

UNIVERSITY OF MUMBAI

No. UG/148 of 2010

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the Master of Arts M.A.(Parts - I & II) degree course vide Pamphlet No.157 and to this office Circular No.UG/173 of 2006 dated 5<sup>th</sup> June, 2006 and Head, University Department of Urdu, the Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Board of Studies in Urdu at its meeting held on 16<sup>th</sup> February, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.45 and that, in accordance therewith, the syllabus and Paper Pattern of M.A. Part I & II degree Course in the subject of Urdu is revised as per Appendix and that the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032

7<sup>th</sup> June, 2010

L. R. Mane  
Offg. Registrar

To,

Head, University Department of Urdu, the Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning

A.C./4.45/3/03/2010

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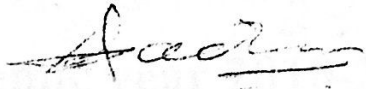
No. UG/148-A of 2010,

MUMBAI-400 032

7<sup>th</sup> June, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Arts,
- 2) The Chairman, Board of Studies in Urdu,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro- Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyvanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum- Director, Institute of Distance and Open Learning, etc.



Enclosure to Item No.4.45

3/3/2010

**Revised Syllabus**  
**and**  
**Paper pattern**  
**of**  
**M. A. Part I and II**  
**in the subject of**  
**Urdu**

**(with effect from the academic year 2010-2011)**

**UNIVERSITY OF MUMBAI**  
**M.A. URDU PART I**

Revised syllabus for M.A. Degree Examination in Urdu  
(with effect from the academic year 2010-2011)

Paper I Classical Urdu Literature (Poetry)

A Qasida :

- i) Definition & Art of Qasida
- ii) The Historical & Gradual Development of Urdu Qasida
- iii) Types of Urdu Qasida
- iv) Causes of Decline of Urdu Qasida
- v) Special study of Nusrati and Zauq with reference to the following book

1. Intekhab-e-Qasaid-e-Urdu Ed. By Dr. Abu Mohd. Saher  
Published by Nasim Book Depo Lucknow  
(Page No. 29 to 35 & 115 to 122)

B Ghazal :

- i) Definition & Art of Urdu Ghazal
- ii) The Historical and Gradual Development of Urdu Ghazal
- iii) Future Prospects of Urdu Ghazal
- i) Study of Ghazal with special reference to the prescribed books and the Poets (i.e. Meer and Momin)

1. Intekhab-e-Kalam-e-Meer Ed. by Molvi Abdul Huq  
Published by Anjuman Taraqq Urdu Hind New Delhi

The following Ghazals Only

- 1 Keya Main Bhi Preshani-e-Khatir Se Qaren Tha
- 2 Is Ahed mein Ilahi Muhabbat Ko kiya Huwa
- 3 Ulti Ho Gayein Sab Tadbiren Khuch Na dawa Ne Kam Kiya
- 4 Munh Takahi Kare Hai jis tis Ka
- 5 Hamare Aage Tera Jub Kasu Ne Naam Liya
- 6 BeKali Bekhudi Khuch Aaj Nahen
- 7 Ibteda-e-Ishq Hai Rota Hai Keya
- 8 Jite Jee Kucha-e-Dildar Se Jaya na Gaya
- 9 Hasti Apni Hubab Ki Si Hai
- 10 Faqirana Aae Sada Kar Chale

- (b) Intekhab-e-Momin pub. By Sahiyat Academi New Dehli  
(11 Ghazals) from page No. 72 to page No.76

**Books recommended for reference:**

1. Tareekh-e-Adab-e-Urdu – Vol.II (Part I&II) by Jameel alibi
2. Tareekh-e-Adab-e-Urdu by Rambabu Sexena
3. Decan men Urdu by Naseeruddin Hashimi
4. Mohammad Taqi meer by Jameel Jalibi
5. Mulla Nusrati by Maulvi Abdul haque
6. Urdu Ghazal by Dr. Yusuf Husain Khan
7. Ghazal Aur Mutala-e-Ghazal by Ibadat Barelavi
8. Urdu men Qasida Nigari by Dr. Abu Mohd. Saher
9. Urdu Qasida Nigari by Umm-e-Hani Ashraf—
10. Dehlavi Qasidago by Ali Jawwad Zaidi
11. Meer Taqi-meer-Shakhsiyat Aur fun by Khush hal Zaidi
12. Meer Ki sheri Lisaniyat by Qazi Afzal Husain
13. Decani Ghazal Ki Nash-o-Numa by Mohd. Ali
14. Meer Taqi Meer by Khuwaja Ahmad Farooqi
15. Decani Adab Ki Tareekh by Dr. Mohiuddin Qadri Zor
16. Urdu men Qasida Nigari Ka Tanqeedi Jaiza by Dr.Mehmood Ilahi
17. Nusrati Ki Shairi by Tayyab Ansari
18. Naqad-e-Meer by Syed Abdullah
19. Meer Ki Aapbiti by Nisar Ahmad Farooqi
20. Momin, ShakhSiyat Aur Fun Ed. By Prof. Nazeer Ahmed.
21. Momin Shakhsiyat Aur Fun Ed. By Zaheer Ahmad Siddiqi.

A. Masnavi :

- (ii) Definition & Art of Urdu Masnavi
- (iii) The Historical and Gradual development of Urdu Masnavi
- (iv) Comparative study of Daccani and Northern Urdu Masnavi
- (v) Causes of decline of Urdu Masnavi
- (vi) Masnavi with special reference to the prescribed books and their Poets

(b) Qutub Mushtari by Mulla Wajhi Ed. By Molvi Abdul Huq

(c) Seher-ul-Bayan by Meer Hasan pub. By U.P. Urdu Akademi,  
Lucknow.

B. Nazm :

- (i) Definition & Art of Urdu Nazm
- (ii) The Social Background of Urdu Nazm
- (iii) The Historical and Gradual development of Urdu Nazm
- (iv) Future and Prospects of Urdu Nazm
- (v) Nazm with special reference to the prescribed books and their Poets

(a) Intekhab-e-Nazeer Akbarabadi Published by Maktaba Jamia  
Ltd. New Delhi

The following Nazm only

Ilahi Nama, Edulfitr, Barsat Ki Baharen, Adami Nama, Banjara  
Nama and Asrar-e-Qudrat

(b) Zameen zameen by Akhtar-ul-Iman

The following Nazm only

Khahish, Aur Ab Sochte Hain, Kuffara, Bazgasht, Dhalaan,  
Khameer, Achanak, Makafat, Tasalsul, Ruya-e-Sadiqa



**Books recommended for reference:**

1. Urdu mein Taweel Nazm Nigari Ki Rewayat aur uska Irteqa by Roshan Akhtar Kazmi
2. Nazeer Nama by Shamsul Huq Usmani
3. Jadeed Urdu Nazm-Nazariya wa Amal by Dr. Aqeel Ahmad
4. Urdu mein Nazm-e-mua'rra by Haneef Kaifi
5. Urdu Nazm par Europi Asrat by Dr. Hamidi Kashmiri
6. Akhtar-ul-Iman- Muqam Aur Kalam by Dr. Mohd. Firoz
7. Akhtar-ul-Iman Aks Aur Jehten Ed. By Shahid Mahuli
8. 'Ajkal' New Delhi Aktar-ul-Iman Number
9. Urdu Ki Teen Masnaviyan by Khan Rasheed
10. Urdu Masnavi Shimali Hind mein by Gyanchand Jain
11. Urdu Masnavi Ka Irteqa by Dr. Abdul Qadir.
12. Akhtar-ul-Iman Ki Nazm Nigari by Shamshad Jahan
13. Nazeer Akbarabadi Published by Sahitya Akademi New Delhi
14. Jadeed Urdu Nazm Ek Mutala by Dr. Qasim Imam

**Paper V: Essay, Translation, Rhetorics & Prosody.**

- (c) Essay : No book prescribed  
(d) Translation : Books Prescribed :

i) Tarjuma Nigari ka fan ed. By Khalique Anjum

The following two articles only

1. Tarjume Ki Zaroorat by Dr. Mirza Hamid Beg
2. Tarjume Ke Buniyadi Masail by Dr. Zoe Ansari

ii) Tarjume Ka fan aur riwayat ed. By Dr. Qamar Raees

The following two articles only

1. Usool-e-waz'-e-Istelahat by Waheeduddin Saleem
2. Manzoom Tarjume Ka Amal by Dr. Unwan Chishti

(e) Rhetoric :

Book Prescribed : Dars-e-Balaghat by Shamsur-Rehman Farooqui

The following figures of Speech only

1. Talmee', Taushee', Zoo-Qafiyatain, Tansee-qus-Sifat, Siyaqatul A'adad, Raddul-Ijz Walas-Sadr Tajnees-e-Muzare', Tajnees-e-Murakkab, Tajnees-e-Khatti, Tajnees-e-Zaid, Tajnees-e-taam and Tajnees-e-Naqis Tajnees-e-Qalub, Tajnees-e-Muzayel, Ishteqaq, Ehyam, Tarsee.

(d) Prosody:

Book Prescribed : Fan-e-Shairi by Akhlaque Ahmed Dehlavi

The following Chapters only

1. Zehaf
2. Ilm-e-Qafia
3. Radeef

**Prescribed Bahren :**

- 1 Bahr-e-Mutadarik Muzaal
- 2 Bahr-e-Mutaqarib Musamman Maqsoor
- 3 Bahr-e-Ramal Musamman Mehzoof
- 4 Bahr-e-Hazaj Musamman Akhrab Makfoof Mehzoof
- 5 Bahr-e-Rajaz Musamman Mutvi makhboon
- 6 Bahr-e-Muzare Musamman Akhrab Makfoof Mehzoof

**Books recommended for reference :**

- 1 Fann-e-Shairi by Azeez Ahmed
- 2 ~~Jawaharul Balaghat by Shah Abul Hasan~~
- 3 Rooh-e-Balaghat by Akhlaque Ahmed Dehlavi
- 4 Qamoosul Adab by Jahid Mazahri
- 5 Mubadiyat-e-Aroz by Dr. Saheb Ali
- 6 Bahrul Fasahat by Najmul Ghani
- 7 Tafheemul Balaghat by Wahab Ashrafi
- 8 Naseemul Balaghat by Syed Jalaluddin

**Paper VII A. Literary Movements, Trends & Schools of Thought in Urdu Poetry  
(optional)**

**(a) Literary Movements & Trends**

- (i) Definition Scope Principles and importance of Literary Movements and Trends
- (ii) Difference between Literary Movements and Trends
- (iii) Detailed study of following Movements and Trends

1. Progressive movement ( Poetry only) No Book is prescribed
2. Halqa-e-Arbab-e-Zauque ( No Book is prescribed)

**(b) Literary Schools**

The importance and Characteristics of Literary Schools

- (i) Contribution of Literary Schools in the Development of Urdu Poetry
- (ii) Difference between Dehli & Lucknow School
- (iii) Dehli School and Lucknow School

**A. Dehli School**

Prescribed Book

- 1 Dilli Ka Dabistan-e-Shairi by Noorul Hasan Hashmi.  
Published by U.P. Urdu Akademi Lucknow

The following Chapters only  
III, VI, VII

**B. Lucknow School**

Prescribed Book

- 1 Lucknow Ka Dabistan-e-Shairi by Abul Lais Siddiqi  
Published by Educational Publishing House Dehli

The following Chapters only

- Social & Cultural Background of Lucknow School
- Lucknoweyat Keya Hai
- The following Selected Poets, School of Lucknow
  1. Imam Bakhsh Nasikh
  2. Khuwaja Haider Ali Atish
  3. Musahafi
  4. Ameer Minayee



### **Books recommended for reference**

1. Urdu Adab Ke Irteqa mein Adabi Tehreekon Aur Rujhanon Ka Hissa by Manzar Azmi
2. Urdu Adab Ki Tahreeken by Dr. Anwar Sadeed
3. Dilli Ka Dabistan-e-Shairi by Noorul Hasan Hashmi
4. Lucknow Ka Dabistan-e-Shairi by Abul Lais Siddiqi
5. Urdu Taraqqi Pasand Adabi Tahreek by Khalilur Rahman Azmi
6. Taraqqi Pasand Adabi Tahreek by Sardar Jafri
7. Do Adabi School by Ali Jawwad Zaidi
8. Halqa-e-Arbab-e-Zanq by Yunus Javed

**Paper VII B Special Study of 'Iqbal' (optional)**

1. Following Topics will be dealt with

- (i) Era of Iqbal
- (ii) Life & Personality
- (iii) Origin and Development of Iqbal's Poetry
- (iv) Philosophy of Iqbal with special reference to
  - (a) Khudi Aur Bekhudi
  - (b) Zaman-o-Makan
  - (c) Ishq
  - (d) Iblees

2. Detailed and Analytical Study of the following Nazms

1. Tasveer-e-Dard
2. Khizr-e-Rah
3. Tulu-e-Islam
4. Zauq-o-Shauq
5. Lala-e-Sehra
6. Lenin Khuda Ke Huzoor Mein
7. Iblees Ki Majlis-e-Shura
8. Saqi Nama
9. Shama-o-Shair

3. Ghazals :

First Ten Ghazals of 'Bal-e-Jibreel'

4. Art of Iqbal

(i) Critical Study of Iqbal's (Urdu) Books

1. Bang-a-Dara
2. Zarb-e-Kaleem
3. Bal-e-Jibreel

(ii) Iqbal as a Ghazal Nigar

(iii) Iqbal as a Nazm Nigar

(iv) Contribution of Iqbal to the Development of Urdu Poetry

## Books recommended for reference

1. Iqbal-e-Kamil by Abdus Salam Nadvi
2. Fikr-e- Iqbal by Khalifa Abdul Hakeem
3. Rooh-e-Iqbal by Yousuf Husain Khan
4. Iqbal Ki Terah Nazmen by Asloob Ahmad Ansari
5. Iqbal Sab Ke Liye by Farman Fatehpuri
6. Iqbal Bahaisiyat Shair by Rafiuddin Hashmi
7. Naqd-e-Iqbal by Maikash Akbarabadi
8. Nqoosh-e-Iqbal by Abul Hasan Ali Nadvi
9. Iqbal Ek Shair by Salim Ahmad
10. Iqbal Ki Talash by Zoe Ansari
11. Iqbal Ka Fun by Gopichand Narang
12. Iqbal Ka Nazarya-e-Khudi by Mughni Tabassum
13. Iqbal Ki Shairi Mein Paikar Trashi by Tauqeer Ahmad Khan
14. Iqbal ka Harf-e- Tamnna by Shamim Hanfi
15. Iqbal Ka ~~Zohri Irteqa~~ by ~~Abdul Mughni~~
16. Iqbal Ki Nazmon Ka Tajziyati Mutala by Fakhrul Islam Azmi

**Paper VII C Dakniyat (optional)**

**A. Dakni Ghazal :**

- (i) The Historical and Gradual Development of Dakani Ghazal
- (ii) Characteristics of Dakni Ghazal
- (iii) Dakani Ghazal with special reference to the prescribed book and his Poet.

1. Intekhab-e-Siraj Aurangabadi Ed. By Mohd. Hasan  
Published by Maktaba Jamia New Delhi.  
From the beginning Ten Ghazals only

**B. Dakani Masnavi :**

- (i) The Historical and Gradual Development of Dakani Masnavi
- (ii) Characteristics of Dakni Masnavi
- (iii) Dakani Masnavi with special reference to the prescribed book and his Poet.

1. Phool Bun by Nusrati

**C. Detailed Study of Dakniyat :**

One Book is prescribed Dakni Urdu Ed. by Abdus Sattar Dalvi

The following Articles only

- Dakani Zabaan
- Dakani Adab Ka Tehzibi Pas Manzar
- Qadeem Dakani Shairi mein Hindu Asateer
- Dakani Ke Lisani Rishte
- Dakani Urdu Ka Usloobiyati Mutala
- Dakani Marsiya aur Azadari

Books recommended for reference

- 1 Dakan Mein Urdu by Dr. Naseeruddin Hashmi
- 2 Dakani Adab Ki Tareekh by Dr. Mohiuddin Qadri Zor
- 3 Dakani Ki Qadeem Tarikh by Prof. Yazdani
- 4 Dakani Ghazal Ki Nasho-Numa by Mohd. Ali
- 5 Qutub Mushtari Ka Mutala by Dr. Wahab Asharfi
- 6 Mullah Wajhi by Javed Vashist
- 7 Urdu Mashavi Ka Irteqa by Abdul Qadir Sarwari
- 8 Urdu Shahpare by Dr. Mohiuddin Qadri Zor
- 9 Urdu-e-Qadeem by Shamsullah Qadiri
- 10 Urdu Shairi Mein Hindustaniyat by Dr. Zarina Sani
- 11 Dakani Darpan by Dr. Javed Vashisht



## APPENDIX

Revised format of setting question papers in Urdu at the M. A. (parts I&II)  
Examinations to be introduced with effect from the academic year 2010-2011

### M.A. Part -1

### URDU

#### Paper I- Classical Urdu Literature (poetry)

One paper- 100 marks -3 Hours.

- (a) Two forms of Urdu poetry representing four poets to be prescribed.
- (b) Two books of Urdu of Urdu poetry, pertaining to each of the Two selected forms  
Representing four poets be prescribed i. e. 4 books in all to be studied.

The following will be the pattern of the question paper

- 1 Two question of the two forms, with one question each in addition as Alternatives, the choice being internal, will be set. These questions will pertain To the historical and gradual development, the techniques, the niceties, the Characteristics etc. of the said forms.
- 2 TWO question with TWO alternative, shall be set on the FOUR Representative works. These FOUR questions will pertain to the poet's concerned and their styles, their contributions, the critical study of the books, the General questions on the books etc.
3. ONE questions will be totally textual. It will have No alternative but will Consist of 2 parts. One part will comprise 8 independent verses out of which 5 will be explained by the candidates, while the second part will be composed of 2 stanzas on sets of connected verses to with reference to context.

The allotment of marks to each question will be as follows.

TWO questions at item No. 1 above	(2x20)	40 marks
TWO questions at item No 2 above	(2x20)	40 marks
ONE questions at item No. 3 above	(10+10)	20 marks.

**Total 100 marks**

**Paper III - Urdu Poetry and its Styles**

One paper 100 Marks – 3 Hours

- (a) Two forms of Urdu poetry to be prescribed
- (b) Two books of Urdu poetry, pertaining to each of the Two selected forms be prescribed i.e., 4 books in all to be studied.

The following will be the pattern of the question paper:

1. TWO Question of the two forms, with ONE question each in addition as alternative, the choice being internal, will be set. These question will pertain to the historical and gradual developments the techniques, the niceties, the characteristics etc. of the side forms.
2. ONE question with one alternative, shall be set on each of the two representative works of one form. This question will pertain to the poets concerned, their styles, there contribution, the critical study of the books, the general question on the book etc.
3. ONE question with ONE alternative, shall be set on each of the TWO representative works of another form. This question will pertain to the poets concerned, their styles, their contribution, The critical study of the books, the general question on the books etc.
4. ONE question will be totally textual. It will have no alternative but will consist Two stanzas culled from 4 Books and the candidate will be required to explain with reference to context from the Book.

The allotment of marks to each question will be as follows:

TWO question at item No. 1 above	(2 x 20)	40Marks
ONE question at item No.2 above		20 Marks
ONE question at item No.3 above		20Marks
ONE question at item No.4 above	(10 + 10)	20 Marks
		<b>Total 100 Marks</b>

**Paper V - ESSAY, TRANSLATION, RHETORICS AND PROSODY.**

One paper 100 Marks – 3 Hours.

- (a) No specific book to be prescribed for Essay- Writing
- (b) A book on principles and practice of Translation to be prescribed.
- (c) One book on Urdu Rhetoric's to be prescribed.
- (d) One book on Urdu prosody to be prescribed

The following will be the pattern of the question paper.

1 One question on Essay writing, in all 5 topics equally divided into prose and Poetry. Including Drama keeping in view various literary trends, movements, Problems etc. and the candidates will be asked to write an exhaustive essay On any one of those topics.

2 ONE question to be set on Urdu Rhetoric's. At least 8 types be given and the Candidates be asked to attempt any 5.

3 ONE question on prosody be set. Three 3 verses of different prescribed meters Be given and the candidates be asked to scan any TWO (2) of them. ANOTHER QUESTION, be set on the theoretical aspect of prosody, like the Definition of various technical terms, the importance and the utility of this Science. THE CANDIDATES WILL BE REQUIRED TO ATTEMPT TWO

(2)

OUT OF FOUR (4) TOPICS.

4 One question, with ONE additional question as an alternative, the choice being Internal be set on the technique and methodology of translation, its various Forms Requirements.

5 ONE question, having no alternative, and consisting of TWO parts, one passage In Urdu prose and the other in Urdu poetry, each containing at least 10 line to Be set for the purpose of translation in to English.

6 One question , having no alternative, and consisting of TWO parts, one passage In English prose and one stanza in English poetry, each containing at least 10 Lines to be set for the purpose of translation on to Urdu.

7 The allotment of marks to each question will be as follows :

ONE Question on Essay at item	No.1 above	20 marks
ONE question on Rhetoric's at item	No.2 above	10 marks
ONE question at item No. 3 above	(4 + 6)	10 marks
ONE question at item No. 4 above		20 marks
ONE question at item No.5 above	(10+10)	20 marks
ONE question at item No. 6 above	(10+10)	20 marks
	Total	100 marks

**Paper VII A: Literary Movements, Trend and School of Thoughts (Optional)**

**One Paper 100 Marks – 3 Hours**

**The following Topics to be dealt with:**

**A:** Literary Movements and trends: progressive movements and Halqa-e-Arbabe Zauq

**B:** Literary school: Dabistan-e-delhi and Dabistan-e-Lucknow

The following will be the pattern the question paper:

1. ONE question, with one additional question, as alternative, the choice being internal, will be set in general on the definition of a movement, difference between a movement and a trend and school of thought historical reason giving rise to a movement and its importance in the development of literature.
2. ONE question, with one additional question as alternatives, the choice being internal, will be set on Dabistan-e-Delhi with the concern chapter.
3. ONE question, with one additional question as alternative, the choice being internal, will be set on Dabistan-e-Lucknow with the concern chapters and poets.
4. ONE question, with one additional question as alternative, the choice being internal, will be set on Progressive movement and poets connected with this movement.
5. ONE question, with one additional question as alternative, the choice being internal, will be set on Halqa-e-Arbabe Zauq and poets connected with this movement.
6. The allotment of marks to each of the question will be as follows:

ONE question at item No. 1 above	20	Marks
ONE question at item No. 2 above	20	Marks
ONE question at item No. 3 above	20	Marks
ONE question at item No. 4 above	20	Marks
ONE question at item No. 5 above	20	Marks

**Total 100 Marks**

**OR**



## Paper VII B: Special Study of Iqbal

One Paper 100 Marks – 3 Hours

The following Topics to be dealt with:

- A: Era, of Iqbal life and personality origin and Development of Iqbal poetry and philosophy of Iqbal etc.
- B. Critical study of Iqbal,s Urdu collections Iqbal as a Ghazal and Nazm winter and contribution of in the development of Urdu poetry.
- C. Analytical study of Iqbal,s Nazm
- D. Explanation with reference to the context of prescribed Iqbal Ghazals and Nazms.

The following will be the pattern of the question paper:

1. TWO question, with ONE additional question as alternative, the choice being internal, will be set on item No. A
2. ONE question, with ONE additional question as alternative, the choice being internal, will be set on item No.B
3. ONE question, with ONE additional question as alternative, the choice being internal, will be set on item No. C
4. One question will be totally textual Two passage explanation with reference to the context from prescribed Iqbal Ghazals and Nazms

The allotment of marks to each question will be as follows:

ONE question at item No. 1 above	(2 x 20)	40 marks
ONE question at item No. 2 above		20 marks
ONE question at item No. 3 above		20 marks
ONE question at item No. 4 above	(10 + 10)	20 marks

**Total 100 marks**

**WORK LOAD (M.A. Part-I)**

Title of the Paper	Student Seminar	No. of Lecture	
<b>1. Paper 1:</b>			
(a) - (i)	Qasida and Ghazal as form	01	
(ii)	Intekhab-e- Qasaid-e- Urdu	01	
(b) - (i)	Intekhab-e- Kalam-e- Meer	01	
(ii)	Intekhab-e- Momin	01	01
<b>2. Paper III:</b>		<b>04 + 01 = 05</b>	
(a) - (i)	Qutub Mushtari	01	
(ii)	Sehr-ul- Bayan	01	
(b) - (i)	Nazeer Akbrabadi ka Muntakhab Kalam	01	
(ii)	Zameen Zameen	01	01
<b>3. Paper V:</b>		<b>04 + 01 = 05</b>	
(a)	Essay	01	
(b)	Translation	01	
(c)	Rhetoric	01	
(d)	Prosody	01	01
<b>4. Paper VII- (Optional)</b>		<b>04 + 01 = 05</b>	
<b>VII - A:</b>			
(a)	Dabistan-e- Delhi	01	
(b)	Dabistan-e- Lucknow	01	
(c)	Progressive Movement	01	
(d)	Halqa-e-Arbab-e-Zauq	01	01
		<b>04 + 01 = 05</b>	
	<b>OR</b>		
<b>VII - B:</b>			
(a)	Era, life, personality and philosophy of Iqbal	01	
(b)	Analysis of Iqbal Nazms	01	
(c)	Iqbal Ghazals	01	
(d)	Art of Iqbal	01	01
		<b>04 + 01 = 05</b>	

OR

VIII - C:

1	Autobiography, Tanz-o-Mizah and Drama as form/style	01
2	Is Abad Kharabe Mein	01
3	Chiragh Tale	01
4	Mitti ka Bulawa	01

01

04 + 01 = 05

**Details**

Paper II	04 + 01 = 05
Paper IV	04 + 01 = 05
Paper VI	04 + 01 = 05
Paper VIII (Specialisation)	
A	04 + 01 = 05
B	04 + 01 = 05
C	04 + 01 = 05

**Grand Total = 24 + 06 = 30 hours**  
**(For day Session)**

**Grand Total = 24 + 06 = 30 hours**  
**( For Evening Session)**

**Grand Total Lecture For Day And Evening Session- 30+30=60 Hours**

**Paper VII C: Dakniyat (Optional)**

One Paper 100 Marks – 3 Hours

The paper will consist the following Topics

- A. Detailed study of Dakni Ghazal and Intekhabe Siraj Aurangabadi 10 Gazal.
- B. Detailed study of Daccni Masnavi and Qutub Mushtari bu Mulla Wajhi.
- C. Six Articles from prescribed Book Dakni Urdu ed. Prof. Abdussattar Dalvi

The following will be pattern of the question paper:

1. One question with one additional questions alternative, the choice being internal will be set on Dakni Ghazal and Siraj Aurangabadi
2. One question with one additional questions alternative, the choice being internal will be set on Dakni Masnavi and Qutub Mushtari.
3. Two question with one additional questions alternative, the choice being internal will be set On the prescribed Book Dakni Urdu.
4. One question will be totally textual. It will have no alternative but will consist to two Passage culled from the 2 Books to explanation reference to the context.

The allotment of marks to each question will be as follows:

ONE question at item No. 1 above	20 marks
ONE question at item No. 2 above	20 marks
TWO question at item No. 3 above (2 x 20)	40 marks
ONE question at item No.4 above (10 + 10)	20 marks

**Total 100 marks**

(الف) قصیدہ:

- ۱- قصیدے کی تعریف اور نثرن قصیدہ نگاری
- ۲- اردو قصیدے کا تاریخی و تدریجی ارتقا
- ۳- اردو قصیدے کے اقسام
- ۴- اردو قصیدے کے زوال کے اسباب
- ۵- نثری اور ذوق کے قصیدوں کا مندرجہ ذیل کتب کی روشنی میں خصوصی مطالعہ  
۱- انتخاب قصائد اردو از ابو محمد محمد مطبوعہ نسیم بک ڈپارٹمنٹ (ص ۲۹ سے ۳۵ اور ۱۱۵ سے ۱۲۲)

(ب) غزل:

- ۱- غزل کی تعریف اور غزل بحیثیت فن
- ۲- غزل کا تاریخی و تدریجی ارتقا
- ۳- غزل کے آئندہ امکانات
- ۴- میر اور مومن کی مندرجہ ذیل کتابوں کی روشنی میں خصوصی مطالعہ  
۱- انتخاب کلام میر از مولوی عبدالحق مطبوعہ انجمن ترقی ہندی دہلی  
مندرجہ ذیل غزلیں شامل نصاب ہیں۔  
۱- کیا میں بھی پریشانی خاطر سے تریں تھا  
۲- اس ہمد میں الٹی محبت کو کیا ہوا  
۳- ایش ہو گئیں سب تدبیریں کچھ نہ دوانے کام کیا  
۴- منہ دکھائی کرے ہے جس تہس کا  
۵- ہمارے آگے تراجم کس نے نام لیا  
۶- بے گلی بے خودی کچھ آج نہیں  
۷- ابتدائے عشق ہے دوتا ہے کیا  
۸- چیتے جی کوچہ دلدار سے جایا نہ کیا  
۹- سستی اپنی حباب کی سی ہے  
۱۰- فقیرانہ آئے صدا کر چلے
- ۲- انتخاب مومن مطبوعہ ساہتیہ اکیڈمی نئی دہلی (۱۱ غزلیں ص ۷۲ سے ۷۶)



کتب برائے حوالہ جاتی مطالعہ:

- ۱- تاریخ ادب اردو جلد دوم (حصہ اول/ دوم) از جمیل جالبی
- ۲- تاریخ ادب اردو از رام بابو سکینہ
- ۳- دکن میں اردو از نصیر الدین ہاشمی
- ۴- محمد تقی میر از جمیل جالبی
- ۵- ملا نصرتی از مولوی عبدالحق
- ۶- اردو غزل از ڈاکٹر یوسف حسین خان
- ۷- غزل اور مطالعہ غزل از عبادت بریلوی
- ۸- اردو میں قصیدہ نگاری از ڈاکٹر ابو محمد سحر
- ۹- اردو قصیدہ نگاری از ام ہانی اشرف
- ۱۰- دہلوی قصیدہ گو از علی جواد زیدی
- ۱۱- میر تقی میر شخصیت اور فن از خوشحال زیدی
- ۱۲- میر کی شعری لسانیات از قاضی افضل حسین
- ۱۳- دکنی غزل کی نشوونما از محمد علی
- ۱۴- میر تقی میر از خواجہ احمد فاروقی
- ۱۵- دکنی ادب کی تاریخ از ڈاکٹر محی الدین قادری زور
- ۱۶- اردو میں قصیدہ نگاری کا تنقیدی جائزہ از ڈاکٹر محمود الہی
- ۱۷- نصرتی کی شاعری از طیب انصاری
- ۱۸- ناقد میر از سید عبداللہ
- ۱۹- میر کی آپ بیتی از ثار احمد فاروقی
- ۲۰- مومن شخصیت اور فن مرتب پروفیسر نذیر احمد
- ۲۱- مومن شخصیت اور فن مرتب ظہر احمد صدیقی

- ۱۔ مثنوی کی تعریف اور نثر مثنوی نگاری
  - ۲۔ اردو مثنوی کا تاریخی و تدریجی ارتقاء
  - ۳۔ دکن اور شمالی ہند کی مثنویوں کا تقابلی مطالعہ
  - ۴۔ اردو مثنوی کے زوال کے اسباب
  - ۵۔ مثنوی کا خصوصی مطالعہ مندرجہ ذیل شعرا اور منثور شدہ کتابوں کے حوالے سے
- ۱۔ نقشب مشتری از ملّا وجہی      ۲۔ بحر البیان از میر حسن

(ب) نظم:

- ۱۔ نظم کی تعریف اور نظم کا فن
  - ۲۔ اردو نظم کا تاریخی و تدریجی ارتقاء
  - ۳۔ اردو نظم کا سماجی پس منظر
  - ۴۔ مستقبل میں اردو نظم کے امکانات
  - ۵۔ نظم کا خصوصی مطالعہ مندرجہ ذیل شعراء اور منثور شدہ کتابوں کے حوالے سے
- (الف) انتخاب نظیر اکبر آبادی، پبلشنگ کتبہ جامعہ لیڈز نئی دہلی
- مندرجہ ذیل نظمیں شامل نصاب ہیں:
- الہی نامہ، عید القدر، برسات کی بہاریں، آدمی نامہ، بخارہ نامہ اور اسرار قدرت
- (ب) زمین زمین از اختر الایمان
- مندرجہ ذیل نظمیں شامل نصاب ہیں:
- خوابش، اوراب سوچتے ہیں، کفارہ، بازگشت، ڈھلان، خمیر، اچانک، مکافات، تسلسل، رو

کتب نمائے حوالہ جاتی مطالعہ:

- ۱۔ اردو میں طویل نظم نگاری کی روایت اور اس کا ارتقا از روشن اختر کاظمی
- ۲۔ نظیر نامہ از شمس الحق عثمانی
- ۳۔ جدید اردو نظم، نظریہ اور عمل از ڈاکٹر عقیل احمد
- ۴۔ اردو میں نظم معزا از حنیف کنفی
- ۵۔ اردو نظم پر یورپی اثرات از حامد کشمیری
- ۶۔ اختر الایمان مقام اور کلام از ڈاکٹر محمد فیروز
- ۷۔ اختر الایمان عکس اور جہتیں مرتب شاہد مابلی
- ۸۔ آج کل نئی دہلی اختر الایمان نمبر
- ۹۔ اردو کی تین مثنویاں از خان رشید
- ۱۰۔ اردو مثنوی شمالی ہند میں از گیان چند جین
- ۱۱۔ اردو مثنوی کا ارتقاء از ڈاکٹر عبدالقادر
- ۱۲۔ اختر الایمان کی نظم نگاری از شمشاد جہاں
- ۱۳۔ نظیر اکبر آبادی، مطبوعہ ساہتیہ اکیڈمی نئی دہلی
- ۱۴۔ جدید اردو نظم ایک مطالعہ از ڈاکٹر قاسم امام

(الف) مضمون نگاری:

کوئی مخصوص کتاب شامل نصاب نہیں

(ب) ترجمہ نگاری:

منظور شدہ نصابی کتب:

(الف) ترجمہ نگاری کا فن مرتبہ خلیق انجم

مندرجہ ذیل مضامین شامل نصاب ہیں

۱۔ ترجمہ کی ضرورت از ڈاکٹر مرزا حامد بیگ

۲۔ ترجمے کے بنیادی مسائل از ڈاکٹر ظ انصاری

(ب) ترجمہ نگاری اور روایت مرتبہ ڈاکٹر قمر رئیس

مندرجہ ذیل مضامین شامل نصاب ہیں

۱۔ اصول و فن اصطلاحات از وحید الدین سلیم

۲۔ منظوم ترجمہ کا عمل از ڈاکٹر عنوان چشتی

(ج) صنائع بدائع:

منظور شدہ نصابی کتب:

درس بلاغت از شمس الرحمن فاروقی

تلخیص، پوشش، ذوق، تفسیق، تسمیق، صفات، سیاق و سباق، اعداد، رد و الجھ علی الصدر، تجنیس مضارع، تجنیس نظمی،

تجنیس زائد، تجنیس تام، تجنیس ناقص، تجنیس قلوب، تجنیس مدہل، اختلافات، ایہام، ترسیخ۔

(د) عروض:

منظور شدہ نصابی کتب:

فن شاعری از اخلاق احمد دہلوی

مندرجہ ذیل ابواب شامل نصاب ہیں:

۱۔ زہاف ۲۔ علم قافیہ ۳۔ ردیف

منظور شدہ بحرین:

۱۔ بحر متدارک مدال ۲۔ بحر متقارب مشن مقصور ۳۔ بحرزل مشن محذوف ۴۔ بحر بزم مشن اثر ب مکفوف محذوف

۵۔ بحر جز مشن مطوی مخبون ۶۔ بحر مضارع مشن اثر ب مکفوف محذوف

کتب برائے حوالہ جاتی مطالعہ:

۱۔ فن شاعری از عزیز احمد

۲۔ جواہر البلاغت از شاہ ابوالحسن

۳۔ روح بلاغت از اخلاق احمد دہلوی

۴۔ قاموس الادب از جالب مظاہری

۵۔ مبادیات عروض از ڈاکٹر صاحب علی

۶۔ بحر فصاحت از نجم الغنی

۷۔ تفہیم البلاغت از وہاب اثرنی

۸۔ نسیم البلاغت از سید جلال الدین

(الف) ادبی تحریکیں اور رجحانات:

- ۱۔ ادبی تحریکوں اور رجحانات کی تعریف، اصول اور ان کی اہمیت
- ۲۔ ادبی تحریکوں اور رجحانات کا فرق
- ۳۔ مندرجہ ذیل ادبی تحریکات اور رجحانات کا تفصیلی مطالعہ
  - ۱۔ ترقی پسند تحریک (صرف شاعری) کوئی منظوم شدہ کتاب شامل نصاب نہیں
  - ۲۔ حلقہء ارباب ذوق (صرف شاعری) کوئی منظوم شدہ کتاب شامل نصاب نہیں

(ب) ادبی دبستان:

ادبی دبستانوں کی اہمیت اور ضرورت:

- ۱۔ اردو شاعری کے ارتقا میں ادبی دبستانوں کا حصہ
- ۲۔ دہلی اور لکھنؤ کے دبستانوں کا فرق
- ۳۔ دبستان دہلی اور دبستان لکھنؤ

(الف) دبستان دہلی: مندرجہ ذیل نصابی کتاب:

- ۱۔ دہلی کا دبستان شاعری از نور الحسن ہاشمی مطبوعہ اتر پردیش اردو اکیڈمی لکھنؤ
- درج ذیل ابواب نصاب میں شامل ہیں: باب نمبر ۶، ۳ اور ۷

(ب) دبستان لکھنؤ: مندرجہ ذیل نصابی کتاب:

- ۱۔ لکھنؤ کا دبستان شاعری از ابوالیث صدیقی، ایجوکیشنل پبلسٹک ہاؤس دہلی
- درج ذیل ابواب نصاب میں شامل ہیں:
  - ۱۔ دبستان لکھنؤ کا سماجی و ثقافتی پس منظر
  - ۲۔ لکھنویت کیا ہے؟
  - ۳۔ لکھنؤ کے چار نامندہ شعرا

۱۔ امام بخش ناسخ ۲۔ خواجہ حیدر علی آکمل ۳۔ مصطفیٰ ۴۔ امیر غنائی

کتاب برائے حوالہ جاتی مطالعہ:

- ۱۔ اردو ادب کے ارتقا میں ادبی تحریکوں اور رجحانات کا حصہ از مشرف اعظمی
- ۲۔ اردو ادب کی تحریکیں از انور سعید
- ۳۔ دہلی کا دبستان شاعری از نور الحسن ہاشمی
- ۴۔ لکھنؤ کا دبستان شاعری از ابوالیث صدیقی
- ۵۔ اردو ترقی پسند ادبی تحریک از ظلیل الرحمان اعظمی
- ۶۔ ترقی پسند ادبی تحریک از سردار جعفری
- ۷۔ دو ادبی اسکول از علی دوازدی
- ۸۔ حلقہء ارباب ذوق از پولس جاوید

(الف) مندرجہ ذیل عنوانات شامل نصاب ہیں:

- ۱۔ اقبال کا عہد
- ۲۔ حیات اور شخصیت
- ۳۔ اقبال کی ابتدائی شاعری اور اس کا عہد بہ عہد ارتقا
- ۴۔ اقبال بہ حیثیت فلسفی
- ۱۔ خودی اور بے خودی
- ۲۔ زمان و مکاں
- ۳۔ عشق
- ۴۔ ابلیس

(ب) مندرجہ ذیل نظموں کا تفصیلی و تجزیاتی مطالعہ:

- |                         |                       |               |               |              |
|-------------------------|-----------------------|---------------|---------------|--------------|
| ۱۔ تصویر درد            | ۲۔ خضر راہ            | ۳۔ طلوع اسلام | ۴۔ ذوق و شوق  | ۵۔ لالہ محرا |
| ۶۔ لینن خدا کے حضور میں | ۷۔ ابلیس کی مجلس شوری | ۸۔ ساتی نامہ  | ۹۔ شمع و شاعر |              |

(ج) غزلیں:

بال جبریل کی ابتدائی دس غزلیں

(د) اقبال کا فن:

۱۔ اقبال کی مندرجہ ذیل کتابوں کا تنقیدی مطالعہ:

- ۱۔ بانگِ درا
- ۲۔ ضربِ کلیم
- ۳۔ بال جبریل
- ۱۔ اقبال بہ حیثیت غزل گو
- ۲۔ اقبال بہ حیثیت نظم نگار
- ۳۔ اردو غزل کے ارتقا میں اقبال کا حصہ

کتاب برائے حوالہ جاتی مطالعہ:

- ۱۔ اقبال کامل از عبدالسلام ندوی
- ۲۔ فکرِ اقبال از خلیفہ عبدالحکیم
- ۳۔ روحِ اقبال از یوسف حسین خان
- ۴۔ اقبال کی ۱۳ اظہیں از اسلوب احمد انصاری
- ۵۔ اقبال سب کے لئے از فرمان فتح پوری
- ۶۔ اقبال بحیثیت شاعر از رفیع الدین ہاشمی
- ۷۔ ناقدِ اقبال از میکیش اکبر آبادی
- ۸۔ نقوشِ اقبال از علی میاں ندوی
- ۹۔ اقبال ایک شاعر از سلیم احمد
- ۱۰۔ اقبال کی تلاش از ظانصاری
- ۱۱۔ اقبال کا فن از گوپی چند نارنگ
- ۱۲۔ اقبال کا نظریہ خودی از مشقی ہسم
- ۱۳۔ اقبال کی شاعری میں پیکر تراشی از توقیر احمد خان
- ۱۴۔ اقبال کا حرفِ تمنا از شمیم حنفی
- ۱۵۔ اقبال کا فنی ارتقاء از عبدالمعنی
- ۱۶۔ اقبال کی نظموں کا تجزیاتی مطالعہ از فخر الاسلام اعظمی



دکنی ادب کا تفصیلی مطالعہ (صرف شاعری)

(الف) دکنی غزل

۱- دکنی غزل کا تاریخی و تدریجی ارتقا

۲- دکنی غزل

۳- دکنی غزل مندرجہ ذیل شعر اور کتابوں کے حوالے سے

۱- آفتاب سراج اور نگ آبادی مطبوعہ مکتبہ جامعہ لٹریچر ڈیپارٹمنٹ دہلی

ابتدائی دس غزلیں

(ب) دکنی مثنوی:

۱- دکنی مثنوی کا تاریخی و تدریجی ارتقا

۲- دکنی مثنوی کی خصوصیات

۳- مندرجہ ذیل دکنی مثنوی

۱- پھول بن از طاہر قتی

(ج) دکنی ادب کا تفصیلی مطالعہ: مندرجہ ذیل کتاب کے حوالے سے

۱- دکنی اردو امرتسر پروفیسر عبدالستار دہلوی

مندرجہ ذیل ابواب شامل نصاب ہیں۔

۱- دکنی زبان

۲- دکنی ادب کا تہذیبی پس منظر

۳- قدیم دکنی شاعری میں ہندو اساطیر

۴- دکنی کے لسانی رشتے

۵- دکنی اردو کا اسلوبیاتی مطالعہ

۶- دکنی مرثیہ اور مرزا اداری

کتاب برائے حوالہ جاتی مطالعہ:

۱- دکن میں اردو از نصیر الدین ہاشمی

۲- دکنی ادب کی تاریخ از ڈاکٹر محمد الدین قادری زور

۳- دکن کی قدیم تاریخ از پروفیسر یزدانی

۴- دکنی غزل کی نشوونما از محمد علی

۵- قطب مشتری کا مطالعہ از وہاب اشرفی

۶- طلا و جہی از جاوید داشت

۷- اردو مثنوی کا ارتقا از عبدالقادر سردری

۸- اردو شاہ پارے ڈاکٹر محمد الدین قادری زور

۹- اردو سے قدیم از شمس اللہ قادری

۱۰- اردو شاعری میں ہندوستانییت از ڈاکٹر زرینہ طانی

۱۱- دکنی درپن از جاوید داشت

**UNIVERSITY OF MUMBAI**  
**M.A. URDU PART II**

**Revised syllabus for M.A. Degree Examination in Urdu**  
(with effect from the academic year 2010-2011)

**Paper II**

**Classical Urdu literature (Prose)**

**A. Dastan :**

- i) Definition & Art of Dastan
- ii) The Historical & Gradual development of Dastan.
- iii) Social & Cultural study of Dastan.
- iv) Social & Cultural Back ground of Dastan.
- v) Causes of the decline of Dastan.
- vi) Dastan with special reference to the prescribed book and the writer.

1. Rani Ketki Ki Kahani by Inshallah Khan Insha.

**B. Novel :**

- i) Definition & Art of Urdu Novel
- ii) Types of Urdu Novel
- iii) The Historical and Gradual Development of Urdu Novel.
- iv) Future and Prospects of Urdu Novel
- v) Novel with special reference to the prescribed Books and their writers.

1. Ibn-ul-waqt by Nazeer Ahmad

2. Umrao Jaan Ada by Mirza M. Hadi Ruswa

**C. Urdu Short Story :**

- i) Definition & Art of Urdu Short Story.
- ii) The Historical and Gradual Development of Urdu Short Story.
- iii) Difference between Urdu Novel & Short Story.
- iv) Urdu Short Story with special references to the prescribed books and their writers.

1. Premchand Ke Numaenda Afsane Ed. By Qamar Raees.

The following short stories only.

Bade Ghar Ki Beti, Namak Ka Darogha, Budhi Kaki, Poos Ki Raat, Nijat, Kafan.

2. Qurrat-ul-Ain Haidar Ki Muntakhab Kahaniyan by Qurrat-ul-Ain Haider published by National Book Trust India New Delhi.

he following short Stories only.

Qalandar, Karman, Photographer, Jugnowon Ki Duniya, Kuhre Ke Peechhe, Hasab Nasab.

**Books recommended for reference :**

- 1) Urdu Zaban Aur Fun-e Dastan goee by Kaleemuddin Ahmad.
- 2) Urdu Ki Nasri Dastanen by Gayanchand Jain.
- 3) Urdu Dastan-Tanqeed wa Tajziya by Dr. Qamrul Huda Faridi.
- 4) Hamari Dastanen by Vaqar Azeem.
- 5) Dastan se Afsane Tak by Vaqar Azeem
- 6) Dastan, Novel Aur Afsana by Durdana Qasimi.
- 7) Jadeed Novel Ka fun Urdu Novel Ke Tanazur mein by Syed Mohd. Aqeel.
- 8) Novel Kya Hai by Ahsan Farorqi & Noorul Hasan Hashmi.
- 9) Urdu Novel Ki Tareekh wa Tanqeed by Ali Abbas Husaini.
- 10) Beesween Sadi mein Urdu Novel by Yousuf sarmast.
- 11) Urdu Novel Azadi Ke baad by Aslam Azad.
- 12) Jadeed Afsana Aur unke Masail by Waris Alvi.
- 13) Afsana Rewayat Aur Masail by Gopichand Navrang.
- 14) Urdu Afsana main samaji masail ki Akkasi by Shakeel Ahmad.
- 15) Urdu Fiction Ek Mutala by Dr. Saheb Ali.
- 16) Urdu Afsanon Ka Tajziyati Mutala by Dr. Saheb Ali.
- 17) Jadeed Urdu Afsana by Khursheed Ahmad.
- 18) Qurrat-ul-Ain Haider ; Shakhsiyat Aur fun Ed. by Dr. Saheb Ali.
- 19) Umrao Jaan Ada Ed. by Tamkeen Kazmi.
- 20) Qurrat-ul-Ain Haider Ka fun by Irteza Kareem
- 21) Inshaallah Khan Insha by Abid Peshawari
- 22) Inshaallah Khan Insha by M. Habib Khan
- 23) Nazeer Ahmad ke Novel by Dr. Ashfaq
- 24) Nazeer Ahmad ke Novel mein Niswani Kirdar by Zeenat Basheer
- 25) Premchand Kahani Ka Rahnuma by Syed Jafar Raza
- 26) Mirza Ruswa Ke Navel on mein Iniswani Kirdar by Dr. Tauheed Khan
- 27) Nazeer Ahmad by Noor-ul-Hasan Naqvi
- 28) Mirza Hadi Ruswa by Dr. Adam Shaikh
- 29) Prem Chand Ek Naqeeb by Dr. Sagheer Afrahim

The following aspects of Urdu Language will be studied with the help of representative works

- (a) Origin and Development of Urdu Language
- (b) Development of Urdu Linguistics and Urdu Dialects
- (c) Phonetics and Phonemics
- (d) Urdu Grammar

Prescribed Books :

- (a) Muqaddama-e-Tareekh-e-Zaban-e-Urdu by Prof. Masood Husain Khan (Chapter III, IV and V)
- (b) Urdu men Lisaniyati Tahqeeq ed. By Dr. Abdus Sattar Dalvi (Chapter II and Chapter IV)
- (c) Urdu Ki Taleem Ke Lisaniyati Pahloo by Dr. Gopi Chand Narang (Page 13 to Page 65)
- (d) Urdu Sarf-o-Nahv by Maulvi Abdul Haq ('Sarf' only)

Books recommended for reference :

1. Hindustani Lisaniyat by Dr. Mohiuddin Qadri Zor
2. Punjab men Urdu by Mehmood Shirani
3. Maqalat-e-Shirani by Mehmood Shirani
4. Umoomi Lisaniyat by Dr. Gyanchand Jain
5. Urdu men Adabi wo Lisaniyati Tahqeeq by Dr. Abdus Sattar Dalvi
6. Urdu Zabab aur Samaji Siyaq by Dr. Abdus Sattar Dalvi
7. Zaban aur Ilm-e-Zaban by Dr. Abdul Qadir Sarwari
8. Nai Urdu Qawaid by Dr. Ismat Javed
9. Urdu Zaban-o-Qawaid by Dr. Shafee Khan
10. Misbahul Qawaid by Fateh Mohd. Khan
11. Urdu Sarf by Dr. Mohd. Ansarullah
12. Urdu Lisaniyat by Dr. Shaukat Sabzwari
13. Urdu Sarf-e-Nahv by Iqtidar Husain
14. Urdu ka Ibtidai zamana by Shamsur Rahman Farooqi.

**Paper VI: Urdu Criticism :**

**( Study of the History, principles and schools of Urdu Criticism with special reference to two prominent Urdu Critics.)**

- A.**
- (i) Definition, scope, principles, importance and the characteristics of criticism**
  - (ii) Responsibilities of a critic.**
  - (iii) The Historical and Gradual development of Urdu criticism**
- B. Detailed Study of two prominent critics**
- (i) Masood Hasan Rizvi Adeeb**
  - (ii) Al-e-Ahmad Suroor**

**Prescribed Books :**

- 1. Hamari Shairi by Masood Hasan Rizvi Adeeb, Chapter : Hissa Awwal Meyar**
- 2. Tanqeed kya Hai by Al-e-Ahmad Suroor**

**The following Articles only**

- (i) Tanqeed kya Hai**
- (ii) Taraqqi Pasand Tehreek par Ek Nazar**
- (iii) Yadgar-e-Hali**
- (iv) Shibli Meri Nazar mein**

- C. Jadeed Urdu Tanqeed usool Aur Nazariyat by Dr. Sharib Rudaulavi**

**The following Chapters only**

**Chapter III, IV & V Only**



**Books recommended for reference :**

1. Urdu Tanqeed Ka Irteqa by Ibadat Barelvi
2. Urdu Tanqeed per Ek Nazar by Kaleemuddin Ahmed
3. Urdu mein Tanqeedi Nazaryat by Prof. Ehtesham Husain
4. Amali Tanqeed by Kaleemuddin Ahmad
5. Fane Tanqeed Aur Urdu Tanqeed Nigari by Noorul Hasan Naqvi
6. Tanqeedi Afkar by Shamsur Rahman Farroqi
7. Muqaddama-e-Sher-o-Shairi by Altaf Husain Hali
8. Al-e-Ahmad Suroor shakhsiyat aur fun by Imtiyaz Ahmad
9. Khwab Baqi Hain by Prof. Al-e-Ahmad Suroor
10. Aaina-e-Blaghat by Mirza Mohd. Askari
11. Tanqeedi Sarmaya by Abdus Shakoor
12. Urdu Tanqeed Hali se kaleemuddin Tak by Syed Mohd. Nawab Kareem
13. Tanqeedi Dabistan by Saleem Akhtar

A Makateeb (Letters)

- 1 Definition and Art of Urdu Makateeb
- 2 The Historical and Gradual Development of Urdu Makateeb
- 3 Characteristics of Makateeb
- 4 Makateeb with special reference to the prescribed book and his writer

i) Ghalib Ke Khutoot Edit by Dr. Tanveer Ahmad Alvi, Published by National Book Trust India New Delhi.

The following Letters are to be dealt with :

Hargopal Tufta Ke Ibtedai Teen Khutoot, Meer Sarfraz Husain,  
Mehdi Majrooh Ke Ibtedai Teen Khutoot.

B Inshaiya (Essays)

1. Definition of Inshaiya
2. Characteristics of Inshaiya
3. The Historical and Gradual Development of Urdu Inshaiya
4. Inshaiya with special reference to the prescribed book

1. Urdu Essays Ed. by Dr. Zaheeruddin Madni

Six articles from the beginning are to be dealt with.

C Khaka (Sketches)

5. Definition & Art of Urdu Khaka
6. Types of Urdu Khaka
7. The Historical and Gradual Development of Urdu Khaka
8. Khaka Nigari with special reference from the prescribed book

1. Chand Adabi Shakhshiyaten (Intekhab) by Shahid Ahmad Dehlavi, Published by Qalam Publication, Mumbai.

**Books recommended for reference:**

1. Urdu Nasar Mein Adab-e-Lateef by Dr. Abdul Wadood
2. Urdu Mein Khutoot Nigari by Shamsur Rahman
3. Mutala-e-Khutoot-e-Ghalib by Abdul Qavi Dasnavi
4. Khutoot Nigari Ka fun Aur Tareekh by Rashida Khatoon.
5. Inshaiya Aur Insha'eye by Mohd. Hasnain
6. Urdu Inshaiya Ki Buniyad by Anwar Sadeed
7. Urdu Inshaiya by Dr. Adam Shaikh
8. Urdu Mein Khaka Nigari by Sabira Saeed
9. Azadi Ke Baad Dehli Mein Khaka Nigari Edit by Shamimhanfi
10. Inshaiya Ke Khad-o-Khal by Dr. Wazir Agha

**Paper VIII B Special Study of Sir Syed Ahmed Khan**

**A Following topics dealt with**

- 1 Era of Sir Syed
- 2 Life & Personality
- 3 Detailed Study of Sir Syed's Books (Urdu)

**B Philosophy of Sir Syed Ahmed Khan**

1. Social & Cultural Thought's of Sir Syed
2. Secular thoughts of Sir Syed
3. Educational Thought's of Sir Syed

**C Contribution of Sir Syed in the Development of Urdu Prose**

1. Literary Contribution of Sir Syed
2. Sir Syed as a Historical Writer
3. Contribution of Sir Syed in Urdu Journalism

**D Prescribed Book "Intekhab-e-Mazameen-e-Sir Syed" Published by Maktaba Jamia New Delhi**

The following Eight Essays by text with analytical study

1. Hamdardi
2. Apni Madad Aap
3. Insaan Ke Kheyalat
4. Guzra Huwa Zamana
5. Akhlaq
6. Ta'assub
7. Ummeed Ki Khushi
8. Surab-e-Hayat

**Books recommended for reference :**

1. **Mazameen-e-Sir Syed published by Educational Book House, Aligarh**
2. **Asbab-e-Baghawat-e-Hind by of Sir Syed Ahmad Khan**
3. **Hayat-e-Jawed by Altaf Husain Hali**
4. **Mutala-e- Sir Syed by Molvi Abdul Huq**
5. **Sir Syed Aur Unke Namwar Rufqa by Syed Abdullah**
6. **Hayat-e- Sir Syed by Noorur Rahman**
7. **Sir Syed Ahmad Khan by Khaliq Ahmad Nizami**
8. **Sir Syed Ahmad Khan Ek Siyasi Mutala by Ateeq Ahmad Siddiqi**
9. **Sir Syed Aur Hindustani Musalman by Noor-ul-Hasan Naqvi**
10. **Sir Syed Ki Sahafat by Asghar Abbas**
11. **Sir Syed Aur Urdu Zaban Adab by Qamar-ul-Huda Faridi**
12. **Sarkashi-e-Bijnaur by Sir Syed**
13. **Mauj-e-Kausar by Shaik Mohd. Ikram**
14. **Khutbat-e-Ahmadiya by Sir Syed Ahmad Khan**



**Paper VIII C Modern Urdu Literature (Optional)**

Three forms / styles of Prose with three representative works of the modern period.

- A: Autobiography  
B: Tanz-o-Mizah  
C: Drama

**A: Autobiography**

1. Definition and Introduction
2. Historical Development of Autobiography
3. Characteristics of Autobiography
4. Autobiography with Special reference to the prescribed Book and his writer

1. Is Aabad Kharabe mein by Aktar-ul-Iman

**B: Tanz-o-Mizah**

- 1 Definition and introduction
  - 2 Historical Development of Tanz-o- Mizah
  - 3 Characteristics of Tanz-o-Mizah
  - 4 Tanz-o-Mizah with special reference to the Prescribed Book and his writer
1. Chiragh Tale by Mustaq Ahmad Yusufi

**C. Drama :**

1. Definition and Art of Urdu Drama
2. Historical and Gradual Development of Urdu Drama
3. Characteristics of Urdu Drama
4. Drama with special reference to the prescribed Book and his writer.

1. Mitti Ka Bulawa by Shameem Hanfi

**Books recommended for reference :**

1. Urdu Khudriwisht : Fun Aur Tajziya by Wahajuddin Alvi
2. Urdu mein Khudnawisht Sawanah -e-Hayaat by sabiha Anwar
3. Fann-e-Sawanesh Nigari Ka Irteqa by Altaf Fatima
4. Urdu Adab mein tanz-o-Mizah by Dr. Wazir Agha
5. Tanziyat-o-Muzhakat by Rasheed Ahmad Siddiqi
6. Aligarh Magazine Tanz-o-Mizah number
7. Urdu Drame ki Tanqeed-o-TAreekh by Ishrat Rahmani
8. Urdu Drame ki Tanqeed Ka Jayaza by Ibrahim Yusuf
9. Urdu Drama Nigari Ka Tanqeedi Jayaza by Ibrahim Yusuf
10. Urdu Drama Tareekh-o-Tanqeed Ki Ranshani mein
11. Urdu Drama Aur Inder Sabha by Dr. Atiya Nishat
12. Drama Nigari Ka Fun by Aslam Qureshi
13. Urdu Ka Pehla Yakbabi Drama by Dr. Fasih Ahmad Siddiqi

**Format & Scheme of Papers**

**M.A.PART - II**

**Paper II - CLASSICAL URDU LITERATURE (PROSE)**

**One Paper 100 Marks – 3 Hours.**

1. Three forms of Urdu prose to be prescribed.
2. TWO books of Urdu prose, pertaining to each of the Three forms to be prescribed i.e. 4 books in all to be studied.

The following will be the pattern of the Question paper.

1. TWO questions on the Three forms with one additional question as alternative, the choice being internal, will be set. These questions will pertain to the historical and gradual development, the techniques, the niceties, the characteristics etc. of the said forms.
2. TWO question with ONE alternative will be set from the FOUR representatives works. These Two questions will pertain to the prose-writers concerned, their styles, Contributions, the critical study of the books, the general questions on the books etc.
3. ONE question will be totally textual. It will have no alternative but will consist of Two passages culled from the 4 books to explain with reference to context.

The allotment of marks to each question will be as follows:

TWO questions at item No. 1 above ( 2 x 20 )	40 marks
TWO questions at item No. 2 above ( 2 x 20 )	40 marks
ONE questions at item No. 3 above ( 10+10.)	20 marks

**Total 100 marks**

One paper 100 Marks - 3 Hours.

- a) One specific book prescribed on the origin and Development of Urdu Language.
- b) One book on Development of Urdu Linguistics and Urdu dialects to be prescribed.
- c) One book on Urdu phonetics and phonemics to be prescribed.
- d) One book of Urdu Grammar to be prescribed.

The following will be the pattern of the question paper:

1. One question, with one additional questions as alternative, the choice being internal, will be set on the origin and Development of Urdu Language.
2. One question , with one additional question as alternative, the choice being internal, will be set on the origin and Development of Urdu Linguistics.
3. One question, with One additional question as alternative, the choice being internal, will be set on Urdu and its Dialects.
4. One question, with one additional question as alternative, the choice being internal, will be set on Urdu Phonetics and phonemics.
5. One question with One additional question as alternative, the choice being internal, will be set on Urdu grammar.

The allotment of marks to each question will be as follows :

One question at item No. 1 above	20	marks.
One question at item No. 2 above	20	marks.
One question at item No. 3 above	20	marks.
One question at item No. 4 above	20	marks.
One question at item No. 5 above	20	marks.

**Total 100 Marks.**

**One paper 100 Marks – 3 Hours.**

(i) One book dealing with the definition, scope of criticism, and one book on gradual evolution of Urdu Criticism and its characteristics etc.

(ii) Two books of two selected Urdu critics.

The following will be the pattern of the Question paper :

1. One question with one additional question as alternative, the choice being Internal will be set on the definition, scope, the characteristics of criticism and the responsibilities of a critic etc.
  - (i) One question, with one additional question as alternative, the choice being Internal will be set on the historical and gradual development of Criticism in Urdu and various schools of criticism.
  - (ii) Two question with one additional questions, as alternative, the choice Being internal, will be set on the back-ground, the standard of criticism and general influence of the selected critics.
4. One question, with one alternatives, the choice being internal, will be set on contents of the books prescribed of the selected critics. The reproduction of the views expressed in their articles contained in those books with comments and analysis from the candidate can be asked.

The allotment of marks to each of the questions will be as follows :

One question at item No. 1 above	20	marks.
One question at item No. 2 above	20	marks.
Two question at item No. 3 above	40	marks.
One question at item No. 4 above	20	marks.

**Total 100 marks.**

**Paper VIII A – URDU PROSE AND ITS STYLES**

**One paper 100 Marks – 3 Hours.**

1. Three forms of Urdu prose to be prescribed for the study of their literary styles.
2. Three books of Urdu prose, pertaining to each of the three forms to be prescribed.

The following will be the pattern of the Question paper.

- 1 Two questions on the THREE forms with one additional question the choice being internal will be set. These questions will pertain to the historical and gradual development, the techniques, the niceties, the characteristics etc. of the said forms.
- 2 Two question with ONE additional question as alternative will be set on the three representative works. These concerned their styles, their contributions, the critical study of the books, the general Questions on the books etc.
- 3 One question will be totally textual. It will have no alternative but will consist of TWO passages culled from the THREE books to explain and critically analyse with reference to context.

The allotment of marks to each question will be as follows:

TWO question at item No. 1 above ( 2 x 20 )	40	marks.
TWO question at item No. 2 above ( 2 x 20 )	40	marks.
ONE question at item No. 3 above (10 + 10)	20	marks.

**Total 100 marks**



OR

**Perper VIII- B- Special Study of Sir Syed Ahmad Khan**  
**one paper 100 marks- 3 hours.**

The flowing Topics to be dealt with:

1. Two questions with one additional question the choice being internal will be set. These question will pertain with the era of Sir Syed Ahmad Khan , life and personal and detailed study of Sir syed urdu books.
2. One question with one additional question the choice being internal will be Set. The question will be set on the philosophical study of Sir syed.
3. One question with one additional question the choice being internal will be Set on the contribution of Sir syed in the Development of Urdu literature.
4. One question will be totally Textual. It will have no alternative but will Consist of Two passage culled from the eight essays with text and analytical study from the prescribed Book to,explain with reference to the context.

5. The allotment of Marks to each question will be as follows :

Two questions at item No. 1 above (2x 20)	40	marks.
One questions at item No. 2 above (2x 20)	20	marks.
One questions at item No. 3 above (2 x20)	20	marks.
One questions at item No. 4 above (10 +10)	20	marks.

**Total 100 marks.**

OR

**Paper VIII C: Modern Urdu Literature (Optional)**

One Paper 100 Marks – 3 Hours

- A: Three forms / style of Urdu prose to be prescribed.
- B: Three Books with Three writers of Urdu prose, pertaining to each of all Three forms / style to be prescribed.

The following will be the pattern of the question paper:

1. Two questions on the three forms / style with one additional question as alternative, The Choice being internal will be set. Three question will be pertain to the definition, Historical and Gradual development, the techniques, the niceties, the characteristics etc. of the said form / style.
2. Two question with one alternative will be set of the three representative works, Three question will pertain to the prose writer concerned their style, contribution, the critical study of the Books, the general question on the book etc.
3. One question will be totally textual it will have no alternative but will consist of two Passages culled from the three books to explain with reference to context.

The allotment of marks to each question will be as follows.

Two question at item No. 1 above	(2 x 20)	40 Marks
Two question at item No. 2 above	(2 x 20)	40 Marks
One question at item No. 3 above	(10 + 10)	20 Marks

**Total 100 Marks**

**WORK – LOAD (M.A. part – II)**

Title of the Paper	No. of lectures	Students Seminar
<b>1. Paper II:</b>		
1. Rani ketki ki kahani	01	
2. Umrao jaan Ada	01	
3. Ek Chadar Maili si	01	01
4. Prem Chand ke Numaenda Afsane	01	
	04 + 01 = 05	
<b>2. Paper IV:</b>		
1. Origin and Development of Urdu Language	01	
2. Development of Urdu Linguistics And Dialects.	01	
3. Urdu Phonetics and Phonemics	01	01
4. Urdu Grammar	01	
	04 + 01 = 05	
<b>3. Paper VI:</b>		
1. Origin and Scope of criticism	01	
2. Development of Urdu criticism	01	
3. Masood Hasan Rizvi Adeeb Aur Hamari shairi	01	
4. Aal-e- Ahmad Suroor Aur Tanqeed Keya hai	01	01
	04 + 01 = 05	
<b>4. VIII – A:</b>		
1. Maktoob Nigari, Inshaiya Aur Khaka	01	
2. Ghalib ke Khutoot	01	
3. Urdu Essays	01	
4. Chand Adabi Shakhshiyaten	01	01
	04 + 01 = 05	
<b>OR</b>		
<b>VIII – B:</b>		
1. Era, life and personality of Sir Syed etc.	01	
2. Philosophical Study of Sir Syed	01	
3. Contribution of Sir Syed in the Development of Urdu prose	01	
4. Intekhab-e- Mazameen-e- Sir Syed	01	01
	04 + 01 = 05	

OR

VIII - C:	1	Autobiography, Tanz-o-Mizah and Drama as form/style	01	
	2	Is Abad Kharabe Mein	01	
	3	Chiragh Tale	01	
	4	Mitti ka Bulawa	01	01

04 + 01 = 05

**Details**

Paper II	04 + 01 = 05
Paper IV	04 + 01 = 05
Paper VI	04 + 01 = 05
Paper VIII (Specialisation)	
A	04 + 01 = 05
B	04 + 01 = 05
C	04 + 01 = 05

**Grand Total = 24 + 06 = 30 hours**  
**(For day Session)**

**Grand Total = 24 + 06 = 30 hours**  
**( For Evening Session)**

**Grand Total Lecture For Day And Evening Session- 30+30=60 Hours**

REVISED SYLLABUS FOR M.A. DEGREE EXAMINATION IN URDU  
(FROM THE ACADEMIC YEAR 2010 - 2011)

Paper II  
قدیم اردو ادب (نثر)

(الف) داستان:

- ۱۔ داستان کی تعریف اور فن داستان نگاری
- ۲۔ داستان کا تاریخی و تدریجی ارتقا
- ۳۔ داستان نگاری کا سماجی و تہذیبی مطالعہ
- ۴۔ داستان کا سماجی و تہذیبی پس منظر
- ۵۔ داستان نگاری کے زوال کے اسباب
- ۶۔ مندرجہ ذیل داستان مصنف اور کتاب کے حوالے سے
- ۱۔ رائی کینگی کی کہانی از انشاء اللہ خاں انشا

(ب) ناول:

- ۱۔ ناول نگاری کی تعریف اور فن ناول نگاری
- ۲۔ اردو ناول کے اقسام
- ۳۔ اردو ناول کا تاریخی و تدریجی ارتقا
- ۴۔ اردو ناول کے آئینہ امکانات
- ۵۔ مندرجہ ذیل ناول مصنف اور کتاب کے حوالے سے
- ۱۔ ابن الوقت از ڈپٹی نذیر احمد
- ۲۔ امر او جان ادا از مرزا ہادی رسوا

(ج) مختصر افسانہ:

- ۱۔ مختصر افسانے کی تعریف اور فن
- ۲۔ مختصر افسانے کا تاریخی و تدریجی ارتقا
- ۳۔ اردو افسانے اور ناول کا فرق
- ۴۔ مختصر افسانہ مندرجہ ذیل مصنف اور کتاب کے حوالے سے
- ۱۔ پریم چند کے نمائندہ افسانے مرتب قمر رئیس
- مندرجہ ذیل افسانے شامل نصاب ہیں:

۱۔ بڑے گھر کی بیٹی ۲۔ نمک کا داروغہ ۳۔ بوڑھی کا کی ۴۔ پوس کی رات ۵۔ سجات ۶۔ کفن

۲۔ قرۃ العین حیدر کی منتخب کہانیاں از قرۃ العین حیدر مطبوعہ نیشنل بک ٹرسٹ نئی دہلی

مندرجہ ذیل کہانیاں شامل نصاب ہیں:

۱۔ قلندر ۲۔ کرمان ۳۔ نوٹو گرافر ۴۔ جگنوؤں کی دنیا ۵۔ کمرے کے پیچھے ۶۔ حسب نصاب

کتب برائے حوالہ جاتی مطالعہ:

- ۱- اردو زبان اور فن و داستان گوئی از کلیم الدین احمد
- ۲- اردو کی نثری داستانیں از گیان چند جین
- ۳- اردو داستان تنقید و تجزیہ از ڈاکٹر قمر الہدیٰ فریدی
- ۴- ہماری داستانیں از وقار عظیم
- ۵- داستان سے افسانے تک از وقار عظیم
- ۶- داستان، ناول اور افسانہ از دردانہ قاسمی
- ۷- جدید ناول کا فن اردو ناول کے تناظر میں از سید محمد عقیل
- ۸- ناول کیا ہے از احسان فاروقی اور نور الحسن ہاشمی
- ۹- اردو ناول کی تاریخ و تنقید از علی عباس حسینی
- ۱۰- بیسویں صدی میں اردو ناول از یوسف سرمست
- ۱۱- اردو ناول آزادی کے بعد از اسلم آزاد
- ۱۲- جدید افسانہ اور ان کے مسائل از وارث علوی
- ۱۳- افسانہ، روایت اور مسائل از گوپی چند نارنگ
- ۱۴- اردو افسانہ میں سماجی مسائل کی عکاسی از کلیم احمد
- ۱۵- اردو فکشن ایک مطالعہ از ڈاکٹر صاحب علی
- ۱۶- اردو افسانوں کا تجزیاتی مطالعہ از ڈاکٹر صاحب علی
- ۱۷- جدید اردو افسانہ از خورشید احمد
- ۱۸- قرۃ العین حیدر شخصیت اور فن مرتب ڈاکٹر صاحب علی
- ۱۹- امراؤ جان ادا مرتب حکیم کاظمی
- ۲۰- قرۃ العین حیدر کا فن از ارتضیٰ کریم
- ۲۱- انشاء اللہ خان انشاء از عابد پیشاوری
- ۲۲- انشاء اللہ خان انشاء از محمد حبیب خان
- ۲۳- نذیر احمد کے ناول از ڈاکٹر اشفاق محمد خان
- ۲۴- نذیر احمد کے ناولوں میں نسوانی کردار از زینت بشیر
- ۲۵- پریم چند کہانی کا رہنما از سید جعفر رضا
- ۲۶- مرزا رسوا کے ناولوں میں نسوانی کردار از ڈاکٹر توحید خان
- ۲۷- نذیر احمد از نور الحسن نقوی
- ۲۸- مرزا ہادی رسوا از ڈاکٹر آدم شیخ
- ۲۹- پریم چند ایک نقیب از ڈاکٹر مصغیر



- ۱- اردو زبان کی ابتدا اور ارتقا
- ۲- اردو لسانیات اور اردو علاقائی زبانوں کا تدریجی ارتقا
- ۳- صوتیات اور فونیمیات
- ۴- اردو قواعد

مندرجہ ذیل منظور شدہ نصابی کتب:

- ۱- مقدمہ تاریخ زبان اردو از پروفیسر مسعود حسین خاں (تیسرا چوتھا اور پانچواں باب)
- ۲- اردو میں لسانیاتی تحقیق مرتب پروفیسر عبدالستار دلوی (دوسرا اور چوتھا باب)
- ۳- اردو کی تعلیم کے لسانیاتی پہلو از گوپی چند نارنگ (ص ۱۳-۶۵)
- ۴- اردو صرف و نحو از مولوی عبدالحق (فقط ”صرف“)

کتب برائے حوالہ جاتی مطالعہ:

- ۱- ہندوستانی لسانیات از ڈاکٹر محی الدین قادری زور
- ۲- پنجاب میں اردو از محمود شیرانی
- ۳- مقالات شیرانی از محمود شیرانی
- ۴- عمومی لسانیات از ڈاکٹر گیان چند
- ۵- اردو میں ادبی و لسانیاتی تحقیق از عبدالستار دلوی
- ۶- اردو زبان اور سماجی سیاق از ڈاکٹر عبدالستار دلوی
- ۷- زبان اور علم زبان از ڈاکٹر عبدالقادر سروری
- ۸- نئی اردو قواعد از ڈاکٹر عصمت جاوید
- ۹- اردو زبان و قواعد از ڈاکٹر شفیع خان
- ۱۰- مصباح القواعد از فتح محمد خان
- ۱۱- اردو صرف از ڈاکٹر انصار اللہ
- ۱۲- اردو لسانیات از ڈاکٹر شوکت سبزواری
- ۱۳- اردو صرف و نحو از ڈاکٹر افتد ار حسین
- ۱۴- اردو کا ابتدائی زمانہ از شمس الرحمن فاروقی

اردو تنقید کی تاریخ، اصول اور تنقیدی دبستان (دو ممتاز نقادوں کا خصوصی مطالعہ)

(الف) ۱- تنقید کی تعریف، فنی خصوصیات، اہمیت اور افادیت

۲- نقاد کی ذمہ داریاں

۳- اردو تنقید کا تاریخی و تدریجی ارتقا

(ب) دو نقادوں کا خصوصی مطالعہ:

۱- مسعود حسن رضوی ادیب

۲- آل احمد سرور

مندرجہ ذیل مصنف اور منظور شدہ کتاب کے حوالے سے:

۱- ہماری شاعری از مسعود حسن رضوی ادیب (باب حصہ اول معیار)

۲- تنقید کیا ہے از آل احمد سرور

مندرجہ ذیل مضامین شامل نصاب ہیں:

۱- تنقید کیا ہے۔

۲- ترقی پسند تحریک پر ایک نظر

۳- یادگار حالی

۴- شبلی میری نظر میں

(ج) جدید اردو تنقید، اصول اور نظریات از ڈاکٹر شارب رد لوی (باب تیسرا، چوتھا اور پانچواں)

کتاب برائے حوالہ جاتی مطالعہ:

۱- اردو تنقید کا ارتقا از عبادت بریلوی

۲- اردو تنقید پر ایک نظر از کلیم الدین احمد

۳- اردو میں تنقیدی نظریات از پروفیسر احتشام حسین

۴- عملی تنقید از کلیم الدین احمد

۵- فن تنقید اور اردو تنقید نگاری از نور الحسن نقوی

۶- تنقیدی افکار از شمس الرحمن فاروقی

۷- مقدمہ شعر و شاعری از الطاف حسین حالی

۸- آل احمد سرور شخصیت اور فن از امتیاز احمد

۹- خواب باقی ہیں از پروفیسر آل احمد سرور

۱۰- آئینہ بلاغت از مرزا محمد عسکری

۱۱- تنقیدی سرمایہ از عبد الشکور

۱۲- اردو تنقید، حالی سے کلیم الدین تک از سید محمد نواب کریم

۱۳- تنقیدی دبستان از سلیم اختر

(الف) مکاتیب:

- ۱- مکاتیب کی تعریف اور فن
- ۲- اردو مکتوب نگاری کا تاریخی و تدریجی ارتقا
- ۳- مکاتیب کی خصوصیات
- ۴- مکتوب نگاری اور مندرجہ ذیل مصنفین کا مطالعہ  
غالب کے خطوط مرتبہ ڈاکٹر تنویر احمد علوی، مطبوعہ نیشنل بک ڈسٹریبیوٹرز ایسوسی ایشن دہلی  
مندرجہ ذیل خطوط شامل نصاب ہیں:  
ہرگوبال تفتہ کے ابتدائی تین خطوط، میرسر فراز حسین، مہدی مجروح کے ابتدائی تین خط۔

(ب) انشائیہ:

- ۱- انشائیہ کی تعریف
- ۲- انشائیہ کی خصوصیات
- ۳- اردو انشائیہ کا تاریخی و تدریجی ارتقا
- ۴- انشائیہ مندرجہ ذیل مصنف اور کتاب کے حوالے سے  
اردو انشائیہ مرتبہ ڈاکٹر ظہیر الدین مدنی، ابتدائی چھ مضامین

(ج) خاکہ:

- ۱- خاکہ نگاری کی تعریف اور فن
- ۲- خاکہ نگاری کے اقسام
- ۳- خاکہ نگاری کا تاریخی و تدریجی ارتقا
- ۴- خاکہ نگاری مندرجہ ذیل مصنف اور کتاب کے حوالے سے  
چند ادبی شخصیتیں (انتخاب) از شاہد احمد دہلوی، مطبوعہ قلم پبلیکیشن ممبئی

کتاب برائے حوالہ جاتی مطالعہ:

- ۱- اردو نثر میں ادب لطیف از ڈاکٹر عبد الوہود
- ۲- اردو میں خطوط نگاری از شمس الرحمان
- ۳- مطالعہ خطوط غالب از عبد القوی دستوی
- ۴- خطوط نگاری کا فن اور تاریخ از رشید خان تون
- ۵- انشائیہ اور انشا مرتبہ محمد حسین
- ۶- اردو انشائیہ کی بنیاد از انور سعید
- ۷- اردو انشائیہ از ڈاکٹر آدم شیخ
- ۸- اردو میں خاکہ نگاری از صابرہ سعید
- ۹- آزادی کے بعد دہلی میں خاکہ نگار مرتبہ فہیم حنفی
- ۱۰- انشائیہ کے خدو و خال از وزیر آغا

(الف) مندرجہ ذیل موضوعات شامل نصاب ہیں:

- ۱- سرسید کا عہد
- ۲- سرسید کی حیات اور شخصیت
- ۳- سرسید کی تصانیف کا مجموعی جائزہ

(ب) سرسید احمد خاں کا فلسفہ:

- ۱- سرسید احمد خاں کے سماجی و تہذیبی افکار
- ۲- سرسید احمد خاں کے سیکولر افکار
- ۳- سرسید احمد خاں کے تعلیمی افکار

(ج) اردو نثر کے ارتقا میں سرسید احمد خاں کی خدمات

- ۱- سرسید احمد خاں کی ادبی خدمات
- ۲- سرسید احمد خاں کی تاریخی خدمات
- ۳- سرسید احمد خاں اور اردو صحافت

(د) منکورشہ کتاب انتخاب مضامین سرسید مطبوعہ مکتبہ جامعہ ملی دہلی

- مندرجہ ذیل آٹھ مضامین اور ان کا تجزیاتی مطالعہ
- ۱- ہمدردی
  - ۲- اپنی مدد آپ
  - ۳- انسان کے خیالات
  - ۴- امید کی خوشی
  - ۵- اخلاق
  - ۶- تعصب

- ۴- گذرا ہوا زمانہ
- ۸- سراب حیات

- ۳- انسان کے خیالات
- ۴- امید کی خوشی

کتاب برائے حوالہ جاتی مطالعہ:

- ۱- مضامین سرسید مطبوعہ ایجوکیشنل بک ہاؤس علی گڑھ
- ۲- اسباب بغاوت ہند از سرسید احمد خاں
- ۳- حیات جاوید از الطاف حسین حالی
- ۴- مطالعہ سرسید از مولوی عبدالحق
- ۵- سرسید اور ان کے نامور رفقا از سید عبداللہ
- ۶- حیات سرسید از نور الرحمن
- ۷- سرسید احمد خاں از خلیق احمد نظامی
- ۸- سرسید احمد خاں ایک سیاسی مطالعہ از شفیق احمد صدیقی
- ۹- سرسید احمد اور ہندوستانی مسلمان از نور الحسن نقوی
- ۱۰- سرسید کی صحافت از اصغر عباس
- ۱۱- سرسید اور اردو زبان و ادب از قمر الحسن فریدی
- ۱۲- سرکشی بجنور از سرسید احمد خاں
- ۱۳- مویج کوثر از شیخ محمد اکرام
- ۱۴- خطبات احمدیہ از سرسید احمد خاں

تین اصناف / اسالیب موجودہ دور کے تین نمائندہ نثر نگار  
۱- سوانح نگاری ۲- طنز و مزاح ۳- ڈراما

(الف) سوانح نگاری

- ۱- تعریف اور فن
  - ۲- سوانح نگاری کا تاریخی ارتقا
  - ۳- سوانح نگاری کی خصوصیات
- سوانح نگاری مندرجہ ذیل کتاب اور مصنف کے حوالے سے  
۱- اس آباد خرابے میں از اختر الایمان

(ب) طنز و مزاح

- ۱- تعریف اور فن
  - ۲- طنز و مزاح کا تاریخی ارتقا
  - ۳- طنز و مزاح کی خصوصیات
- طنز و مزاح مندرجہ ذیل مصنف اور کتاب کے حوالے سے  
۱- چراغ تلے از مشتاق احمد یوسفی

(ج) ڈراما

- ۱- اردو ڈرامے کی تعریف اور فن
  - ۲- اردو ڈرامے کی تاریخی اور تدریجی ارتقا
  - ۳- اردو ڈرامے کی خصوصیات
- اردو ڈراما مندرجہ ذیل مصنف اور کتاب کے حوالے سے  
۱- مٹی کا بلاوا از شمیم حسنی

کتاب برائے حوالہ جاتی مطالعہ:

- ۱- اردو خودنوشت - فن اور تجزیہ از وہاب الدین طلوی
- ۲- اردو میں خودنوشت سوانح حیات از مصیحا نور
- ۳- فن سوانح نگاری کا ارتقا از الطاف قاطمہ
- ۴- اردو ادب میں طنز و مزاح از ڈاکٹر وزیر آغا
- ۵- طنزیات و مضحکات از رشید احمد صدیقی
- ۶- علی گڑھ میگزین طنز و مزاح نمبر
- ۷- اردو ڈرامے کی تنقید و تاریخ از عشرت رحمانی
- ۸- اردو ڈرامے کی تنقید کا جائزہ از ابراہیم یوسف
- ۹- اردو ڈراما تاریخ و تنقید کی روشنی میں
- ۱۰- اردو ڈراما اور اندر سہا از ڈاکٹر عطیہ نشاط
- ۱۱- ڈراما نگاری کا فن از اسلم قریشی
- ۱۲- اردو کا پہلا ایک بابی ڈراما از ڈاکٹر فصیح احمد صدیقی

UNIVERSITY OF MUMBAI

No.UG/ 149 of 2010

CIRCULAR: -

A reference is invited to the Ordinances, Regulations and syllabi relating to the Master of Arts (M.A) (Part I & II) degree course vide Pamphlet No. 157 and to this office Circular No.UG/324 of 2008 dated 21<sup>st</sup> July, 2008 and the Head, University Department of Philosophy, the Principals of the affiliated Colleges in Arts and Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by Board of Studies in Logic and Philosophy at its meeting held on 21<sup>st</sup> January, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.43 and that in accordance therewith, the syllabus of Paper-VI ('Philosophy of Consciousness') at M.A. Part-II in the subject of ~~Philosophy~~ Philosophy is revised as per Appendix and the same has been brought in to force with effect from the academic year 2010-2011.

MUMBAI-400 032

7<sup>th</sup> June, 2010

L.R. Mane  
Offg. Registrar

To,

The Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning.

A.C./4.43/03/03/2010

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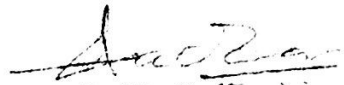
No. UG/ 149 -A of 2010,

MUMBAI-400 032

7<sup>th</sup> June, 2010

Copy forwarded with compliments for information to:

- 1) The Dean, Faculty of Arts,
- 2) The Chairperson, Board of Studies in Logic and Philosophy,
- 3) The Controller of Examination,
- 4) The Co-ordinator, University Computerization Center.



(D. N. Jadhav)

Ag. Deputy Registrar

UG/PG Section

Copy to:

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Personal Assistants to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative, Ratnagiri for information.

The controller of examinations (10 copies), the Finance and Accounts officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrollment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical, Affiliation Section (2 copies), the Professor-cum-Director, Institute of Distance and Open Learning (IDOL), (10 copies) the Director University Computer Center (IDOL Building), Vidyayanagari (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar (PRO), The Assistant Registrar,



03.03.2010

**UNIVERSITY OF MUMBAI**



**Revised Syllabus  
of  
Paper VI  
(Philosophy of Consciousness)  
in  
Philosophy  
at  
M.A. Part II**

**(with effect from the academic year 2010 - 2011)**

## **PAPER VI : PHILOSOPHY OF CONSCIOUSNESS**

Total number of lectures : 120

Number of lectures per unit : 30

Total marks: 100

### **Section I - Indian Philosophy of Consciousness**

#### **Unit I (Early classical Indian views of Consciousness)**

1. Upanisadic view of consciousness and materialist view of consciousness.
2. Vedanta view: psychological analysis of waking, dream, deep sleep and turiya states
3. Samkhya-yoga view – Purusa as drsta, citta, citta vrtti, citta bhumi, nirvikalpa samadhi, -  
Consciousness without intentionality, mind and jiva.

### **Section II - Western Philosophy of Consciousness**

#### **Unit II (Later Classical Indian views of Consciousness)**

4. Nyaya Vaisesika view of consciousness - Problem of mind and jiva.
5. Buddhist view of consciousness - Identity of jiva - Buddhist denial of strict identity.
6. Jaina view of consciousness - Status of jiva and lesya.

## **Section II (Western Philosophy of Consciousness)**

### **Unit III (Western philosophy – The mind-body problem)**

7. Aristotelian psychology vs. Hobbes's materialism.
8. Cartesian dualism vs. Spinoza's monism.
9. The mind-body problem and a linguistic solution: Wittgenstein and Ryle.

### **Unit IV (Contemporary western philosophy of consciousness)**

10. The notion of an Explanatory gap, Identity theories of consciousness (J J C Smart and Armstrong) and Eliminativism (Paul Churchland, R Rorty).
11. Artificial Intelligence and Functionalism (A. Turing, H. Putnam and J.Fodor and Ned Block), Representational theories of Consciousness (J.Fodor, F. Dretske)
12. Naturalist theories of Consciousness (J. Searle and T. Nagel) and Transcendental theories of Consciousness (Colin McGinn).

#### Examination Guidelines:

1. The final exam paper will be of 100 marks covering all four Units I, II, III & IV
2. There will be 8 questions in the exam, whereby 2 questions will be framed for each Unit
3. Each question will carry 25 marks
4. Students have to answer 4 questions in the final examination, choosing 1 question from each unit.
5. The minimum standard of passing is 40 marks in the Final Examination.
6. There is no practical/ project work for this paper.

## Book List

1. M. Indich Williams - Consciousness in Advaita Vedanta - Motilal Banarasidass, Delhi, 1980.
2. Debabrata Sinha — The Metaphysics of experience in Advaita Vedanta: A Phenomenological Approach — Motilal Banarasidass, Delhi, 1995.
3. Ramaprasad — Patanjala Yoga Sutras — Sree Ramaprasad Press, 1966.
4. Geraldine Costner — Yoga and Western Psychology: A Comparison — Motilal Banarsidass, Delhi, 1998.
5. Swami Abhedananda — Yoga Psychology — Ramakrishna Vedanta Math, 2002.
6. Bina Gupta — CIT: Consciousness — Oxford India, 2003.
7. Padmasiri De Silva, An Introduction to Buddhist Psychology, 4th edition, London: Palgrave, Macmillan, 2005.
8. T. G. Kalghatgi — Some Problems in Jaina Psychology, Dharwad: Karnataka University Press, 1961.
9. Uttaradhyayana Sutra Chapter 3, 4.
10. Peter A. Morton — A Historical Introduction to the Philosophy of Mind: Readings with Commentary — Broadview Press, Toronto, Canada, 1997, Part I: Chapters 2, 5 and 6; Part II: Chapters 7, 8, 9, 10, 11 and 12; Part III.
11. David Chalmers — Philosophy of Mind: Classical and Contemporary Readings — Oxford University Press, New York, Delhi, 2002, 1. Part A, Part B: Chapter 5.
12. Christopher Martin, 'Consciousness in Spinoza's Philosophy of Mind', Southern Journal of Philosophy, July 1, 2007
13. David Chalmers — Philosophy of Mind: Classical and Contemporary Readings — Oxford University Press, New York, Delhi, 2002, Part B: Chapters 6 and 7, 1. Part C, Part D, Part E and Part F. Rest of book recommended.
14. S. Guttenplan, A Companion to Philosophy of Mind, Oxford: Blackwell, 1994.
15. Stephen P. Stich and Ted A. Warfield (eds.) — The Blackwell Guide to Philosophy of Mind — Oxford: Blackwell, 1993.
16. John Heil, Philosophy of Mind: A Contemporary Introduction, Routledge, 2004.
17. Daniel Dennett — Consciousness Explained — Penguin, 1991.
18. John Searle — Rediscovery of the Mind — MIT Press, 1992.
19. Jerry Fodor — The Language of Thought — Harvard University Press, 1975.

UNIVERSITY OF MUMBAI

No.UG/ 150 of 2010

**CIRCULAR: -**

A reference is invited to the Ordinances, Regulations and syllabi relating to the T.Y.B.A degree course vide Pamphlet Nos. 140 and 150 and Principals of the affiliated Colleges in Arts and Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Faculty of Commerce at its meeting held on 16<sup>th</sup> February, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.57 and that in accordance therewith, the syllabus for 1) Advertising (Applied Component) at the S.Y.B.A. and 2) Commerce Paper- IV, V & VI at T.Y.B.A. examination is revised as per Appendix and the same has been brought in to force with effect from the academic year 2010-2011.

MUMBAI-400 032

7<sup>th</sup> June, 2010

L.R. Mane

Offg. Registrar

To,

The Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning.

A.C./4.57/03/03/2010

\*\*\*\*\*

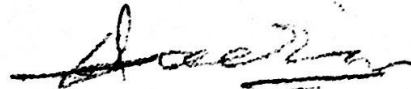
No. UG/ 150 -A of 2010,

MUMBAI-400 032

7<sup>th</sup> June, 2010

Copy forwarded with compliments for information to:

- 1) The Dean, Faculty of Commerce,
- 2) The Chairman Board of Studies in Commerce,
- 3) The Controller of Examination,
- 4) The Co-ordinator, University Computerization Center.



(D. N. Jadhav)

Ag. Deputy Registrar

UG/PG Section

2/16  
\*

Copy to:

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Personal Assistants to the Vice-Chancellor, the Pro-Vice-Chancellor, the Assistant Registrar, Administrative, Ratnagiri for information.

# UNIVERSITY OF MUMBAI



## **Revised syllabus and Question Paper Pattern for**

- 1. Advertising : Applied Component Group  
at S.Y.B.A.**
- 2. Commerce: Paper-IV, V & VI  
at T.Y.B.A.**

**(with effect from the academic year 2010 - 2011)**



Suggested Syllabus for S.Y.B.A.

Advertising

(applied component group)

(W.e.F. academic year 2010-2011)

SECTION I

35 lectures

1. Introduction to Advertising

(a) Introduction to Integrated Marketing Communications – Publicity – Public Relation – Salesmanship – Sponsorship - Advertising – Sales promotion.

- Advertising - Features, Active participants, Role of Advertising in Marketing Mix, Communication and society.
- Advertising and brand building

(b) Classification of Advertising

On the basis – Area, Audience, Advertisers, Media, Objectives.

Social Advertising, Political Advertising, Advocacy Advertising, Retail Advertising, Financial Advertising, Corporate Image Advertising, Primary & Selective Advertising.

(c) Media in advertising

- Comparative analysis of Media options for advertising – Television (cable / satellite / DD), Radio (special reference to FM), Internet, Print, Film (Product Placement) and Outdoor advertising.  
Emerging Media Options - New Options of Transit Advertising, Marketing Through Social sites, Advertising through cell phones
- Media planning – media scheduling strategies and media objectives – Reach, frequency and GRP
- Concepts - Media buying, Media Selling, Media Mix, Clutter, Zipping & Zapping, Need for media research and Organizations conducting media research. Media survey, National Readership Survey (NRS), Television Rating Points (TRP)

15 lectures

2. Economic & Social Aspects of Advertising

(a) Economic aspects of advertising - impact on production, distribution and consumer cost, advertising and competition, waste in advertising.

(b) Social aspects of advertising - advertising and culture (values, festivals, customs), standard of living, ethics in advertising.

(c) Regulation and control on advertising in India – Advertising Standard Council of India (ASCI), Advertising Agencies Association of India (AAAI), Information & Broadcasting Ministry

10 lectures.

### 3. Advertising Agency

- (a) Advertising Agency – definition, types of services offered, types of advertising agencies, structure of ad agencies, agency selection criterion, ways of getting clients with special reference to creative pitch, agency accreditation and client turnover, current advertising agency's scenario.
- (b) Career options available in advertising field – advertising agency, media, production houses, research and allied fields – printing, graphics and animation, modeling and dubbing

## SECTION II

22 lectures

### 4. Planning an Advertising campaign

Meaning of advertising campaign

Important aspects of campaign planning

The target audience – need for segmenting the market and bases of market segmentation

Objectives of ad campaign – communication (DAGMAR) versus sales objectives

Media Selection & factor determining selection of Media

Advertising budget – Factors affecting budget / Methods

Requisite of an advertisement – AIDA, role of persuasion

Determining the message theme – USP

Decision on advertising appeals and selling styles (soft selling / Hard selling skills)

25 lectures

### 5. Creativity in advertising

(a) Psychology in advertising – perception, attitudes and values, personality, motivations (including buying motives) and beliefs.

(b) Visualisation techniques

(c) Copy – types and essentials

(d) Elements of copy – headline (functions and types), overline, underline, body copy, captions, taglines, slogans, call to action, logo, company name and signature.

(e) Illustrations – functions and types

(f) Layouts – stages, functions, types and essentials

Types of advertising options – dramatization, animations, testimonials, demonstration (informative, educative and fantasy).

Copy writing for print, outdoor, radio, web and television (concept of storyboards)

13 lectures

### 7. Advertising research

Evaluating advertising effectiveness –

Importance of research in advertising

Types of research - copy research and behavioural research

Pre-testing and Post-testing methods of evaluation –

- Pre-testing methods - methods for concept testing and copy testing

- Post-testing methods – sales and response rates, recall tests, recognition tests and attitude and opinion tests

## References

- **Batra Rajeev, Myers John G., and Aaker David A.**, Advertising Management, 5th ed., Prentice Hall India, New Delhi, 2004.
- **Belch G. and Belch M.**, Advertising and Promotion, An Integrated Marketing Communications Perspective, 6th ed., Tata McGraw-Hill Publishing Company Limited, New Delhi, India, 2003.
- **Bergh B. G. V. and Katz H.**, Advertising Principles, NTC Business Books, Lincolnwood, Illinois, USA, 1999.
- **Clow Kenneth E. and Baack Donald**, Integrated Advertising, Promotion and Marketing Communications, Pearson Education Inc., 2002.
- **Kazmi S. H. H. and Batra Satish K.**, Advertising and Sales Promotions, 2nd ed., Excel Books, New Delhi, India, 2004.
- **Keller Kevin L.**, Strategic Brand Management, 2nd ed., Pearson Education Inc., 2007.
- **Wells William, Moriarty Sandra and Burnett John**, Advertising, Principles and Practice, 7th ed., Pearson Education Inc., 2006.

## Question Paper Pattern

Q1. Explain the terms / Concepts. (Any four out of six)

08 marks

Q2. Descriptive type question (any two out of three)

16 marks

Q3. Descriptive type question (any two out of three)

16 marks

Q4. Notes (any two out of four)

10 marks

Total = 50 marks

Time = 2 hours

- Same pattern for first term and second term examinations.
- Project work for 20 marks to be awarded at the end of the year.
- Marks at the first term examination and second term examination to be converted into 40 marks each term, total 80 marks, and 20 marks for project work.

T.Y.B.A.

**Introduction to Management**

Commerce Paper – IV

**Section – I**

1. **Nature of Management**  
Introduction – Definition – Features – Functions – Importance – Administration & Management – Manager – Functions of a Manager – Role of a Manager. 10
2. **Development of Management Thought**  
Introduction – Henry Fayol – Fredrick Taylor & Scientific Management – Elton Mayo and others – Peter Drucker, Learning from Indian Sources. Lessons for Management Theory & Practice from Arthashastra – Mahatma Gandhi's rousing call to the Nation – Killing instinct learning from Chattrapati Shivaji. 25
3. **The Environmental Context of Management, Social Responsibility & Business Ethics** (10)  
External Environment – Internal Environment – Organization – Environmental Relationship – Social Responsibility and Organizations – Arguments for and against Social Responsibility – Government and Social Responsibility, Business Ethics.
4. **a) Planning and Forecasting**  
Introduction – Definition – Nature – Steps- Planning Premises- Types of Plan – Problems in Planning Process – Definition of Forecasting – Forecasting Process, Importance, Methods, Differences between Forecasting and Planning (12)  
**b) Decision Making** – Process - Types of Decision – Steps in Decision Making – Problems in Decision Making
5. **Objectives and Management by Objectives** (08)  
Definition – Features – Nature of Objectives (Hierarchy of Objectives, Multiplicity of Objectives, Qualitative and Quantitative Objectives, Verifiable and Non-verifiable Objectives), MBO – Features, Process, Benefits and Problems.

## Section - II

6. **Organization**
  - a) Introduction - Definition, Importance of Organizing - Principles of Organization - Formal Organization - Informal Organization - Process of Organizing - Organization Charts - Organization Manuals.
  - b) Introduction - Line Organization - Functional Organization - Line and Staff Organization - Committee Organization - Project Organization - Matrix Organization
7. **Delegation of Authority -**  
Concept of Authority, Responsibility, Objective of Delegation, Process of Delegation, Benefits of Delegation, Problems in Delegation - Centralization - Decentralization.
8. **Departmentation & Span of Control**
  - a) Departmentation  
Introduction - Definition - Factors influencing Departmentation - Basis used for departmentation
  - b) Span of Control  
Introduction - Definition - factors affecting span of control - Graicunas theory of span of management.
9. **Control and Co-ordination**
  - a) Introduction - Purpose for control - Areas of control - Steps in the control process - some important techniques of control.  
Budgets - Budgetary control - Preparation of Budget - Types of Budgets
  - b) Co-ordination  
Definition - Need and Importance - Principles - Problems of co-ordination & co-operation.
10. **Total Quality Management & Quality Circles**  
Meaning of quality - Importance of Quality - Total Quality Management - Benchmarking, ISO, ISI.

### **Suggested Reading Material:-**

H.R. Bower - Social Responsibility of Businessman  
Fancis Charunilam - Business Environment - Himalaya Publishing House  
Davis Keith - The Challenge of Business  
Peter Drucker - The Practice of Management  
K.M. Mittal - Social Responsibility of Business - Area and Progress  
Pigore and Myres - Readings in Personnel Administration - McGraw Hill



- R.S. Dwivedi – Management & Human Resources – Oxford and IBM, Publishing Co. Bombay.
- S.K. Warriar – Manual of General and Personal Management – Asian Publication Services.
- Vozder – Pitman – Personnel Management and Industrial Relations.
- Koontz and O'Donneill – Management.
- EFL Breach – Principles and Practice of Management.
- Donald J. Clough – Concepts in Management Science- Prentice Hall.
- Herbert G. Hicks – The Management and Organization
- Stoneiz and Hague – Management
- Kaste & Rosan Zweig – Organization and Management.



Question Paper Pattern for the T.Y. B.A. Annual Examination in Commerce  
Paper IV and V with effect from the Academic Year 2010-2011.

N.B.:

- 1) The Question Paper will be of 3 Hours duration, carrying 100 Marks each, comprising of the complete syllabus.
- 2) All questions are compulsory, with internal choices as given below:

**Section – I**

Question No.1 – Express briefly the following (Objectives Type Question)  
(Explain the meaning of any 4 Terms / Concepts out of 7)  
2 Marks each

(8 Mar

Question No. 2 – Answer any 2 (out of 3)  
8 Marks each

(16 Mar

Question No. 3 – Answer any 2 (out of 3)  
8 Marks each

(16 Mar

Question No. 4 – Short Notes any two (out of three)

(10 Mar

**Section – II**

Question No. 5 – Express briefly the following (Objectives Type Questions)  
(Explain the meaning of any 4 Terms / Concept out of 7)  
2 Marks each

(8 Mar

Question No. 6 – Answer any 2 (out of 3)  
8 Marks each

(16 Mar

Question No. 7 – Answer any 2 (out of 3)  
8 Marks each

(16 Mar

Question No.8 – Short Notes any two (out of three)

(10 Mar

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(Revised syllabus w.e.f. 2010-11)

T.Y.B.A.

## Human Resource Management

Commerce Paper - V

### Section - I

#### 1. **Introduction to Human Resource Management**

Introduction - What is Management? - What is Human Resource Management?  
How it differs from Personnel Management?  
Areas covered by HRM;  
Changing environment of HRM;  
Challenge for HR Manager.

(10)

#### 2. **Human Resource Planning**

Importance - Definition - Need - Process of Human Resource Planning Job - Job  
Analysis - Job Description, Job Specification and Purpose or Uses of Job analysis;  
Content of Job analysis.

(07)

#### 3. **Recruitment and Selection Process**

Introduction - Factors governing Recruitment - Constraints of Manager to Recruit -  
Sources of Recruitment - Internal and External, Selection Procedures - Steps  
involved.

(07)

#### 4. **Psychological testing, Interviews and Induction**

**Psychological testing** - Purpose, Characteristics, Classification, Advantages, Basic  
guidelines.

(15)

##### **Interviews -**

Objectives of Interviews - Types of Interviews - Guidelines for effective Interview,  
Interview Techniques (Preparation, Physical setting, Conduct, Close and Evaluation)  
errors in interviewing, Interview Guidelines for Interviewee,

##### **Induction -**

Objectives of Induction,  
Considerations in Developing Orientations (formal/informal), individual or  
collective, fixed or variable time, orientation process.

#### 5. **Training and Development**

Introduction - distinction between Training and Development -

Training - Need, Principles of Training, Steps in Training program, Training  
methods / Techniques (on-the-job, vestibule, demonstration, apprenticeship,  
classroom methods or off-the-job training.)

(15)

- Training evaluation - Principles, why training fails? And improving  
effectiveness of Training.

- Managerial Development - Importance, Characteristics of Manager,  
Skills of Manager, Purpose and Objects of Manager, Components of MD program -

Basic requirements for the success of the program – on-the-job training (Coaching, Job rotation, Assignment, Participating in Committees) off-the-job training (Case study, Incident method, Role playing etc.).  
- Organizational development (Definition, Goals – Characteristics – Process).

6. **Performance Appraisal-**  
Importance and Purpose – Appraisal Process – Methods (traditional and new),  
Contents of Appraisal – Problems.

## Section – II

7. **Group dynamic & human needs -**  
Definition of a Group - Features, Function & Goals of formal groups – informal groups – Need for Grouping – Process of Group Formation & its size – characteristics of Groups – Conflicts & Managing the Conflicts.  
  
Human needs – Meaning – Changing nature of human needs – Management's role in need fulfillment.
8. **Human Relations -**  
Introduction – Definition – Objectives – Scope – Fundamental concept in human relations – Measures to be taken by Management to improve relations.
9. **Motivation -**  
Introduction – Definition – Classification of Motivation – Types of Motivation – steps involved in Motivation – Management techniques to increase Motivation.  
Organizational Detailed study of financial & non-financial Motivations, Important theories of Motivation by Maslow, Mc-Gregor, Herzberg, Vrooms.
10. **Employee Morale -**  
Definition & features – Factors influencing Morale – Measurement of morale & improving Morale.
11. **Communication**  
Definition & Characteristics – Importance - Objectives process – formal & informal communication – written & oral communication – vertical & horizontal communication- verbal & non-verbal – transmission of informal messages - Media of Communication – Significance of informal communication to Management – Barriers to communication – removing the barriers.
12. **Leadership**  
Definition – Characteristics – Roles expected from leader – function of the leader – Qualities of the leader – Styles of leadership – Different approaches to leadership (trait-oriented, situational, functional, and interactive).

## **References:**

- Parek Udai – Organizational Behaviour Process, Rawat Publication
- M.Gangadhar Rao - Organizational Behaviour Text, Konark Publication
- Mheta KIK - Organizational Behaviour, Prentwell Publication
- Greenberg & Boron - Behaviour in Organization, Prentic Hall
- Mathur, B.L. – Human Resource Development, Arihant Publication
- V.S.P. Rao – Human Resource Management in Small Industry, Discovery Publication
- Bhatia SK – Strategic Human Resource Management Winning through people, Deep & Deep Publication
- Prakash Ved – Human Resource Management Anmol Publication

**EXPORT MANAGEMENT**

**REVISED SYLLABUS FROM THE ACADEMIC YEAR 2010-11**

1. **Introduction to Export Management** **10 lectures**  
Definition, Need for export management, Nature of export management, Features of export management, Process of export management, Functions of an export manager, Organisation structure of an export firm.
  
2. **India's Export Trade** **10 lectures**  
Trends in India's export trade since independence, Composition of India's export trade, Direction of India's export trade, India's share in world trade, Reasons for India's poor share in world trade, Exports of services.
  
3. **International Trading Environment** **15 lectures**  
Meaning and definition of international trade, Factors influencing international trade, Problems in international trade, Regulations in international trade, Trade barriers, Role of WTO in international trade, Implications of Uruguay round for world trade. Trade blocs and their effects on world trade, Major trade blocs -- EU, ASEAN and NAFTA.
  
4. **Organising an export firm and developing an export marketing plan** **10 lectures**  
Nature of export firm, Setting up of an export firm, Registration formalities, Need for export marketing plan, Contents of export marketing plan, Developing an effective export marketing plan.
  
5. **Foreign Trade Policy and Export Promotion** **10 lectures**  
Foreign Trade Policy – 2009-14, Objectives of Foreign Trade Policy, Main highlights of Foreign Trade Policy, Main Export Promotion Organisations in India – EPCs, Commodity Boards, STC, FIEO, Chambers of Commerce, IIP, ITPO.
  
6. **Export Product Planning** **10 lectures**  
Modes of entry in foreign markets, Criteria for selection of products for exports, Steps in new product development process, Identifying foreign markets for export of products, Product Life Cycle, Product mix, Product Branding, Product packaging and labeling.



7. **Export Pricing and Finance**

15 lectures

Export Pricing - Factors determining export price, Export pricing objectives, Export pricing quotations, Marginal cost pricing, Break even pricing, Export pricing strategies.

Export Finance – Types of export finance, Features of pre-shipment and post-shipment finance, Methods of payment, Role of commercial banks and EXIM bank in export finance, Role of ECGC in export cover.

8. **Export Procedure and Incentives**

10 lectures

Stages in export procedure, Shipping and Customs formalities, Banking procedure, Procedure for realisation of export incentives, Main export incentives available to Indian exporters.

**SUGGESTED REFERENCES :**

1. Export Management – P.K. Khurana – Galgotia Publishing Company, New Delhi.
2. Export Management – T.A.S. Balagopal – Himalaya Publishing House, Mumbai.
3. Export Management – D.C. Kapoor – Vikas Publishing House Pvt. Ltd., New Delhi.
4. Export Management – Francis Cheruuilam – Himalaya Publishing House, Mumbai.
5. International Marketing and Export Management – Pearson Publication, New Delhi.
6. International Marketing Management – An Indian Perspective – R.L. Varshney and B. Bhattacharya, Sultan Chand & Sons.
7. International Marketing – P.K. Vasudeva- Excel Books, New Delhi.
8. Pepsi Handbook of India Exports – Global Business Press, New Delhi.

Question Paper Pattern for the T.Y.B.A Annual Examination in Commerce Paper  
VI (Applied Component) with effect from the Academic Year 2010 - 2011

(For the new syllabus from academic year 2010 - 2011)

- A. The paper will be of 2 ½ hours duration carrying 80 marks for regular students and 3 hrs duration carrying 100 marks for IDE students.
- B. The paper will have two sections, the first section for regular and IDE students and the second section for IDE students only.
- C. All students have to attempt any 5 questions out of 8 given in Section I.
- D. Each question will carry 16 marks which may divided into two parts of 8 marks each.
- E. Section II will consist of one question of 20 marks. Students have to attempt any 4 out of a set of 6 short notes.

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UNIVERSITY OF MUMBAI

No. UG/151 of 2010

CIRCULAR :-

A reference is invited to the Scheme of Papers relating to the Master of Commerce (M.Com.) (Parts-I&II) degree course vide this office Circular No.UG/269 of 2003 dated 26<sup>th</sup> June, 2003 and the Principals of the affiliated Colleges in Commerce and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Faculty of Commerce at its meeting held on 16<sup>th</sup> February, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.59 and that in accordance therewith, the syllabus and Question Paper Pattern for the M Com (Part-I) degree course in Accountancy is revised as per Appendix and the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032

7<sup>th</sup> July, 2010

L. R. Mane  
Offg. Registrar

To,

The Principals of the affiliated Colleges in Commerce and the Professor-cum-Director, Institute of Distance and Open Learning

A.C./4.59/3/03/2010

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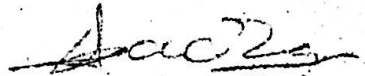
No. UG/151-A of 2010,

MUMBAI 400 032

7<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Commerce,
- 2) The Chairman, Board of Studies in Accountancy,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,



(D N Jadhav)

Ag. Deputy Registrar

(UG/PG Section)

Copy to :-

Secretary, Board of College and University Development, the Deputy Registrar (Eligibility and Migration), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

(5 copies), the Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (3 copies), the Information Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (2 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanaagari Open Learning Centre, the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum-Director, Institute of Distance and Open Learning, the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) the Assistant Registrar, Academic Authorities Unit (2 copies), the Assistant Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above circular and that on separate copy of the Assistant Registrar Constituent Computing Unit (2 copies), BUC (1 copy), the Deputy Account, Unit V (1 copy), the In-charge Director, Centralized Computing Facility (1 copy), the Deputy Registrar, Administrative sub-center, Ratnagiri (1 copy) the same.

Enclosure to Item No. 4.59  
03/03/10

# UNIVERSITY OF MUMBAI



**Revised syllabus  
and  
Question Paper Pattern  
of  
M.Com. (Part-I)  
in  
Accountancy**

**(with effect from the academic year 2010 - 2011)**

# REVISED SYLLABUS OF M.COM.

PART-I

(w.e.f. ~~Accountancy~~ ~~Academic Year 2010-11~~)  
Paper 1- Advanced Financial Accounting

Sr. No.	Topics
1.	Consolidated Financial Statement
2.	Accounting & Statutory Requirements of (Banking Companies, Insurance Companies & Co-operative Societies)
3.	Foreign Currency Conversion (As per AS- 11)
4.	Published Corporate Annual Reports
5.	Specified Accounting Standards (AS)
6.	Valuation of Goodwill, Shares and Business for Amalgamation
7.	International Financial Reporting Standards (IFRS)
	<b>Note : Law &amp; Accounting Standards in force as on 1<sup>st</sup> April immediately preceding academic year shall be applicable for examination</b>

# DETAILED TOPICS OF PAPER-1

## Advanced Financial Accounting

Sr. No.	Topics
1.	<p>I – Consolidated Financial Statements</p> <ul style="list-style-type: none"> <li>a) Accounting Standard 21</li> <li>b) Consolidated Balance sheet</li> <li>c) Consolidated Profit &amp; Loss Account</li> <li>d) Simple Subsidiary Company Only</li> <li>e) Excluding - Inter Company Holding of Shares</li> <li>f) Foreign Subsidiary Company</li> </ul>
2.	<p>II - Accounting &amp; Statutory Requirements of</p> <p>(a) Banking Companies</p> <ul style="list-style-type: none"> <li>- Accounting Provision of Banking Regulation Act</li> <li>- Provisioning of Non- Performing Assets</li> <li>- Form &amp; Requirements of Final Account</li> </ul> <p>(b) Insurance Companies</p> <ul style="list-style-type: none"> <li>- Accounting Provision for Insurance Act and Insurance Regulations &amp; Development Authorities for (1) Life insurance business (2) General Insurance business</li> <li>- Forms &amp; Requirements of Final Accounts for (1) Life insurance Business (2) General Insurance Business</li> </ul> <p>(C) co-operative Societies</p> <ul style="list-style-type: none"> <li>- Accounting Provision of Maharashtra State Co-operative Societies Act and Rules</li> <li>- Forms &amp; Requirements of Final Accounts</li> </ul>

3.	<p>III – Foreign Currency Conversion</p> <ul style="list-style-type: none"> <li>(a) Requirements as per AS- 11</li> <li>(b) Foreign Branches</li> </ul>
4.	<p>IV – Published Corporate Annual Reports</p> <ul style="list-style-type: none"> <li>(a) Contents of Annual Reports</li> <li>(b) Notes of Accounts</li> <li>(c) Director’s Reports</li> <li>(d) Auditor’s Reports</li> <li>(e) Management Discussion Analysis</li> </ul>
5.	<p>VI – Accounting Standards</p> <ul style="list-style-type: none"> <li>(a) AS - 16 Borrowing Costs</li> <li>(b) AS - 17 Segment Reporting</li> <li>(c) AS - 20 Earnings per share</li> <li>(d) AS – 22 Accounting for taxes on income</li> </ul>
6.	<p>VII - Valuations for Amalgamation, Merger</p> <ul style="list-style-type: none"> <li>(a) Methods of Goodwill</li> <li>(b) Methods of Shares</li> <li>(c) Methods of Business</li> </ul>
7.	<p>VIII – International Financial Reporting Standards (IFRS)</p> <ul style="list-style-type: none"> <li>(a) I.F.R.S</li> </ul>

## PATTERN OF QUESTION PAPER

Maximum Marks 100

Duration 3 Hours

No of questions to be asked

7

No of questions to be answered

5

Question No.01 Compulsory Practical question

20 Marks

Question No.02 Compulsory Objective

16 Marks

Question No. 03 to Question No. 07

16 Marks each

### Notes:-

(1) From Question No. 03 to Question No.07 not more than one question may be theory including short problems/questions

(2) Student to all the Question out of Question No. 03 to Question No.07

(3) Objective questions to be based on all topics and include Inter alia questions like:-

(a) Multiple choice (b) Answer in one sentence

### Reference Books

#### ● Accountancy

Introduction to Accountancy by T. S. Grewal

Advance Accounts by Shukla & Grewal

Advance Accountancy by R. L. Gupta and M Radhaswamy

Modern Accountancy by Mukherjee and Hanif

Financial Accounting by Lesile Chandwichk

Financial Accounting for Management by Dr. Dinesh Harsalekar

Financial Accounting by P. C. Tulsian

Accounting Principles by Anthony, R.N. and Reece J.S.

Financial Accounting by Gupta and Radhaswamy M

Financial Accounting by Monga, J.R. Ahuja, Girish and Shehgal Ashok.



**Paper 2—Advanced Cost Accounting (100 Marks)**

1	<b>Process Costing</b> Essential characteristics of Process Costing, Comparison of process costing and job costing, Inter process profits, Work in progress and equivalent production, Practical problems
2	<b>Operating Costing</b> Meaning of operating costing, Determination of per unit cost, Collection of costing data Practical problems based on costing of hospital, hotel and goods and passenger transport
3	<b>Integrated accounts</b> Meaning, Advantages and disadvantages, Distinctive features, practical problems <b>Non integrated system of accounts</b> Cost control accounts to be prepared, Journal entries, practical problems
4	<b>Marginal Costing and absorption costing</b> Meaning of absorption costing, distinction between absorption costing and marginal costing, Theory and Problems on Breakeven Analysis. Cost Volume Profit Analysis, Breakeven Charts. Contribution margin and Various decision making problems.
5	<b>Managerial Decisions</b> Managerial Decisions through Cost Accounting such as Pricing Accepting special Offer, Profit planning. Make or Buy decision, Determining key-factor, Determining Sales-mix, Determining optimum Activity Level, Performance Evaluation, Alternatives methods of Production, Cost reduction and cost Control.
6	<b>Standard Costing</b> Standard Costing as an Instrument of Cost Control and Cost Reduction. Fixation of Standards. Theory and Problems based on Analysis of Variances of Sales, Materials, Labour and Overheads.
7	<b>Budgetary Control</b> Budget and Budgetary control, Zero based budget, Performance budgets, Functional Budgets Leading to the Preparation of Master Budgets, Capital Expenditure Budget. Fixed and Flexible Budgets and preparation of different types of budgets.
8	<b>Cost Audit</b> Cost and Efficiency Audit, Cost Audit vis-à-vis Financial audit, special Characteristics, Scope And Functions of Cost Audits, Organizations For and Circumstances favouring cost audits, Benefits of Cost audits, Cost audit programme and Procedure, External or Statutory Cost Audit. Provisions of Cost audit in companies Act and cost Audit (reporting) Rules, Cost Investigation.

**PATTERN OF QUESTION PAPER**

**Maximum Marks 100**

**Duration 3 Hours**

**No of questions to be asked**



No of questions to be answered		6
Question No.01 Compulsory	Practical question	20 Marks
Question No.02 Compulsory	Objective	16 Marks
Question No. 03 to Question No. 09		16 Marks each

**Notes:-**

(1) From Question No. 03 to Question No.09 not more than one question may be theory including short problems/questions

(2) Student to answer any four out of Question No. 03 to Question No.09

(3) Objective questions to be based on all topics and include Inter alia questions like :-

(a) Multiple choice (b) Answer in one sentence

**Costing Recommended Books**

- Lecture on costing by Swaminathan published by S.Chand & Co.
- Practical costing by Khanna Pandey and Ahuja published by S.Chand & Co.
- Cost Accounting by C S Rayudu published by Tata McGraw Hills
- Cost Accounting by Jawaharlal published by Tata McGraw Hills
- Theory and problems of Cost and Management accounting by M Y Khan and P K Jain published by Tata McGraw Hills
- Cost Accounting by Ravi M Kishore published by Taxmann Ltd.
- Cost Accounting by N K Prasad
- Cost Accounting- Theory and Practice by B K Bhar
- Cost Accounting- Theory and Practice by M N Arora published by
- Practical Costing by P C Tulsian published by Vikas Publishing house
- Cost Accounting- Text and problems by M C Shukla, T S Grewal and M P Gupta published by S.Chand
- Cost Accounting- Problems and solutions by V K Saxena C D Vashist published by S.Chand
- Cost Accounting by S P Jain and K L Narang published by Kalyani
- Cost Accounting- Principles and practice by M N Arora published by Vikas
- Principles of Management Accounting by Anthony Robert published by Richard Irwin Inc
- Cost Accounting- A Managerial emphasis by Horngreen, Charles, Foster and Datar published by Prentice Hall of India
- Management Accounting by M Y Khan and P K Jain published by Tata McGraw Hills
- Advanced Management Accounting by R S Kapllan and AA Atkinson Prentice India International
- Advanced problems and solutions in Cost Accounting by S N Maheshwari published by Sultan Chand

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UNIVERSITY OF MUMBAI

No. UG/152 of 2010

CIRCULAR:-

A reference is invited to the Ordinances, Regulations and syllabi relating to the Bachelor of Science in Information Technology (B.Sc.) (I.T.) degree course vide this Pamphlet No.338 and to this office Circular No.UG/150 of 2001 dated 3<sup>rd</sup> May, 2001 and No.UG/402 of 2002 dated 18<sup>th</sup> September, 2002 and the Principals of the affiliated Colleges in Arts, Science, Commerce and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Ad-hoc Committee appointed by the Academic Council to advise on all matters relating to the B.Sc & M.Sc. Degree Course in the subject of Information Technology at its meeting held on 11<sup>th</sup> February, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.63 and that, in accordance therewith, the syllabus for the B.Sc.(I.T.) for Semester- I & II examination is revised as per the Appendix and the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
7<sup>th</sup> July, 2010

L. R. Mane  
Offg. Registrar

To,

The Principals of the affiliated Colleges in Arts, Science, Commerce and the Professor-cum-Director, Institute of Distance and Open Learning

A.C./4.63/3/2010

\*\*\*\*\*

No. UG/152-A of 2010,

MUMBAI-400 032

7<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Science,
- 2) The Chairman, Ad-hoc Board of studies in Information Technology
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre.



(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section) *8/12*

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section, Deputy Registrar, Enrolment, Eligibility and Migration Section, Vidyanagari

Enclosure to Item No. 4.63  
03/03/10

# UNIVERSITY OF MUMBAI



**Revised Syllabus**

**for**

**B.Sc. (IT)**

**Semester – I & II**

**(with effect from the academic year 2010 - 2011)**

**University of Mumbai**  
**B.Sc. (IT) semester – I & II**  
 (Revised Syllabus to be brought in force w.e.f. academic year 2010-2011)

**Semester – I**

Subjects (5 PAPERS)

Professional Communication skills

Applied Mathematics – I

Fundamentals of digital computing

Electronics and Communication technology

Introduction to C++ programming

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester – I</b>	
<b>SUBJECT: Professional Communication Skills</b>			
<b>Periods per week</b> 1 Period is 50 minutes	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

<b>Unit – I</b>	<b>The Seven Cs of Effective Communication</b> Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness
<b>Unit- II</b>	<b>Communication: Its interpretation</b> Basics, Nonverbal Communication, Barriers to Communication
<b>Unit-III</b>	<b>Business Communication at Work Place:</b> Letter Components and Layout, Planning a letter, Process of Letter writing, E-mail Communication, Memo and Memo reports, Employment Communication, Notice agenda and Minutes of meeting, Brochures
<b>Unit-IV</b>	<b>Report Writing</b> Effective writing, types of business reports, structure of reports, gathering information, organization of the material, writing abstracts and summaries, writing definitions, visual aids, user instruction manual.
<b>Unit -V</b>	<b>Required Skills</b> Reading skills, listening skills, note-making, précis writing, audiovisual aids, oral communication

Unit-VI	<b>Mechanics of Writing</b> Transitions, Spelling rules, hyphenation, transcribing numbers, Abbreviating technical and non-technical terms, Proof reading.
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**Text Books:**

Professional Communication by Aruna Koneru, McGrawHill  
Effective Business Communication by Herta A Murphy, Herbert W Hildebrandt, Jane P Thomas, McGraw

**Reference Books:**

Business Communication, Lesikar and Petit, McGrawHill  
Communication Skills Handbook, Summers, Wiley, India  
Business Communication (Revised Edition), Rai and Rai, Himalaya Publishing House  
Business Correspondence and Report Writing by R. C. Sharma and Krishna Mohan, TMH.

**Term Work and Tutorial**

Should contain minimum 10 assignments and two class tests

**Practical**

None

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester – I</b>	
<b>SUBJECT: Applied Mathematics I</b>			
<b>Periods per week</b> 1 Period is 50 minutes	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
<b>Evaluation System</b>		<b>Hours</b>	<b>Marks</b>
	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

Unit – I	<b>Matrices:</b> Minors and Cofactors, Adjoint of a square matrix, Inverse of a matrix. Rank of a matrix, Solution of Homogeneous and non homogeneous linear Equations using Matrix method.
Unit- II	<b>Eigen Values and Eigen Vectors:</b> Vectors, linear combination of vectors, Inner Product of two vectors, characteristic equation, Eigen Vector, Cayley- Hamilton Theorem, Similarity of Matrices, Derogatory and Non-derogatory matrices, Complex Matrices: Hermitian, skew-Hermitian and Unitary matrices and their properties.
Unit -III	<b>Vector Calculus:</b> Vector Differentiation: Vector Operator Del, Gradient, and Geometrical Meaning of gradient, Divergence and Curl.

Unit - IV	<b>Differential Equations:</b> Differential Equations of 1 <sup>st</sup> order and 1 <sup>st</sup> degree and applications
Unit - V	<b>Linear Differential Equations:</b> Linear Differential equations with constant coefficient, Differential equations of higher order and applications.
Unit -VI	Successive differentiation, Mean Value theorems, Partial differentiation, Euler's Theorem, Approximation and errors, Maxima and Minima

**Text Books:**

Engineering Mathematics A tutorial approach by R. R. Singh and Mukul Bhatt, TMH 2010  
Text Book of Applied Mathematics Vol I and Vol II. P.N. Wartikar & J.N. Wartikar, Pune Vidyarthi Griha Prakashan

**References:**

Higher Engineering Mathematics by B. V. Ramana, McGrawHill  
Differential Calculus by Shanti Narayan. S. Chand.  
Higher Engineering Mathematics by B.S. Grewal, Khanna Publications  
Vector Analysis by Murray Spiegel, McGrawHill  
Matrices by Vashistha, S. Chand

**Term Work and Tutorial**

Should contain minimum 10 assignments and two class tests

**Practical**

None

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester – I</b>	
<b>SUBJECT: Fundamentals of Digital Computing</b>			
<b>Periods per week</b> <b>1 Period is 50 minutes</b>	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

Unit – I	<b>Data and Information</b> Features of Digital Systems, Number Systems-Decimal, Binary, Octal, Hexadecimal and their inter conversions, Representation of Data: Signed Magnitude, one's complement and two's complement, Binary Arithmetic, Fixed point representation and Floating point representation of numbers.
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	<b>Codes</b> BCD, XS-3, Gray code, hamming code, alphanumeric codes (ASCII, EBCDIC, UNICODE), Error detecting and error correcting codes.
Unit- II	<b>Boolean Algebra:</b> Basic gates (AND, OR, NOT gates), Universal gates (NAND and NOR gates), other gates (XOR, XNOR gates). Boolean identities, De Morgan Laws.  <b>Karnaugh maps:</b> SOP and POS forms, Quine McClusky method.
Unit -III	<b>Combinational Circuits:</b> Half adder, full adder, code converters, combinational circuit design, Multiplexers and demultiplexers, encoders, decoders, Combinational design using mux and demux.
Unit - IV	<b>Sequential Circuit Design:</b> Flip flops (RS, Clocked RS, D, JK, JK Master Slave, T, Counters, Shift registers and their types, Counters: Synchronous and Asynchronous counters.
Unit- V	<b>Computers:</b> Basic Organisation, Memory: ROM, RAM, PROM, EPROM, EEPROM, Secondary Memory: Hard Disk and optical Disk, Cache Memory, I/O devices
Unit -VI	<b>Operating Systems:</b> Types (real Time, Single User / Single Tasking, Single user / Multi tasking, Multi user / Multi tasking, GUI based OS. Overview of desktop operating systems-Windows and LINUX.

**Text Books:**

Modern Digital Electronics by R. P. Jain, 3<sup>rd</sup> Edition, McGraw Hill  
 Digital Design and Computer Organisation by Dr. N. S. Gill and J. B. Dixit, University Science Press  
 Linux Commands by Bryan Pfaffaenberger BPB Publications  
 UNIX by Sumitabha Das, TMH

**References:**

Digital Principles and Applications by Malvino and Leach, McGrawHill  
 Introduction to Computers by Peter Norton, McGraw Hill  
 Introduction to Computers by Balagurusamy

**Term Work and Tutorial**

Should contain minimum 5 assignments and two class tests

**Practical (Minimum 8 expts.)**

List of Practicals:

1. Study of logic gates (basic and universal)



2. Verify De Morgan's theorems
3. Design and implement Half adder and full adder using gates.
4. Design and implement binary to gray code converter and vice versa using XOR gates.
5. Design and implement multiplier for two 2-bit binary numbers using minimum number of gates.
6. Reduce the given numeric form using K-map and implement using gates.
7. Implement SOP /POS forms using logic gates.
8. Implement logic gates using multiplexers.
9. Implement expressions using multiplexers and demultiplexers
10. Implement 3-bit binary ripple counter using JK flip flops.

Linux

1. Installation of Linux
2. Study of Linux Commands with all switches:  
ls, mkdir, cd, rmdir, wc, cat, mv, chmod, date, time, grep, tty, who, whoami, finger, pwd, man, cal, echo, ping, ifconfig, tar, telnet

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester – I</b>	
<b>SUBJECT: Electronics and Communication Technology</b>			
<b>Periods per week</b> <b>1 Period is 50 minutes</b>	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

Unit – I	Concept of Conductor, Semiconductor, Insulator. Semiconductor Diode, Forward bias, Reverse Bias, Application of Diode as Rectifier, Zener diode and its applications, Introduction to Transistor (BJT, FET), PNP, NPN Transistors their Characteristic. Application of Transistor as amplifier and as a Switch.
Unit- II	Concept of amplification, amplifier notations, $A_v$ , $A_i$ , $A_p$ , $Z_i$ , $Z_o$ , Application of BJT as single stage Amplifier, Frequency response of single stage Amplifier. Multistage Amplifiers:- (Basics concepts) RC coupled, cascade, Darlington pair, DC amplifiers.
Unit-III	Concept of Feedback:- Negative Feedback and its advantage in Amplification, Positive Feedback :- Oscillators, RC Phase Shift Oscillator, LC Oscillator. Switching Circuits Multivibrators : - Monostable using IC 555

	and Astable using IC 555 (including problems)
Unit- IV	Introduction:- Need for modulation system, Concept of Modulation. AM :- Definition of AM, Modulation index, Power relation in AM, Generation and Demodulation of AM. SSB:- Power requirement in comparison with AM, Advantages of SSB over AM, Concept of Balanced Modulator, Generation of SSB, Pilot Carrier System, Independent Side System, Vestigial Sideband Transmission.
Unit- V	FM: - Definition of FM, Bandwidth, Noise triangle, Per-emphasis and De-emphasis. PM: - Definition of PM. Difference between AM and FM. Radio receivers. Pulse Modulation:- Sampling Theorem, PAM, PTM, PWM, PPM, pulse code modulation, Quantization noise, companding, PCM system, differential PCM, Delta modulation. Multiplexing: - FDM/TDM. Television:- Scanning, Composite Video signal, Television Transmitter, television receiver.
Unit-VI	Introduction to Digital Communication: PSK, ASK, FSK. Introduction to fibre optics system:- Propagation of light in optical fibre; ray model . Types of fibre : Single mode, steps index. Graded index. Signal distortion: attenuation, dispersion. Optical sources: LED, LASERS. Optical Detectors and optics links. Link Budget.

### References

- Allen Mottershead, "Electronic Devices and Circuits", PHI  
 Boylstead and Neshelesky , "Electronics Devices and Circuits", 4<sup>th</sup> , PHI, 1999.  
 Simon Haykin, "An Introduction to Analog and Digital communications", John Wiley and Sons, 1994.  
 R.B Carlson, "Communication Systems", MacGraw Hill.  
 George Kennedy, "Electrical Communication systems", Tata McGraw Hill 1993.  
 Roody Collin, "Electronics Communication", PHI  
 J. Millman and A Grabel, " Microelectronics" MacGraw Hill 1988.  
 Proakis J. J, "Digital Communications" Mc Graw Hill.  
 Digital Communications by TAUB Schilling  
 Electronic Communication Systems, Roy Blake Delmar, Thompson Learning  
 Introduction To telecommunications, Anu A Gokhale, Delmar Thompson Learning

### Term Work and tutorial

**Should contain 5 assignments and two class tests**

**Practical: Should contain minimum 8 experiments.**

List of Practicals:

1. Study of Zener diode characteristics
2. Study of Half wave and full wave rectifiers
3. Study of bridge rectifier.
4. Study of Transistor as a switch
5. Monostable multivibrator using IC 555 timer.
6. Astable multivibrator using IC 555 timer.
7. Study of Wien bridge oscillator

8. Frequency Response of single stage transistor amplifier
9. Study of Amplitude Modulation
10. Study of Frequency Modulation
11. Study of Fibre Optic transmission
12. Study of Pulse Amplitude Modulation
13. Study of transistor DC Amplifier

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester – I</b>	
<b>SUBJECT: Introduction to C++ programming</b>			
<b>Periods per week</b> <b>1 Period is 50 minutes</b>	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

<b>Unit – I</b>	<b>Programming Logic and techniques</b> Algorithms, Flow-charts, Program Design. Introduction to C++: Origin of C++, A Sample C++ program, pitfall and programming tips. Testing and Debugging.
<b>Unit- II</b>	<b>C++ concepts</b> Variables and Assignments: variables, identifiers, variable declarations, Assignment Statements, reference variable, symbolic constant. Input and Output: cin, cout, escape sequences, include directives and Namespaces, Indenting and Comments, Operator precedence. Data types and expressions, Arithmetic operators, Type compatibilities.
<b>Unit-III</b>	<b>Flow of Control</b> Compound statements Loops: while, for, do while , nested loops. Decision making: if – else, nested if else, switch , break and continue. Manipulators: endl , setw, sizeof. Increment and decrement operators. Type Cast Operators, Scope resolution operators
<b>Unit- IV</b>	<b>Functions</b> Function Prototypes , built in functions and user defined functions, Function overloading, Call by reference, Call by value, const member functions. Inline Functions and recursive functions, Math Library Functions.
<b>Unit- V</b>	<b>Derived Data types ( Arrays , pointers , functions)</b> Introduction to arrays, arrays in functions, 2-D arrays , Multidimensional

	arrays. Introduction to pointers, void pointers, pointers in function, pointer to constant and constant pointer, generic pointer.
Unit-VI	<b>Strings, Vectors and Structures</b> String functions: strcmp, strcat, strlen, strcpy . Vector Basics. Introduction to Structures.
<b>Books:</b> Problem Solving with C++ , Walter Savitch, Sixth Edition, Pearson Education. J. R. Hubbard, Schaum's outlines "Programming with C++", Second Edition , Tata McGrawHill Y.P.Kanetkar, "Let us C++" , seventh edition, BPB publication	
<b>Reference Books:</b> Object Oriented programming with C++ , E Balagurusamy , Third Edition , Tata McGraw Hill. Object oriented programming with C++ Poonamchandra Sarang, PHI Second Edition. Pure C++ programming , Amir Afzal, Pearson Education. Computer Science – A structured Approach using C++ bu B. Forouzan, R. F. Gilberg, Cengage Publication.	

### Term Work and tutorial

**Tutorial should contain 5 assignments and two class tests**

### Practical: Should contain minimum 8 experiments

- 1) Write a C++ program for Formatting the following statement using setw and endl:  
" Nothing is difficult then beginning"  
"So Let's start the voyage of technology!!"
- 2) Write a C++ program for finding greatest of three number.
- 3) Write a C++ program for solving the quadratic equation.
- 4) Write a C++ program to print all the prime numbers in a given range.
- 5) Write a C++ program for displaying the Fibonacci series.
- 6) Write a C++ program for converting number to words. (switch,break,continue)
- 7) Write a C++ function for swapping two numbers without using third variable.
- 8) Write a recursive function for factorial of given number.
- 9) Write your own function for string reverse , string palindrome , string comparison
- 10) Write a program for sorting the number in ascending and descending order
- 11) Write a program for Matrix addition and multiplication.
- 12) Write a program for implementing the concept of structures.
- 13) Write a program for finding the greatest and smallest number using vector.
- 14) Write a program for implementing the concept of call by value and call by reference.
- 15) Write a program for generating the report card.



**Semester - II**

**Subjects:**

**Web Technologies**

**Applied Mathematics – II**

**Microprocessor and Microcontrollers**

**DBMS**

**Digital Computer Networks**

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester – II</b>	
<b>SUBJECT: Web Technology</b>			
<b>Periods per week 1 Period is 50 minutes</b>	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
<b>Evaluation System</b>		<b>Hours</b>	<b>Marks</b>
	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

<b>Unit – I</b>	<p><b>Internet and WWW</b>                  What is Internet?, Introduction to internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address                  World Wide Web (WWW)                  World Wide Web and its evolution, uniform resource locator (URL), browsers – internet explorer, netscape navigator, opera, firefox, chrome, mozilla. search engine, web saver – apache, IIS, proxy server, HTTP protocol</p>
<b>Unit- II</b>	<p><b>HTML and Graphics</b>                  HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Frame Tags, Executable content tags</p> <p><b>Imagemaps</b>                  What are Imagemaps?, Client-side Imagemaps, Server-side Imagemaps, Using Server-side and Client-side Imagemaps together, Alternative text for Imagemaps,</p> <p><b>Tables</b>                  Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background Color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, Spanning multiple rows or columns, Elements that can be placed in a table, Table Sections and column properties, Tables as a design tool</p> <p><b>Frames</b>                  Introduction to Frames, Applications, Frames document, The &lt;FRAMESET&gt; tag,</p>

	<p>Nesting&lt;FRAMESET&gt; tag, Placing content in frames with the &lt;FRAME&gt; tag, Targeting named frames, Creating floating frames, Using Hidden frames,</p> <p><b>Forms</b>          Creating Forms, The &lt;FORM&gt; tag, Named Input fields, The &lt;INPUT&gt; tag, Multiple lines text windows, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event handlers, Passing form data</p> <p><b>Style Sheets</b>          What are style sheets?, Why are style sheets valuable?, Different approaches to style sheets, Using Multiple approaches, Linking to style information in s separate file, ,Setting up style information, Using the &lt;LINK&gt; tag, Embedded style information, ,Using &lt;STYLE&gt; tag, Inline style information</p>
Unit- III	<p><b>Java Script</b>          Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security,</p> <p><b>Operators</b>          Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++(Increment), --(Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ?: (Conditional operator), , (Comma operator), delete, new, this, void</p> <p><b>Statements</b>          Break, comment, continue, delete, do...while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with,</p> <p><b>Core JavaScript (Properties and Methods of Each)</b>          Array, Boolean, Date, Function, Math, Number, Object, String, RegExp</p> <p><b>Document and its associated objects</b>          document, Link, Area, Anchor, Image, Applet, Layer</p> <p><b>Events and Event Handlers</b>          General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, ondblclick, ondragdrop, onerror, onfocus, onkeydown, onkeypress, onkeyup, onload, onmousedown, onmousemove, onmouseout, onmouseover, onmouseup, onmove, onreset, onresize, onselect, onsubmit, onunload</p>
Unit – IV	<p><b>XML</b>          Introduction to XML, Anatomy of an XML document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL</p>
Unit – V	<p><b>PHP</b>          Why PHP and MySQL?, Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors/problems.</p>
Unit – VI	<p><b>Advanced PHP and MySQL</b>          PHP/MySQL Functions, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, Type and Type Conversions, E-Mail</p>



Term Work and tutorial  
Should contain minimum 5 assignments and two class tests

Practical: Should contain minimum 8 experiments

List of Practicals:

1. Design a web page using different text formatting tags.
2. Design a web page with links to different pages and allow navigation between pages.
3. Design a web page with Imagemaps.
4. Design a web page with different tables. Design a webpage using table so that the content appears well placed.
5. Design a webpage using frames.
6. Design a web page with a form that uses all types of controls.
7. Design a website using style sheets so that the pages have uniform style.
8. Using Java Script design a web page that prints factorial / Fibonacci series / any given series.
9. Design a form with a test box and a command button. Using Java Script write a program whether the number entered in the text box is a prime number or not.
10. Design a form and validate all the controls placed on the form using Java Script.
11. Design a DTD, corresponding XML document and display it in browser using CSS.
12. Design an XML document and display it in browser using XSL.
13. Design XML Schema and corresponding XML document.
14. Design a php page to process a form.
15. Design a php page for authenticating a user.
16. Design a complete dynamic website with all validations.

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester - II</b>	
<b>SUBJECT: Applied Mathematics - II</b>			
<b>Periods per week</b> 1 Period is 50 minutes	<b>Lecture</b>	5	
	<b>TW/Tutorial/Practical</b>	3	
<b>Evaluation System</b>		<b>Hours</b>	<b>Marks</b>
	<b>Theory Examination</b>	3	100
	<b>TW/Tutorial/Practical</b>	--	50

<b>Unit - I</b>	<b>Complex Numbers:</b> Cartesian, Polar & Exponential form, De-Moivre's theorem, Hyperbolic functions, Logarithms of Complex numbers
<b>Unit - II</b>	<b>Complex Variables :</b> Cauchy Riemann Equations, Conformal Mapping and Bilinear Mapping, concept of Line Integral, Riemann Integral, Singularities - Poles, Evaluation of Residues theorem.
<b>Unit - III</b>	<b>Laplace Transform:</b> Introduction, Definition, Properties of Laplace Transform, Laplace Transform of standard function. <b>Inverse Laplace Transform:</b>

	Inverse Laplace Transform , Methods of obtaining Inverse Laplace transform, Laplace transform of Periodic Functions, Heavyside Unit-step Function, Dirac-delta function (Unit Impulse Function), Application of Inverse Laplace transform to solve differential equations.
Unit – IV	Differentiation under Integral sign, Beta and Gamma Functions, Properties and Duplication Formula, Error Functions
Unit – V	<b>Fourier Series:</b> Fourier Series, Change of Interval, Even and odd functions, Half range expansions.  <b>Fourier Transform and Inverse Fourier Transform:</b> Fourier transform of Even and Odd functions, Fourier Transform of sine and cosine functions
Unit – VI	<b>Integral Calculus:</b> Double Integral, Area, Triple Integral, Volume

Engineering Mathematics A tutorial approach by R. R. Singh and Mukul Bhatt, TMH 2010  
Differential Calculus by Shanti Narayan.

B. S. Grewal, "Higher Engineering Mathematics.

Advanced Engineering Mathematics: R.K.Jain, S.R.K. Iyengar, Narosa Publishing House.

Engineering Mathematics : T Veerajan, Tata McGraw-Hill

Integral Transforms: A. R. Vasishta, Dr. R.K. Gupta, Krishna Prakashan Mandir.

### Term Work and Tutorial

Should contain minimum 10 assignments and two class tests

### Practical

None

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester - II</b>	
<b>SUBJECT: Microprocessor and Microcontrollers</b>			
<b>Periods per week</b> 1 Period is 50 minutes	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

Unit – I	Logic devices: Tristate devices, buffers, encoder, decoder, latches, Types of memories, memory organization, concept of control lines such as read/write chip enable
Unit- II	Introduction to 8085 microprocessor: - Organization of Microprocessor based system, 8085 $\mu$ p Architecture, Concept of Address line and Memory interfacing, Address Decoding and Memory Interfacing,
Unit-III	8085 Programming Model, Instruction Classification, Instruction Format, 8085 Instruction Set

Unit- IV	Introduction to Modern day Computer Systems: - Organization and Architecture, Structure and function. System Buses: - Computer Components, Computer function, PCI: - Features of PCI bus, Why PCI bus is needed? Concept of PCI Arbitration. Internal Memory: - Concept of Cache Memory, Methods of Cache Mapping, Concept and need for Cache coherency. External Memory: - RAID.
Unit- V	The 8051 Microcontroller: Introduction and overview of 8051 family, 8051 Assembly Language Programming, Jumps, Loops and call instructions.
Unit-VI	8051 I/O port programming, Addressing Modes, Arithmetic and Logical instructions.

### References

- William Stallings, "Computer Organisation and Architecture" ( 4<sup>th</sup> Edition ) - PHI, 1998.  
 Andrew C. Tanenbaum, "Structured Computer Organisation" (3rd Edition) -, PHI.  
 Computer System Architecture - M. Morris Memo, PHI, 1998.  
 John P Hayes, "Computer Architecture and Organisation" - McGraw Hill, 1998.  
 Digital Computer Fundamentals, Malvino  
 Microprocessor Architecture and Programming and Applications with the 8085, R.S. Gaonkar, PRI (3<sup>rd</sup> Edition)  
 Digital Computer Fundamentals, Thomas C Bartee, TMG  
 The 8051 Microcontroller and Embedded systems by M. A. Mazidi, J. G. Mazidi and R. D. McKinlay, Pearson Education.

### Term Work and tutorial

**Tutorial should contain 5 assignments and two class tests**

**Practical: Should contain minimum 8 experiments (4 from each group)**

#### List of Practicals:

8085 programs for

1. Simple 8-bit and 16-bit addition and subtraction
2. Transfer a block of data from one location to another.
3. Find the largest/smallest of the numbers stored at one location.
4. Addition of 10 numbers.
5. Multiplication of 8-bit and 16-bit numbers.
6. Sorting of numbers.
7. BCD addition
8. Division
9. Find GCD and LCM of two numbers
10. Swapping a block of data

8051 programs for:

1. To search a number from a given set of numbers. The end of the data is indicated by 00.
2. Finding the average of signed numbers.
3. Multiplication of signed numbers.
4. Convert the BCD 0111 0101 number to two binary numbers and transfer this number to registers.
5. To find y where  $y = x^2 + 2x + 5$  and x is between 0 and 9.

6. Write a program to show the use of the BIT directive.
7. Write a program to find the number of zeros in register R2
8. Write a program to check if the accumulator is divisible by 8.
9. To check whether a character string is a palindrome or not.
10. To check the number is prime or not.

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester – II</b>	
<b>SUBJECT: DBMS</b>			
<b>Periods per week</b> <b>1 Period is 50 minutes</b>	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

<b>Unit – I</b>	<b>Introduction to Databases and Transactions</b>
	What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management,
<b>Unit- II</b>	<b>Data Models</b>
	The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.
<b>Unit-III</b>	<b>Database Design ,ER-Diagram and Unified Modeling Language</b>
	Database design and ER Model:overview, ER-Model, Constraints, ER-Diagrams, ERD Issues, weak entity sets, Codd's rules, Relational Schemas, Introduction to UML <b>Relational database model:</b> Logical view of data, keys, integrity rules. Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF).
<b>Unit- IV</b>	<b>Relational Algebra and Calculus</b>
	Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. Calculus: Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities.
<b>Unit- V</b>	<b>Constraints, Views and SQL</b>
	What is constraints, types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers.



Unit-VI	<b>Transaction management and Concurrency control</b>
	Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Books:  
 A Silberschatz, H Korth, S Sudarshan, "Database System and Concepts", fifth Edition McGraw-Hill,  
 Rob, Coronel, "Database Systems", Seventh Edition, Cengage Learning.

**Term Work and tutorial**  
 Should contain 5 assignments and two class tests

**Practical: Should contain minimum 8 experiments**

Practicals

- 1) Design a Database and create required tables. For e.g. Bank, College Database
- 2) Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.
- 3) Write a sql statement for implementing ALTER, UPDATE and DELETE
- 4) Write the queries to implement the joins
- 5) Write the query for implementing the following functions:  
 MAX(), MIN(), AVG(), COUNT()
- 6) Write the query to implement the concept of Intergrity constrains
- 7) Write the query to create the views
- 8) Perform the queries for triggers
- 9) Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints
- 10) Write the query for creating the users and their role.

<b>CLASS: B. Sc (Information technology)</b>		<b>Semester - II</b>	
<b>SUBJECT: Data communication and Network standards</b>			
<b>Periods per week</b> 1 Period is 50 minutes	<b>Lecture</b>	<b>5</b>	
	<b>TW/Tutorial/Practical</b>	<b>3</b>	
		<b>Hours</b>	<b>Marks</b>
<b>Evaluation System</b>	<b>Theory Examination</b>	<b>3</b>	<b>100</b>
	<b>TW/Tutorial/Practical</b>	<b>--</b>	<b>50</b>

Unit-I	<b>Introduction to data communications and networking</b> Introduction, Fundamental concepts, Data communications, Protocol, standards, standard organizations, signal propagation, analog and digital signals, bandwidth of signal and a medium, Fourier analysis and the concept of bandwidth of a signal, The data transmission rate and bandwidth.
Unit-II	<b>Network Models</b> Layered Tasks, The OSI reference model , Layers in the OSI reference model ,

	TCP/IP protocol suite , Addressing IPv4
Unit-III	<b>Information Encoding , Errors Detection and Correction</b> Introduction, Representing different symbols, Minimizing errors , Multimedia , Multimedia and Data compression. Error classification, types of errors, redundancy, detection versus correction , hamming distance , cyclic redundancy check.
Unit-IV	<b>Media and Transmission modes</b> Data and signals, Periodic analog signals, Digital signals, Transmission impairment, Data rate limits, Performance, Digital to digital, Analog to digital conversion , Transmission modes, Digital to analog conversion , Analog to analog conversion, Guided media and Unguided media
Unit-V	<b>Network topologies ,Switching and routing algorithms</b> Mesh,star,tree,ring,bus,hybrid, switching basics , circuit switching, packet switching and Message switching , routing algorithms
Unit-VI	<b>IP version 6</b> Overview , Terminology, IPv6 addresses , Special addresses , IP v 6 header formats, IPv6 extension headers , IPv6 autoconfiguration , configuration via DHCP v6 , IPv6 transition

**Books:**

Behrouz A Forouzan, "Data communications and Networking", Fourth Edition , Mc-Graw Hill  
Achyut Godbole, "Data communications and Networks, TMH  
Dr.Sidnie Feit, "TCP/IP" ,Second Edition, TMH

**Reference:**

W.Stallings,"Data and Computer Communications", Eight Edition,Pearson Education

**Term Work and Tutorial**

Should contain minimum 10 assignments and two class tests. (One case study in lieu of assignments)

**Practical**

None

University of Mumbai  
**B.Sc –IT**

**1) Issues related to Term work, tutorial, assignments and practicals for FY**

- Marks distribution for subjects having Practical/Tutorials and for the subjects only Tutorials
- Theory 100 marks per paper, TW/tutorial/practical 50 marks
- Minimum 40% marks out of 100 for passing in theory and 20 marks out of 100 for passing in TW/tutorial/practical.



*Semester I*

<i>Subject</i>	<i>Theory (100)</i>	<i>Practical / Demo</i>	<i>Tutorial/a ssignments</i>	<i>Cass tests</i>	<i>Total</i>
P1- Professional Communication skills	Yes (100)	None	Yes (30)	Yes (20)	100+50
P2- Applied Maths – I	Yes (100)	None	Yes (30)	Yes (20)	100+50
P3- Electronics and communication technology*	Yes (100)	Practical (25)	Yes (15)	Yes (10)	100+50
P4- Fundamentals of Digital Computing*	Yes (100)	Practical (25)	Yes (15)	Yes (10)	100+50
P5- Introduction to C++ programming*	Yes (100)	Practical (25)	Yes (15)	Yes (10)	100+50

*Semester II*

<i>Subject</i>	<i>Term Work (50)</i>				<i>Total</i>
	<i>Theory (100)</i>	<i>Practical / Demo</i>	<i>Tutorial/as signments</i>	<i>Cass tests</i>	
P1- Web Technology*	Yes (100)	Practical (25)	Yes (15)	Yes (10)	100+50
P2- Applied Maths – II	Yes (100)	None	Yes (30)	Yes (20)	100+50
P3- Microprocessor and Microcontrollers*	Yes (100)	Practical (25)	Yes (15)	Yes (10)	100+50
P4- DBMS*	Yes (100)	Practical (25)	Yes (15)	Yes (10)	100+50
P5- Digital Computer Networks	Yes (100)	None	Yes (30)	Yes (20)	100+50

- *Tutorials are theory/problems to be solved by the students in the classroom at the end of a practical/Theory session.*
- *Assignments are theory/problems to be solved by the students at home.*
- *Test is conducted in the classroom with due notice. Test could be out of any sum total but is to be converted out of 10 for papers with practicals and out of 20 for papers without practicals as given in table for term work..*
- *Semesters I, II, III, IV are college examinations. Question papers will be set by the examiners appointed by the Principal of the affiliated colleges.*

- The Principal of the respective colleges is expected to appoint senior faculty as examiners for each subject.
- In respect of I, II, III, IV semesters the assessment will be done by the respective colleges. Moderation and result preparation will be as per existing College / University rules in respect of other similar courses.
- ATKT/Failures examination: After 15 to 20 days from the date of declaration of results of the semester in question.

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**UNIVERSITY OF MUMBAI**

No.UG/153 of 2010

**CIRCULAR :-**

A reference is invited to the Ordinances, Regulations and syllabi relating to the Bachelor of Science (Computer Science) degree course vide this office Circular No. UG/150 of 2005 dated 26<sup>th</sup> April, 2005 and the Principals of the affiliated colleges in Science are hereby informed that the recommendation made by the Ad-hoc Board of Studies in Computer Science at its meeting held on 24<sup>th</sup> February, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.69 and that, in accordance therewith, the syllabus and pattern of question paper for the T.Y.B.Sc. Examination in the subject of Computer Science is revised as per Appendix and that the same has been brought into force with effect from the academic year 2010 - 2011.

MUMBAI-400 032  
7<sup>th</sup> July, 2010

L. R. Mane  
Offg. Registrar

To,

The Principals of the affiliated colleges in Science.

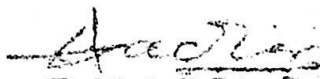
A.C/4.69/3/03/2010

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No. UG/153-A of 2010      MUMBAI-400 032      7<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Science,
- 2) The Chairperson, Ad-hoc Board of Studies in Computer Science,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanageri (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum- Director, Institute of Distance Education, (10 copies) the Director University Computer Center (IDE Building), Vidyanageri, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) the Assistant Registrar, Academic Authorities Unit (2 copies) and the Assistant Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above circular and that on separate Action Taken Report will be sent in this connection. the Assistant Registrar Constituent Colleges Unit (2 copies)

3/3/2010

**UNIVERSITY OF MUMBAI**



**Revised Syllabus  
and  
Paper Pattern  
for  
T. Y. B. Sc.  
in  
Computer Science**

**(with effect from the academic year 2010 - 2011)**

Note : Each student must maintain a record of experiments and project performed as per syllabus and must bring a certified journal and project report duly signed by the teacher concerned and HOD at the time of final examination.

The Bachelor of Science BSc with Computer Science course has the status as one of the subject at the BSc course. It is further clarified that adequate laboratory staff are required for conduct BSc Computer Science practicals, on the same pattern as with the other science subjects such as physics, chemistry etc. For smooth conduct of practicals at FY, SY and TYBSc computer science, a minimum of 1 lab assistant and a minimum of 1 lab attendant be provided for each lab, each session, during entire period of laboratory practical session.

Main	Subject Title	No. Of lectures	Theory Marks	Practical Marks	Total Marks
Paper I	Data Communication, Networking & Security	120 (4 lectures per week)	100 (3 Hr Exam)	Group I 50 Linux and Database (4 lab lectures per batch per week)	150
Paper II	Advanced Java	120 (4 lectures per week)	100 (3 Hr Exam)	Group II 50 Advanced Java (4 lab lectures per batch per week)	150
Paper III	Operating Systems & Linux	120 (4 lectures per week)	100 (3 Hr Exam)	Group III 50 Elements of Software Engineering and Project Management (4 lab lectures per batch per week)	150
Paper IV	DBMS II and Software Engineering	120 (4 lectures per week)	100 (3 Hr Exam)	Group IV 50 Project (4 lab lectures per batch per week)	150



<b>Applied Component</b>	<b>Subject Title</b>	<b>No. Of lectures</b>	<b>Theory Marks</b>	<b>Practical Marks</b>	<b>Total Marks</b>
<b>AC I</b>	<b>Principles of Web Design and Web Technologies</b>	<b>60 (2 lectures per week)</b>	<b>60 (3 Hr Exam)</b>	<b>Group I- AC 40 Web Technologies (2 lab lectures per batch per week)</b>	<b>100</b>
<b>AC II</b>	<b>Dot Net Technologies</b>	<b>60 (2 lectures per week)</b>	<b>60 (3 Hr Exam)</b>	<b>Group II- AC 40 Dot Net Technologies (2 lab lectures per batch per week)</b>	<b>100</b>

**Note: For students offering 3 units of computer science at TYBSc , paper I and II (of 6 units) and group III and group IV practicals(of 6 units) course will form the course contents.**



## TYBSc Computer Science Syllabus

(Revised syllabus w.e.f. the academic year 2010-2011)

- There are 4 units in each paper. The detailed references of books are either mentioned at the respective topics or at the end of the paper.
- It is expected that the question paper will have 5 questions as given below –

Questions	Term I	Maximum Marks* (For Paper I, II, III & IV)	Maximum Marks* (For AC1 & AC2)
Q1	Based on Units 1, 2, 3 & 4	20	12
Q2	Based on Unit 1	20	12
Q3	Based on Unit 2	20	12
Q4	Based on Unit 3	20	12
Q5	Based on Unit 4	20	12
	<b>Total</b>	<b>100</b>	<b>60</b>

- Syllabus details gives list of practicals with minimum number of practicals to be performed.
- For the purpose of examination, the break-up of total marks of practical will be as follows –

<b>A) Main Subject Practical Examinations –</b>	
Experiment I (Group I Practical)	: 45 marks
Experiment II (Group II Practical)	: 45 marks
Experiment III (Group III Practical)	: 45 marks
Experiment IV (Group IV Practical)	: 50 marks
Project	: 50 marks
<b>Journal(Group I To III) &amp; Viva voce on Journal</b>	
	: 15 marks
	-----
	<b>200 marks</b>
<b>B) Applied Component Practical Examination</b>	
Experiment I (Group I AC)	: 35 marks
Experiment II (Group II AC)	: 35 marks
<b>Journal(Group I &amp; II) &amp; Viva voce on Journal</b>	
	: 10 marks
	-----
	<b>80 marks</b>

**Paper I**  
**Data Communication, Networking & Security**

- Note : 1. Students can be made familiar with practical aspects by conducting demo sessions  
2. Demo session can be either Physical/Audio-Video/Online Demo

**Unit I (30 lectures)**

**Introduction** - Data Communication, Networks, Internet, Intranet, Protocols, OSI & TCP/IP Models, Addressing  
**Physical Layer** – Signals, Analog, Digital, Analog VS Digital, Transmission Impairment, Data Rate & Performance  
**Digital Transmission** – Line Coding (Unipolar, Polar, Biphasic), Block Coding(4B/5B Encoding), Analog to digital conversion, PCM, Transmission Modes,  
**Analog Transmission** – Digital to analog conversion(ASK,FSK,PSK, QAM), Analog to Analog conversion  
**Multiplexing** – FDM, WDM, Synchronous TDM(time slots & frames, interleaving, data rate management)  
**Spread Spectrum** – FHSS, DSSS  
**Transmission Media** – Guided & Unguided  
**Switching** – Switching, Circuit-Switched Networks, Datagram networks, Concept of Virtual circuit networks, structure of circuit switch & packet switch, Concepts of DSL & ADSL

**References -**

1. **Data Communication & Networking (Forouzan)– IV Edition → Chapters (1, 2, 3, 4, 5, 6, 7, 8, 9)**

**Demo :**

1. Demo of installing NIC cards, Min. LAN Settings such as IP Address
2. Demo of various types of cables[if available], Cross cable and its use, Crimping
3. Study of lab network [type of network, topology, bandwidth, switches]

**Unit II (30 lectures)**

**Data Link Layer** –Error correction & detection, Types of errors, Detection VS Correction, Block Coding, Hamming Distance, Linear Block codes(single parity check, hamming codes), Cyclic codes, CRC Encoder & Decoder, CRC Polynomial & its degree, Checksum  
**Data Link Control & Protocols** – Framing, Flow & Error Control, Simplex, Stop-N-Wait, Stop-N-Wait with ARQ, Go Back N ARQ, Selective Repeat ARQ, Piggybacking  
**HDLC & PPP**– HDLC Modes, HDLC Frames, PPP, PPP Transition states  
**Multiple Access** – Random(CSMA), Controlled(Reservation, Polling, Token Passing), Channelization(FDMA, TDMA, CDMA)  
**Wired LAN** – LLC, MAC, Ethernet, Ethernet frame, Addressing, Concept of MBaseN Ethernet, Bridge, Switched, Full Duplex Ethernet, Concept of Fast & Gigabit Ethernet  
**Wireless LAN** - Introduction to WLAN(Architecture, Hidden, Exposed Station Problem), Introduction to Bluetooth & Architecture, Cellular telephony, Concept of 1G, 2G, 3G cellular telephony  
**Connecting Devices** – Repeaters, Hubs, Bridges, Spanning tree algorithm, Two & Three layer Switches, Routers, Gateways, Backbone networks, Concept of VLAN  
**Network Layer** –Logical addressing, IPv4 Addresses, Classful & Classless addresses, NAT, IPv6 Addressing,

References -

1. Data Communication & Networking (Forouzan)- IV Edition - Chapter(10, 11, 12, 13, 14, 15, 16, 19)

Demo :

1. Study of network connectivity devices[switches, modems/routers etc installed in lab]

Unit III (30 lectures)

**Network layer protocol** - Internetworking, IPv4, IPv4 protocol packet format, IPv6 Protocol & Packet format, IPv4 VS IPv6, Transition from IPv4 to IPv6, Address Resolution protocols(ARP, RARP), BOOTP, DHCP,  
**Routing Protocols** - Delivery, forwarding, routing, types of routing, routing tables, Unicast Routing, Unicast Routing protocols, RIP, Concepts of OSPF, BGP & Multicast Routing  
**Transport Layer** - Process to process delivery, UDP, TCP  
**Congestion Control & Quality of Service**- Data traffic, Congestion, Congestion Control(Open Loop, Closed Loop & Congestion control in TCP), QoS and Flow Characteristics  
**Application Layer** - DNS, Remote Logging(Telnet), SMTP, FTP, WWW, HTTP

References -

1. Data Communication & Networking (Forouzan)- IV Edition  
(Chapters 20, 21, 22, 23, 24, 25, 26, 27)

Demo :

1. Study of LAN Settings such as IP Addr, Subnet mask, Gateway Address, DNS addresses, Proxy etc
2. Accessing machines in networks, sharing files/folders and printers
3. Study of commands such as ping, netconfig, ipconfig, arp, netstat, route, traceroute etc [ commands will depend on OS ]
4. Useful Browser Settings

Unit IV[30 lectures]

**Introduction:** Introduction to system and network security, security attacks, security services and mechanisms.

**Cryptography:** Traditional and Modern Symmetric-Key Ciphers, DES and AES, Asymmetric -Key Cryptography, RSA and ELGAMAL cryptosystems. Message Digest, Digital Signature, Key Management

**Network Security:** Security at Application Layer (E-MAIL, PGP and S/MIME), Security at Transport Layer (SSL and TLS), Security at Network Layer (IPSec).

**Firewall and Intrusion Detection:** Firewalls and their types, DMZ, Limitations of firewalls, Intruders, Intrusion detection (Host based, Networked, Distributed), IDS.

**Malicious software and Internet Security:** viruses and related threats, virus countermeasures, denial of service attacks, *Hacking*, Security policies and plan, Strategies for a secure network.

References:

1. BF: "Cryptography & Network Security", Behrouz A. Forouzan, Tata McGraw-Hill.  
(1.1-1.4, 3.1-3.4, 5.1-5.2, 6.1-6.5, 7.1-7.6, 8.1, 8.2, 10.1-10.4, 11.1, 11.3, 13.1-13.5, 15.1-15.4, 16.1-16.3, 17.1-17.4, 18.1-18.4)

2. WS: "Network security essentials-applications and standards", William Stallings, Edition, Pearson Education.(1.1-1.6, 2.1-2.6, 3.1-3.5, 5.1-5.2, 6.1-6.4, 7.1-7.3, 8.1-8.2, 9.1-9.3,10.1-10.3, 11.1-11.1)
3. AC: "Cryptography and Network Security", Atul Kahate, Tata McGrawHill.

### **Demo**

1. Antivirus software and its settings
2. Setting firewalls, Enabling/Disabling ports
3. Introduction to cyber crime and cyber law

### **Additional References**

1. Computer Networks and Internets (5th Edition) - Douglas Comer
2. Computer Networks (4th Edition) - Andrew Tanenbaum
3. Networking Complete by Sybex Inc. and Sybex Inc.

## Paper II Advanced Java

### UNIT I: (30 Lectures)

Introduction to JFC and Swing, Features of the Java Foundation Classes, Swing API Components, JComponent Class, Windows, Dialog Boxes, and Panels, Labels, Buttons, Check Boxes, Menus, Toolbars, Implementing Action interface, Pane, JScrollPane, Desktop pane, Scrollbars, Lists and Combo Boxes, Text-Entry Components, Colors and File Choosers, Tables and Trees, Printing with 2D API and Java Print Service API.

JDBC Introduction, JDBC Architecture, Types of JDBC Drivers, The Connectivity Model, The java.sql package, Navigating the ResultSet object's contents, Manipulating records of a ResultSet object through User Interface, The JDBC Exception classes, Database Connectivity, Data Manipulation (using Prepared Statements, Joins, Transactions, Stored Procedures), Data navigation.

#### References

Ch 5, 7 of Ref 6

Ch10 of Ref 5, Ch 9 of Ref 6, Ch 4 of Ref 2

### UNIT II: (30 Lectures)

Threads and Multithreading, The Lifecycle of a thread, Creating and running threads, Creating the Service Threads, Schedules Tasks using JVM, Thread-safe variables, Synchronizing threads, Communication between threads.

Overview of Networking, Working with URL, Connecting to a Server, Implementing Servers, Serving multiple Clients, Sending E-Mail, Socket Programming, Internet Addresses, URL Connections, Accessing Network interface parameters, Posting Form Data, Cookies, Overview of Understanding the Sockets Direct Protocol.

Introduction to distributed object system, Distributed Object Technologies, RMI for distributed computing, RMI Architecture, RMI Registry Service, Parameter Passing in Remote Methods, Creating RMI application, Steps involved in running the RMI application, Using RMI with Applets.

#### References

Ch 3 of Ref 2, Ch 11 of Ref 6, Ch15 of Ref 5, Ref 7

Ch 13 of Ref 5, Ch 5 of Ref 2, Ch 11 of Ref 6

Ch 16 of Ref 5, Ch 25 of Ref 4, Ch 8 of Ref 6, Ch 8 of Ref 2, Ref 7

### Unit III: (30 lectures)

What Is a Servlet? The Example Servlets, Servlet Life Cycle, Sharing Information, Initializing a Servlet, Writing Service Methods, Filtering Requests and Responses, Invoking Other Web Resources, Accessing the Web Context, Maintaining Client State, Finalizing a Servlet.

What Is a JSP Page?, The Example JSP Pages, The Life Cycle of a JSP Page, Creating Static Content, Creating Dynamic Content, Unified Expression Language, JavaBeans Components, JavaBeans Concepts, Using NetBeans GUI Builder Writing a Simple Bean, Properties: Simple Properties, Using Custom tags, Reusing content in JSP Pages, Transferring Control to Another Web Component, Including an Applet.



## References

Ch 3 of Ref 3, Ch 2,3,4 of Ref 1, Ref 7  
Ch 4 of Ref 3, Ch 7,8,9 of Ref 1, Ref 7

## **Unit IV: (30 lectures)**

Introduction to EJB, Benefits of EJB, Types of EJB, Session Bean: State Management Modes, Message-Driven Bean, Differences between Session Beans and Message-Driven Beans, Defining Client Access with Interfaces: Remote Access, Local Access, Local Interfaces and Container-Managed Relationships, Deciding on Remote or Local Access, Web Service Clients, Method Parameters and Access, The Contents of an Enterprise Bean, Naming Conventions for Enterprise Beans, The Life Cycles of Enterprise Beans, The Life Cycle of a Stateful Session Bean, The Life Cycle of a Stateless Session Bean, The Life Cycle of a Message-Driven Bean

Building Web Services with JAX-WS: Setting the Port, Creating a Simple Web Service and Client with JAX-WS.

## References

Ch 20, Ref 3, Ch 14 of Ref 6, Ref 7

## **References:**

1. Bryan Basham, Kathy Sierra, Bert Bates, Head First Servlets and JSP, O'reilly (SPD), Second Edition, 2008
2. Cay S. Horstmann, Gary Cornell, Core Java™ 2: Volume II—Advanced Features Prentice Hall PTR, 2001 (ISBN: 0-13-092738-4)
3. Eric Jendrock, Jennifer Ball, D Carson and others, The Java EE 5 Tutorial, Pearson Education, Third Edition, 2003
4. Herbert Schildt, Java2: The Complete Reference, Tata McGraw-Hill, Fifth edition, 2002 (ISBN 0-07-049543-2)
5. Ivan Bayross, Web Enabled Commercial Applications Development Using Java 2, BPB Publications, Revised Edition, 2006
6. Joe Wigglesworth and Paula McMillan, Java Programming: Advanced Topics, Thomson Course Technology (SPD), Third Edition, 2004
7. The Java Tutorials of Sun Microsystems Inc.



# Paper III Operating Systems and Linux

## Unit I: (30 Lectures)

**Introduction:** Overview of Operating System, Evolution of Operating System, Different Services of Operating System

**Operating System for Main frame Computer Systems:** Batch Processing Systems, Micro programmed Systems, Time-Sharing System. Understanding Multiprogramming, Multiprocessing and Multitasking.

**Operating System for Multiprocessor Systems and Distributed Systems, Operating System for Client Server & Peer-to-Peer Systems, Clustered Systems. Real time Operating System**

**Components of Operating System:** Process Management, Main memory Management, Secondary storage Management, File Management, I/O Management. Operating System Services, Command Interpreter, Interface between user and Operating System. Introduction to System calls: Types of system calls

**System programs and Operating System Structure:** Layered approach, Kernel based approach, Operating system design and Implementation.

**Process Management:** Introduction to Process. Process states: two state and five state model, processes & resources, concurrent processes, process description, process control block and its role. Operation on processes, Cooperating processes

**Interprocess Communication and light weight process:** Direct & indirect communication, message passing, synchronization, buffering. Threads, single & multithreaded processes, user and kernel threads, multithreaded models, Threading issues, Creation of threads

**CPU Scheduling and Process synchronization:** Need for Process scheduling, queuing diagram, scheduler and its types, Scheduling queues. Need for Process switching, context switching, process synchronization, CPU scheduling algorithms.

General structure of a typical process, Critical Section Problem and its solutions, Two and multiple process solutions, Need for Mutual Exclusion, Classifying process interactions and Achieving mutual exclusion: Dekker's Algorithm, Peterson's Algorithm and their final correct solution for two processes.

**Tools for process synchronization:** Semaphores, Binary semaphores, monitors, message passing: their use & implementation for mutual exclusion.

[SG: Chapters 1, 3, 4, 5, 6 and WS: Chapter 3,4, 5]

## Unit II: (30 lectures)

**Classical Problems of Process synchronization:**  
Producer-Consumer problem for infinite and bounded buffers and its bounded buffer solution using Semaphore monitor and messages Reader-writer problem and its solutions with readers' priority and writers' priority, Dining-Philosophers Problem and its solutions

**Concurrency and Deadlock:** Deadlocks and their Characteristics, Resource Allocation Graph, methods of handling deadlocks. Deadlock prevention techniques, Deadlock detection and avoidance: safe and unsafe state, resource allocation algorithm, Banker's algorithm, Recovery from deadlock.

**Memory management:** Memory Management and its need, swapping technique, Contiguous memory allocation. Paging and Segmentation, Segmentation with paging, Introduction to Virtual memory, Demand paging technique, Need for page replacement, Basic scheme, replacement algorithms, Thrashing and its cause.

**File System:** File Concept: attributes, operations, types, structure. File access methods, Different directory structure, File system structures, File system implementations. Directory implementations, Allocation methods, Free space management.

**I/O System:** Principles of I/O hardware and Software: typical bus structure, polling, interrupts, memory access, application I/O Interface

**Disk Scheduling:** FCFS, SSTF, SCAN, C-SCAN. Examples related to disk arm movement.

**Operating System Security:** Introduction to security problem, Program and system threats, Intrusion Detection, Computer –Security Classifications.

[SG: Chapters 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 19 ]

WS: Chapters 4, 5]

Reference:

1. SG: “*Operating System Concepts*”- Abraham Silberschatz, Peter Galvin, Greg Gagne, John Wiley & Sons
2. WS: “*Operating Systems*”- William Stallings, Pearson-Prentice Hall, Fifth Edition.

*Additional Reference:*

1. TW: “*Operating Systems*”- Andrew Tanenbaum & Albert WoodHull, Second Edition, PHI.
2. AG: “*Operating Systems*” – Achyut S Godbole, Tata Mc-Graw Hill,

### Unit-III : (30 Lectures)

**Linux System:** History, Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File system, I/O. (SGG: 20.1 to 20.8)

**Linux Basics:** Looking into the Linux Kernel, GNU Utilities, Desktop environments. (RB: Chapter-1), Linux console (RB: Chapter-2) The Unix/Linux architecture, Features of Unix/Linux. . (SD: 2.1, 2.2)

**Basic bash shell commands:** Starting the shell, Shell prompt, Filesystem Navigation, File and directory listing, File handling, Directory handling, Viewing file contents. (RB: Chapter-3)

**More bash shell commands:** Monitoring programs, Monitoring disk space, Working with data files, Sorting, Searching, Compressing, Archiving. (RB: Chapter-4)

**The Linux environment variable:** Environment variables, setting environment variables, Removing environment variables, Default shell environment variables, setting the PATH environment variable, Locating system environment variables, Variable arrays, Using command aliases. (RB: Chapter-5)

**Understanding Linux file permission:** Linux security, Using Linux groups, Decoding file permissions, Changing security settings, Sharing files. (RB: Chapter-6)

**Basic script building:** Using multiple commands, Creating a script file, Displaying messages, Using variables, Redirecting Input and Output, Pipes, Performing math, Exiting the script. . (RB: Chapter-8)

**Using structured commands:** Working with the if-then, if-then-else and nesting if statements, Using command, Compound condition testing, advanced if then features, the case command. (RB: Chapter-9)

**More structured commands:** for command, C-style for command, while command, until command, nesting loops, Looping on file data, controlling the loop, processing the o/p of a loop. (RB: Chapter-10)

**Handling user input:** Command line parameters, Special parameter variables, shift command, working with options, Standardizing options, Getting user I/P.(RB: Chapter-11)

### Unit-IV : (30 Lectures)

**Presenting data:** Understanding I/O, Redirecting O/p in scripts, Redirecting I/p in scripts, Creating your own redirection, Listing open file descriptors, Suppressing command o/p, Using temporary files, Logging Messages. (RB: Chapter-12)

**Script control:** Handling signals, Running scripts in background mode, Running scripts without a console, Job control. Job Scheduling Commands: nice, renice, at, batch, cron table, Running the script at boot. (RB: Chapter-13)

**Essential System Administration:** root: The system administrator's login, The administrator's privileges, Startup & Shutdown. (SD: 15.1, 15.2, 15.5)

**TCP/IP networking:** TCP/IP Basics, TCP/IP Model, Resolving IP addresses, Applications, telnet, ftp, Berkeley commands. (SD: Chapter-17)

**Advanced System Administration:** Partitions & file systems, /etc/fstab, fsck, System startup and init, Shutdown & sync operation. (SD: 25.2, 25.6.3, 25.7, 25.8, 25.9)

**Editors:** Sed and awk (RB: Chapter-16)

**Linux Firewall:** Introduction to firewall, Displaying status of firewall, Turning an iptables Firewall on/off, Testing firewall, Configuring the firewall for Remote SSH Administration.(CS: 3.0, 3.7-3.11)

**OpenSSH:** Introduction, Starting and Stopping OpenSSH, Creating strong Passphrases, Setting up host keys for simplest authentication, Generating and copying SSH Keys, Public key authentication to protect system password, Hardening OpenSSH, Changing Passphrase, Retrieving a key, Managing SSH Configuration file, Windows and SSH, Mounting remote file system with sshfs. (CS: 7.0 to 7.13, 7.17)

#### Main References:

- SGG: Operating System Concepts, 6e, Silberschatz, Galvin and Gagne, Wiley.
- SD: Unix Concepts and Applications, 4e, Sumitabha Das., TMH.
- RB: Linux Command line and Shell Scripting: Bible, Richard Blum, Wiley-India.
- CS: Linux Networking Cookbook, Carla, Schroder, O'reilly.

#### Additional References:

- Unix Complete Reference, TMH.
- Linux Complete Reference, TMH.
- Linux Command Reference. Shroff.

Paper IV  
**DBMS-II & Software Engineering**

**UNIT I: [30 Lectures]**

**Decomposition:** Functional dependency, Closure of a set of functional dependency, Lossless decomposition, Multi valued dependency and fourth normal form, Join dependency, Fifth normal form.

**Concurrency Control:** Concept of a transaction, ACID properties, Serial and serializable scheduling, Conflict and View serializability, Precedence graphs and test for conflict serializability.

**Enforcing serializability by locks:** Concept of locks, the locking scheduler, Two phase Locking, upgrading and down grading locks, Concept of dead locks, Concurrency control by time stamps, Thomas Write rule.

**Crash Recovery:** ARIES algorithm. The log based recovery, recovery related structures like transaction and dirty page table, Write-ahead log protocol, check points, recovery from a system crash, Redo and Undo phases.

**UNIT II: [30 Lectures]**

**Sequences:** creating sequences, referencing, altering and dropping a sequence.

**Fundamentals of PL/SQL:** Defining variables and constants, PL/SQL expressions and comparisons Logical Operators, Boolean Expressions, CASE Expressions Handling, Null Values in Comparisons and Conditional Statements, PL/SQL Datatypes: Number Types, Character Types, Boolean Type, Datetime and Interval Types.

**Overview of PL/SQL Control Structures:** Conditional Control: IF and CASE Statements, IF-THEN Statement, IF-THEN-ELSE Statement, IF-THEN-ELSIF Statement, CASE Statement, Iterative Control: LOOP and EXIT Statements, WHILE-LOOP, FOR-LOOP, Sequential Control: GOTO and NULL Statements, Concept of nested tables.

**Query evaluation:** System Catalog, Evaluation of relational operators like selection, projection, join and set, introduction to query optimization.

**Cursors:** Concept of a cursor, types of cursors: implicit cursors; explicit cursor, Cursor for loops, Cursor variables, parameterized cursors,

**Transactions in SQL:** Defining a transaction, Making Changes Permanent with COMMIT, Undoing Changes with ROLLBACK, Undoing Partial Changes with SAVEPOINT and ROLLBACK, Defining read only transactions, explicit locks: transaction and system level, Choosing a Locking Strategy: ROW SHARE and ROW EXCLUSIVE Mode.

**References:**

- (a) *Ramakrishnam, Gehrke, "Database Management Systems", McGraw- Hill. (Chapter 12.1-12.4, 16.1-16.4, 17.1- 17.4, 17.6.2, 18.1-18.6, 19.1-19.3, 19.5, 19.8)*
- (b) *Ivan Bayross, "SQL,PL/SQL -The Programming language of Oracle", B.P.B. Publications, 3<sup>rd</sup> Revised Edition[Chap 11, 15- 17]*
- (c) *Michael Abbey, Michael J. Corey, Ian Abramson, Oracle 8i – A Beginner's Guide, Tata McGraw-Hill. ( Chapter 8)*



### Additional References:

- (a) Elsmasri and Navathe, "Fundamentals of Database Systems", Pearson Education.
- (b) Peter Rob and Coronel, "Database Systems, Design, Implementation and Management", Thomson Learning
- (c) C.J.Date, Longman, "Introduction to database Systems", Pearson Education.
- (d) Jeffrey D. Ullman, Jennifer Widom, "A First Course in Database Systems", Pearson Education.
- (e) Martin Gruber, "Understanding SQL", B.P.B. Publications.
- (f) George Koch and Kevin Loney, ORACLE "The Complete Reference", Tata McGraw Hill, New Delhi

### Unit III (30 lectures)

**Project management** : Revision of Project Management Process [Ref3-2.4.1], Role of Project Manager, Project Management Knowledge Areas [Ref1-Chap3 (Pg99-100,104)]  
Managing Changes in requirements [Ref3-2.4.4]  
Role of software Metrics [Ref3-1.3.2, Ref2-23.1.5]  
**Size & Effort Estimation** – Concepts of LOC & Estimation [Ref2-26.6.2, 26.6.3], Function Point [Ref3-3.6.1, Ref2-25.2.3], COCOMO Model [Ref3-5.2.4], Concept of Effort Estimation & Uncertainty [Ref3-5.2, 5.2.1] [Ref1-Chap3 (Pg121)]  
**Project Scheduling** [Ref2-27.2, 27.2.1 & Ref3-5.3.2], Building WBS, Use of Gantt & PERT/CPM chart [Ref1-Chap3 (Pg112-118)] [3 lectures] Staffing [Ref1-Chap3 (Pg100), Ref3-5.3.4]  
**Configuration Management** Process & Functionality & Mechanism [Ref3-2.4.3]  
Process Management, CMM & its levels [Ref3-2.4.5],  
Risk Management & activities [Ref3-5.6.1-5.6.3]  
**Management of OO software Projects** - Object oriented metrics, Use-Case Estimation [Ref2-23.3.3, 25.2.5, 26.6.7-26.6.8, 27.5.3]  
Selecting development tools, Introduction to CASE [Ref1-Chap2 (Pg85-86, Pg 341)]

**Changing Trends In Software Development** - Unified Process, Its phases & disciplines,  
Agile Development – Principles & Practices, Extreme programming- Core values & Practices [Ref1-Chap16 (Pg692-705)]  
Frameworks, Components, Services, [Ref1-Chap16 (714-717, 720-721)], Introduction to Design Patterns, [Ref4-(1.1, 1.3, 1.4, Pg 26 to 28)] Open Source [Ref2-31.3.7]

### References :

1. System Analysis & Design – Satzinger, Jackson, Burd, Cengage Learning, India Ed.
2. Software Engineering- A Practitioner's Approach, 7<sup>th</sup> Edition, McGraw Hill Int.
3. Integrated Approach to Software Engineering - Pankaj Jalote (Narosa), 3<sup>rd</sup> Edition
4. Design Patterns – Elements of Reusable Object-Oriented Software, Pearson  
By – Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,

### Unit IV ( 30 lectures )

**Software Testing:** Introduction to Quality Assurance, Six Sigma [Ref1-14.4.4, 16.2, 16.5.2]  
Testing Fundamentals, Common Terms (like Error, Fault, Failure, Bug, Crash) Objectives of testing, Challenges in Testing, Principles of Testing [Ref2-1.2, 1.2.1, 1.2.3, 1.2.4, 1.5],  
**Static Testing** – Introduction & Principles [ Ref2-3.1, 3.2]  
**Types of Testing** – Levels of testing such as Unit testing, Integration testing, System testing, Validation testing, Acceptance testing,  
Types of testing such as Black box, White Box, Functional, Performance, Regression, Acceptance, Volume, stress, Alpha, Beta testing [Ref2-1.4]

**Black Box Testing** : Introduction, Equivalence partitioning, Boundary-value analysis, Robustness testing, Cause Effect Graph, [Ref2-4.1-4.5, Ref3-10.2.3]  
**White Box Testing** :Statement Coverage, Branch/Decision Coverage, Condition Coverage, Graph Metrics, Cyclomatic complexity, Mutation Testing [Ref2-5.1-5.6]  
**Object Oriented Testing & Web site testing** – Object Oriented Testing Strategies, Testing methods, [Ref2-19.3, 19.4.3, 19.4.5, Ref2-11.2]] Overview of web site testing[Ref1-20.1.1]  
**Planning Software Testing** – Test Plan, Test Plan Specification, Test Case Execution and Analysis, Defect logging and tracking [ Ref3-10.4.2-10.4.5]

### References:

1. Software Engineering- A Practitioner's Approach, 7<sup>th</sup> Edition, McGraw Hill Int.
2. Software Testing – Concepts & Practices, Narosa,
3. Integrated Approach to Software Engineering - Pankaj Jalote (Narosa)

### Additional References

1. Software Engineering: Waman Jawadekar, TMH
2. Software Engineering : Sommerville, VIIIth Edition, Pearson Education



## Group I : Linux & Database

### List of Practicals

- 1 Study of Basic and advanced Linux Commands
- 2 Study of filter commands
- 3 Basic Shell scripting
- 4 Advanced Shell scripting
- 5 Writing PL/SQL Blocks with basic programming constructs
- 6 Procedures and Functions in PL/SQL Block
- 7 Implementing cursors & sequences
- 8 Study of transactions and locks

**Note : Demo of installation of Linux should be given to students**

## Group II : Advanced Java

### List of Practicals

- 1 Developing GUI applications using Swing
- 2 Database programming with Java
- 3 Study of Multithreading
- 4 Study of Socket programming and Distributed computing
- 5 Server-Side Programming using Servlets
- 6 Server-side programming using JSP
- 7 Developing Enterprise Java Beans
- 8 Developing Web services in Java

## Group III : Elements of Software Engineering and Project Management

### List of Practicals

- 1 Preliminary Design of a software system in context with its components, descriptions, limitations, advantages and disadvantages for a given Case Study.
- 2 To draw Event Table & Use Case for a given Case Study.
- 3 To draw Activity Diagram, Class Diagram & Object Diagram for a given Case Study.
- 4 To draw Sequence diagram / Collaboration diagram for a given Case Study.
- 5 To derive tables from entities & relationships with integrity constraints for a given Case Study.
- 6 To draw Component, Package & Deployment diagram for a given Case Study.
- 7 To design Form Layouts/Web Pages/Report layouts for a given Case Study.
- 8 To list test cases and validations for a given Case Study.

## Group IV : OOAD Project

### General Guidelines for Project Development

1. Faculties should arrange project demos for SY students at the end of the year or just at the beginning of the next year (TY). The demos can be of some good students of previous TY batches or it can be a project demo by faculties themselves.
2. SY students should be encouraged to start finding projects in the summer vacation. It is advantageous if students finish majority of the preliminary investigation phase during summer vacation. Faculties may take one or two introductory sessions for SY students before the vacation which will enable students to work on preliminary investigation phase during summer vacation.
3. It can be Stand Alone, Multi-user or Web Based. Projects must be done using Java or .Net Technology & RDBMS.
4. Each student shall do the project individually, though a project with the same topic name could be done by more than one student.
5. A project guide should be assigned to students (**Maximum 24 students for 1 guide**). He/she should assign a schedule for each phase of the project and hand it over to students. The guides should monitor the project progress on a weekly/fortnightly basis. The guides should control iteration if any non-standard technique is used for project development. It is advisable that the design phase gets over in the first term. Sample schedule can be as follows –

Phase	Time of completion
Preliminary investigation	30 <sup>th</sup> June
System Analysis	14 <sup>th</sup> August
System Design	30 <sup>th</sup> September
Coding	15 <sup>th</sup> December
Implementation	5 <sup>th</sup> January
Project Report Submission	15 <sup>th</sup> January

6. College can arrange few sessions by experienced industry people on project management best practices/technologies etc.
7. The student will maintain a Gantt chart from the given schedule and completion of each phase should be noted on the chart.
8. Like Gantt Chart, a separate table should be maintained to check timely completion of the project. The table should contain the names of phases & its sub-phases, Expected Date of completion and Actual Date of completion. The guide should sign and mention the actual date of completion in the specific column of this table. This table should be produced at the time of final project demonstration and should be used for assigning marks. The dates of this table should match with the dates of Gantt Chart. For the students who fail to do projects as per the schedule, project guide can sign the projects with late remarks.

Sample Phase completion table –

Phase Title	Expected Date of Completion	Actual Time of Completion with Guide's Signature	Remarks
I. Phase Name	30 <sup>th</sup> June		
a) Sub Phase 1 ..	20 <sup>th</sup> June		
b) Sub Phase N	30 <sup>th</sup> June		
II. Phase Name	14 <sup>th</sup> August		
a) Sub Phase 1 ..	5 <sup>th</sup> August		
b) Sub Phase N	14 <sup>th</sup> August		

9. After the completion of phase/projects, demos can be planned in front of faculties/clients/students.

**10. Projects should have at least following :**

- a) Good content management, presentation & meaningful images
- b) Data Entry with Validations
- c) Suitable navigation scheme(menus/toolbars/tabs/links etc)
- d) Record Manipulation(add, update, delete, display, search ,sort)
- e) Transactions / Sessions /Reports / Feedback/Registration whichever applicable
- f) Login accounts(Admin & User) with separate functionalities for administrators and users

11. A certificate should be added in the project report which should contain the following information –

- a) The fact that the student has successfully completed the project as per the syllabus and that it forms a part of the requirements for completing the BSc degree in computer science of University of Mumbai.
- b) The name of the student and the project guide,
- c) The academic year in which the project is done,
- d) Date of submission,
- e) Signature of the project guide and the head of the department with date along with the department stamp,
- f) Space for signature of the university examiner and date on which the project is evaluated.

12. Project should be evaluated by External Examiner as follows –

- i. Project Quality → 10 marks
- ii. Adherence to schedule → 10 marks
- iii. Working of Project → 20 marks
- iv. Student's Presentation → 10 marks

**Note →**

- i. Evaluating “Adherence to schedule”** : A project can approximately have 5 phases. Completion of these phases on time will carry 2 marks. Sub-phases need not go as per the schedule but main phase should be completed as per the plan. However, a grace period of 7 days should be given for completing each phase. If the project gets delayed after 7 days of actual time of completion, then the marks can be cut. Concession of some more days can be given for students having genuine reasons(medical cases etc) but it should be mentioned in remarks.
- ii. Evaluating “Project Quality”**: It involves overall modules included in the project, whether it was sufficiently large enough so that it can be done in a year, whether validations were done for data entry, variety of reports etc.
- iii. Evaluating “Working of the Project”**: It involves error-free execution of the project.
- iv. Evaluating Student's Presentation** : Marks can be given based on the presentation skills of a student. A student can prepare a power point presentation for the project.

## Index For Project Documentation

<b>Acknowledgement</b>
<b>I. Preliminary Investigation</b>
(i) Organizational Overview
(ii) Description of System
(iii) Limitations of present system
(iv) Proposed system and its adv. [ For web project, URL can be mentioned]
(v) Feasibility Study
(vi) Stakeholders
(vi) Gantt Chart
<b>II. System Analysis</b>
(i) Fact Finding Techniques (Questionnaire, Sample Reports, Forms...)
(ii) Prototypes(if any)
(iii) Event Table
(iv) Use Case Diagram, Scenarios & Use Case Description
(v) ERD
(vi) Activity Diagram
(viii) Class diagram
(ix) Object Diagram
(x) Sequence diagram/Collaboration Diagram
(xii) State diagram
<b>III. System Design</b>
(i) Converting ERD to Tables
(ii) Design Class diagram[with UI classes, Persistent classes etc...]
(iii) Component Diagram
(iv) Package Diagram
(v) Deployment Diagram
(vi) Prg Flow charts & System flow chart
(vii) Structure Chart (Prg level and System level)
<b>IV. System Coding</b>
(i) Menu Tree / Sitemap
(ii) List of tables with attributes and constraints
(iii) Design Patterns used (if any)
(iv) Program Descr[ Programs /Classes and their responsibilities in brief ] with Naming Conventions
(v) Validations
(vi) Test Cases, Test Data and Test Results [Write test cases for all imp. programs]
(vii) Screen Layouts & Report Layouts
(viii) Program Listing[for dummy proj]
<b>V. System Implementation / Uploading</b>
<b>VI. Future Enhancements</b>
<b>VII. References and Bibliography</b>

# Applied Component

## Applied Component I Principles of Web Design & Web Technologies

### Unit I [15 lectures]

**Web Site Design Principles** – Design for the Medium, Design for the Whole Site, Design for the User, Design for the Screen

**Planning the Site** – Create a Site Specification, Identify the Content Goal, Analyze your Audience, Build a Web Site Development Team, Filenames and URLs, Directory Structure, Diagram the Site

**Planning Site Navigation** – Creating Usable Navigation, Using Text-Based Navigation, Using Graphics-Based Navigation

**Creating Page Templates** – Understanding Table Basics, Table Pointers, Creating a Page Template

#### Unit References

Code: PWD (Ch 2,3,4,5)

**Web Typography** – Type Design Principles, Controlling Typography with the <FONT> Element, Controlling Typography with Cascading Style Sheet, Styling with CSS

**Graphics and Color** – File Format Basics, Computer Color Basic, Choosing a Graphics Tool, Using the <IMG> Element, Working with Hexadecimal Colors

**HTML Frames** – Understanding Frames, Frame Syntax, Targeting in Framesets, Planning Frame Content

**Publishing and Maintaining Your Web Site** – Publishing Your Web Site, Testing Your Web Site, Refining and Updating Your Content, Attracting Notice to Your Web Site

#### Unit References

Code: PWD (Ch 6,7,8,9)

**HTML** - HTML 4.0 Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, List Tags, Hyperlinks, Image & Image map, Table Tags, Form Tags, Frame Tags, Executable Content Tags and Style Sheets, CSS

#### Unit References :

Code: ELJO (Ch3-9)

### Unit II [15 lectures]

**Introduction to Java Script (Functions, Objects)**

**Client-Side Java Script** -Java script in web browser, windows and frames, the document object model, events and event handling, forms and form elements, dynamic html and saving state with cookies

#### References

Code: JSDG (Ch 7, 8, 11-18)

Code: Dummies (Ch 2)

**XML**- Introduction to XML, Problems with HTML & SGML, Types of XML Markup, Document Type Definitions, Using Style Sheets with XML, Creating XML well formed , valid Documents.

## Reference:

Code: EIJO(Ch 12,13)

Code: Unleashed(Ch 1 to 3,5,6,8,9)

## Unit III [15 lectures]

**Introduction to Ajax** -Working of Ajax from a user's perspective and a developer's perspective  
Applications of Ajax : Searching in real time with live searches, Getting the answer with auto-completion  
Chatting with friends ,Dragging and dropping with Ajax, Getting instant login feedback, Ajax-enabled  
up menus, Modifying Web pages on the fly, Google Maps and Ajax.

**Ajax and PHP** : Starting with PHP ,Getting a Handle on Variables ,Handling Your Data  
Operators,Making Choices with the if Statement ,Round and Round with Loops,Handling HTML  
Controls,Getting data from text fields.Checking out data from check boxes,Tuning in data from  
buttons ,Sending Data to the Server

### XML and Ajax

Creating and opening the XMLHttpRequest object., Handling asynchronous downloads,relative vs  
absolute URLs , Interactive Mouseovers Using Ajax ,Server-Side Scripting ,Choosing a server-side script  
language ,Connecting to a script on a server, Setting up a Web page to read XML ,Handling the XML  
read from the server, Extracting data from XML ,Passing Data to the Server with GET, Passing Data to  
Server with POST.

### Ajax in Depth

Returning JavaScript from the Server, Calling a Different Domain , Reversing the Roles: Performing  
Validation on the Server, Getting Data with HEAD Requests., Returning all the header data you can  
,Finding the last-modified date, Debugging Ajax ,Using GET to get text ,Using GET to get XML ,Using  
POST to post data and get text ,Using POST to post data and get XML.

### Unit References

Code :

Dummies( Ch.1 ,3,4,5,10 )

## Unit IV[15 lectures]

### Handling XML in Ajax Applications

Requesting XML Data in Ajax., Extracting XML Data Using Properties ,Right on the node ,Introducing  
JavaScript properties, Navigating an XML document using JavaScript properties, Extracting with  
Value, Accessing XML Elements by Name, Accessing Attribute Values in XML Elements, Validating XML  
Documents in Ajax Applications

### Working with Cascading Style Sheets in Ajax Applications

An Ajax-Driven Menu System, Setting up the styles, Handling mouse events, Displaying a menu ,Hiding  
menu ,Handling the menu items ,Displaying Text That Gets Noticed ,Styling text, Handling colors and  
backgrounds, Positioning using styles

### Ajax Design Issues

Breaking the Back Button and Bookmarks, Giving Visual, Cues, Leaving the User in Control ,remembering  
All the Different Browsers, Showing Users When Text Changes, Avoiding a Sluggish Browser ,Handling  
Sensitive Data, Creating a Backup Plan., Showing Up in Search Engines, Sidestepping a Browser's Cache



## Unit References

Code:  
Dummies( Ch. 8,9,11)

- References:
1. **ELJO**: Using HTML 4, XML & JAVA by Eric Ladd & Jim O'Donnell. (Platinum Edition) (PHI)
  2. **PWD**: Principles of Web Design by Joel Sklar
  3. **JSDG**: Java Script the definitive guide by David Flanagan
  4. **Dummies** : Ajax for Dummies Steve Holzner, PhD,  
Wiley Publishing Inc
  5. **Unleashed** : XML Unleashed Techmedia SAMS, Michael Morrison

## Additional Ref :

1. Ajax in Action Dave Crane, Eric Pascarello, Darren James
2. Beginning javascript, Wilton, Wrox Publication
3. Head first HTML with CSS and XHTML, Elisabeth freeman and Eric freeman, SPD O, reilly
4. AJAX For Beginners, Ivan Bayross And Sharanam Shah, SPD The team

## URLs:

<http://www.w3schools.com>

<http://www.webmonkey.com>

# Applied Component II – Dot Net Technologies

## Unit I [15 lectures]

**Introduction to .NET Framework 3.5(or above):** Overview of .NET Framework, Objectives, components of .NET Framework and their overview, Types of Applications  
**.NET Framework Architecture–** CLR(Goal of CLR, Services/Features, Benefits, Managed Execution Process, Automatic memory Management), CTS(CTS Overview, Type Definitions, Type members), Different types of data such as class, delegates, pointers, arrays, interfaces), Meta Data, Structure of Metadata & Self Describing Components, Cross Language Interoperability & CLS, Assemblies(Assembly Overview, Benefits, Contents, Types)

Ref: 1. MSDN

**Introduction to .NET IDE:** [ 2 Sessions ] [Ref1: &]

**Introduction to VB 2008 :** Adding forms, controls, Setting Properties, Adding code, Handling events, Displaying simple messages, Data Types, Declaring variables, Strings & constants, Operators, Expressions, Declaring methods, subroutines, procedures, Passing & returning Arguments, Decision Statements (if, select), Loops, Adding Comments, Converting Data types [ 4 sessions ] [Ref1: Chap1,2,3, 100-112, 123,142-149,152-157,168-175, Ref2: Pg 1-32, 35-75,85-115]

Ref: 1. Murach' Visual Basic 2008, Anne Boehm, Murach (Chapter 1, 2, 3, 4)  
2. Mastering Visual Basic 2008, Evangelos Petroustos, Wiley-India Edition (Chapter 1, 2, 3)

**Working with Strings, Dates & Time :** Char, String class & Functions, Converting strings to numbers, DateTime class, Formatting Dates[Ref1:Pg 264-279, Ref2: Pg 461-473,481-492]

**Window Controls and Events:** Using basic window controls such as forms, labels, buttons, text boxes, check boxes, radio buttons, list boxes, combo boxes, Adding properties, Processing events, Using various dialog boxes such as MessageBox, OpenFileDialog, SaveDialog, StreamReader & StreamWriter, Using menus, Adding toolbars, status bars, MDI form, Processing events, Adding event handlers for one/many events [Ref1:Pg176-185,294-303,306-317,666-669,730-731,736-751,Ref2:Pg173-190,195-209,217-246,253-263,267-279,572-576]

**Structured Exception Handling :** try, catch, finally blocks, throwing exceptions, Err object, Using masked textboxes [Ref1:Pg 190-203,218-219, Ref2:Pg147-149]

**Collections :** Creating & manipulating arrays, Using System.Array, ArrayLists Collection, [Ref1:Pg 224,235,240-243,246,251,258-259,Ref2:Pg 499-516]

Ref: 1. Murach' Visual Basic 2008, Anne Boehm, Murach (Chapter 1, 2, 3, 4, 5, 6, 7, 9, 10, 24)  
2. Mastering Visual Basic 2008, Evangelos Petroustos, Wiley-India Edition (Chapter 1,2,3,4, 6,7,8,13,14, 15)

Additional Ref: 1. Murach's VB.NET Programming with ADO.NET

## Unit II | 15 lectures |

**OO Programming** : Understanding objects, creating classes, adding constructors, properties, methods & variables, access specifiers, Shared members, Defining & using events, Implementing inheritance, Partial classes, Creating, referencing, importing namespaces [Ref1:Pg 332-351,550-551,554-555,580-582,640-643, Ref2:Pg. 349-363,375-383,395-426]

**Building Class libraries** : Understanding class libraries, using strong names, registering assemblies, designing class libraries [Ref3:Chapter13]

**Creating Custom controls** : Enhancing Existing controls, Building compound controls, Adding custom events [Ref2:Pg. 429-442,450-452]

**ADO.NET** : ADO.NET & Data management, Advantages of ADO.NET, ADO.NET Object model, Data objects, Data Source Interaction objects, .NET Data provides [Ref1:Pg 414-425, Ref4:Pg486-492]

Using Connection, Command, DataReader classes, Queries returning result sets, scalars, Passing parameters in queries [Ref1:Pg 506-519, Ref2:Pg806-822]

Disconnected Data, Data Adapter, Using Data Set(Typed), Data Table, Data Row & Data Column, Command Builder, Modifying & Updating disconnected data [Ref2:Pg822-843,845-854]

Creating and using Data sources, Binding(Simple and Complex binding) controls with data sources, DataGridView Control, Role of BindingSource, TableAdapter, AdapterManager & BindingNavigator classes [Ref1:Pg 428-451,458-459,470-479,488-493,Ref2:Pg. 855-876]

**LINQ** : Introduction to LINQ, Advantages of LINQ, Using From, Where, Order By, Select [Ref1:Pg 704-715]

- Ref :
1. Murach' Visual Basic 2008, Anne Boehm, Murach (Chapter 8, 11, 13,14,15,16,17,18,19, 20, 23,25)
  2. Mastering Visual Basic 2008, Evangelos Petroutsos, Wiley-India Edition (Chapter 10,11,12,17, 22,23)
  3. Beginning Microsoft Visual Basic 2008(Wrox) by Thearon Willis & Bryan Newsome (Chapter 13)

Additional Ref : 1. Murach's VB.NET Programming with ADO.NET

## Unit III | 15 lectures |

**ASP.NET Applications** – Evolution of Web Development [Ref1:Pg1-10], Creating ASP.NET Applications, Designing Web pages, Anatomy of web form[Ref1:Pg 81-99], Writing Code-behind and event handlers, [Ref1:Pg105-118], ASP.NET Files, Application Directories, Server Controls, HTML Control classes, Page Class, Global.asax files and application events, ASP.NET Configuration files[Ref1:Pg121-159]

**Web Controls** – Advantages of web controls, Web control classes, AutoPostBack & Web control events, [Ref 1 : Pg 163-199]

**State Management** – Maintaining state using ViewState [Ref1:Pg201-206], Query String, Cross Page Posting, URL Encoding, Cookies, Sessions State[Ref1:Pg209-230], Application State[Ref1:Pg235-236]

**Validation & rich controls** – Validations & Validator controls, Undertaking regular expressions [Ref1:Pg321-340], Calendar control, AdRotator, Advertisement file, AdRotator class [Ref1: Pg343-353 ]

## References

1. Beginning ASP.NET 3.5 in VB 2008, From Novoice to professional, Second edition, Mathew Mcdonald (Chapters 1,4,5,6, 7, 9,10,11)

## **Unit IV] 15 lectures ]**

**ADO.NET & Data Binding** – ADO.NET Fundamentals[Ref1:486-522], Single-value, Repeated-Value, Data Binding, Data binding with ADO.NET, Data source controls[Ref1:-525-558], GridView, Data columns, Selecting, Sorting & Paging GridView[Ref1:Pg565-579,584-589]

**Using XML** – XML Role in .NET, XML Classes [Ref1:Pg635-636,642-658]

**Protection & Performance** : Determining security requirements, ASP.NET Security model [Ref1:Pg 686], Caching, Types of caching, Example of output caching, data caching,[Ref1:Pg 809-813,819-822]

**AJAX in ASP.NET** –Using ScriptManager, Partial refreshes, UpdatePanel, Triggers, Timed Refreshes [Ref1-843-849, 852-857, 861-863]

**Web Service** – What is web service, ASP.NET Web services, Creating a simple web service, Consuming Web service [Ref2-Pg 981-982,984-990] (Ref - Mastering VB 2008 Chapter 27)

## **References**

1. Beginning ASP.NET 3.5 in VB 2008, From Novoice to professional, Second edition, Mathew Mcdonald (Chapters 13, 14, 15,16, 17, 19, 20, 24,25)
2. Mastering Visual Basic 2008, Evangelos Petroustos, Wiley-India Edition (Chapter 27)

## **Additional References**

1. Beginning ASP.NET 3.5: In C# and VB (Programmer to Programmer) By Imar Spaanjaars
2. Murach's ASP.NET 3.5 with VB2008
3. ASP.NET 3.5 Application Architecture & Design –Vivek Thakur(SPD-PACKT)

## Group I AC : Web Technologies

### List of Practicals

- 1 Study of Basic and Advanced HTML Tags
- 2 Applying CSS, Representing Data using XML
- 3 Executing Client Side Scripts using JavaScript
- 4 Using AJAX for enhancing web-sites

## Group II AC : DotNet Technologies

Note : Demo on using .NET IDE for building .NET Projects, IntelliSense, Running & Debugging Application should be given.

### List of Practicals

- 1 Study of basic & advanced VB.NET Programming alongwith controls, Data Conversion & Message box, MDI, Menus, Toolbars, Dialog boxes & Collection
- 2 Implementing OOP concepts in VB.NET, Creating Custom Controls, ADO.NET Programming & Data Binding
- 3 Fundamentals of ASP.NET such as using HTML/Web Controls, Autopostback, Application events, configuration files, State management, Validation & Rich controls
- 4 ADO.NET in ASP.NET with Data Binding, Interacting with XML documents, Performance improvement using Caching, Creating & Consuming web services



CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the Master of Science in Information Technology (M.Sc.I.T.) (Part I & II) vide this office Circular No.UG/223 of 2004 dated 3<sup>rd</sup> June, 2004 and the Co-Ordinator, Department of Information Technology, the Principals of the affiliated Colleges in Science and Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Ad-hoc Committee appointed by the Academic Council to advise on all matters relating to the B.Sc & M.Sc. Degree Course in the subject of Information Technology at its meeting held on 11<sup>th</sup> February, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.66 and that, in accordance therewith, the syllabus for the 'Software Architecture' for the M.Sc. Part - II (I.T.) examination is revised as per the Appendix and the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
7<sup>th</sup> July, 2010

L. R. Mane  
Offg. Registrar

The Co-Ordinator, Department of Information Technology, the Principals of the affiliated Colleges in Science and Professor-cum-Director, Institute of Distance and Open Learning.

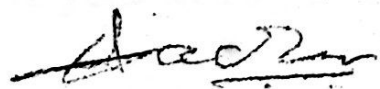
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No. UG/155-A of 2010, MUMBAI-400 032 7<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Science,
- 2) The Chairman, Ad-hoc Board of studies in Information Technology,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre.



(D. N. Jadhav)  
Ag. Deputy Registrar  
(IIG/PG Section)

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The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum-Director, Institute of Distance and Open Learning Education (10 copies) the Director University Computer Center (IDE Building), Vidyanagari (2 copies)



**UNIVERSITY OF MUMBAI**



**Syllabus for**  
**SOFTWARE ARCHITECTURES**  
**for**  
**M.Sc. Part -II (IT)**

**(with effect from the academic year 2010 - 2011)**

UNIVERSITY OF MUMBAI  
 Syllabus for M.Sc. Part – II (IT)  
**SOFTWARE ARCHITECTURES**  
 (w.e.f. the academic year 2010 – 2011)

*M Sc – Information Technology Year II, Elective II, Term I*  
**SUBJECT: SOFTWARE ARCHITECTURES**

Lectures: 4 Hrs per week  
 Practical: 4 Hrs per week

Objectives of the course: Theory: 100 Marks  
Term work/Practical: 50 Marks

Pre-requisites: Component Architecture, Software Engineering, Knowledge of following architectures:

**Technology Architectures**

- CORBA – Common Object Request Broker Architecture
- Java EE – Java Enterprise Edition
- .NET
- Web Services
- Introduction to BPEL (Business Process Execution Language)
- SOA – Service Oriented Architecture
- ESB – Enterprise Service Bus

As these technology architectures are not covered in any other course in the syllabus, it is expected that the instructor will introduce these architectures to the students in about 6 hrs of delivery. No questions will be put directly on these technology architectures in the theory exam, however, in case studies oral examination, the knowledge of these architectures would be tested.

**DETAILED SYLLABUS**

**1. Envisioning Architecture:**

The Architecture Business Cycle: Where Do Architectures Come From?, Software Processes and the Architecture Business Cycle, What Makes a "Good" Architecture?  
 What Is Software Architecture?: What Software Architecture Is and What It Isn't Architectural Patterns, Reference Models, and Reference Architectures, Why Is Software Architecture Important?, Architectural Structures and Views

**2. Creating an Architecture:**

Understanding Quality Attributes: Functionality and Architecture , Architecture and Quality Attributes, System Quality Attributes, Quality Attribute Scenarios in Practice, Other System Quality Attributes, Business Qualities, Architecture Qualities  
 Achieving Qualities: Introducing Tactics, Availability Tactics, Modifiability Tactics, Performance Tactics, Security Tactics, Testability Tactics, Usability Tactics, Relationship of Tactics to Architectural Patterns, Architectural Patterns and Styles  
 Designing the Architecture: Architecture in the Life Cycle, Designing the Architecture, Forming the Team Structure, Creating a Skeletal System  
 Documenting Software Architectures: Uses of Architectural Documentation, Views, Choosing the Relevant Views, Documenting a View, Documentation across Views, Unified Modeling Language  
 Reconstructing Software Architectures: Introduction, Information Extraction, Database Construction, View Fusion, Reconstruction

### 3. Analyzing Architectures:

**The ATAM: A Comprehensive Method for Architecture Evaluation: Participants in the ATAM, Outputs of the ATAM, Phases of the ATAM**

**The CBAM: A Quantitative Approach to Architecture Design Decision Making:**

- Decision-Making Context, The Basis for the CBAM, Implementing the CBAM, Case
- Results of the CBAM Exercise

**Software Architecture in the Future: Creating an Architecture, Architecture within the Life Cycle, The Impact of Commercial Components**

### Books

#### Text Books:

1. Software architecture in practice Second Edition, Addison Wesley  
by Len Bass, Paul Clements, Rick Kazman

#### References :

1. CORBA
  - <http://www.omg.org>
2. Java EE
  - <http://java.sun.com/javaee>
3. .NET
  - <http://www.microsoft.com/NET>
4. Web Services
  - [http://en.wikipedia.org/wiki/Web\\_service](http://en.wikipedia.org/wiki/Web_service)
  - <http://www.w3.org/TR/ws-arch/>
5. BPEL
  - [http://en.wikipedia.org/wiki/Business\\_Process\\_Execution\\_Language](http://en.wikipedia.org/wiki/Business_Process_Execution_Language)
6. SOA
  - [http://en.wikipedia.org/wiki/Service-oriented\\_architecture](http://en.wikipedia.org/wiki/Service-oriented_architecture)
  - <http://www.soablueprint.com/whitepapers/SOAPGPart1.pdf>
  - <http://www.soablueprint.com/whitepapers/SOAPGPart2.pdf>
7. ESB
  - [http://en.wikipedia.org/wiki/Enterprise\\_service\\_bus](http://en.wikipedia.org/wiki/Enterprise_service_bus)

### **TERM WORK**

1. A-7E Avionics System: A Case Study
2. Air Traffic Control: A Case Study in Designing for High Availability
3. Flight Simulation: A Case Study in an Architecture for Integrability
4. The Nightingale System: A Case Study in Applying the ATAM
5. Study: The NASA ECS Project
6. The World Wide Web: A Case Study in Interoperability

### **ORAL EXAMINATION**

An oral examination is to be conducted based on the above syllabus.

UNIVERSITY OF MUMBAI  
No. UG/156 of 2010

CIRCULAR:-

A reference is invited to the Ordinances, Regulations and syllabi relating to the T.Y.B.A. degree course vide this office Circular No.UG/57 of 2007 dated 22<sup>nd</sup> February, 2007 and the Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Ad-hoc Board of Studies in Ancient Indian History Culture and Archeology at its meeting held on 7<sup>th</sup> May, 2010 has been accepted by the Academic Council at its meeting held on 10<sup>th</sup> June, 2010 vide item No. 4.39 and that, in accordance therewith, the syllabus of F.Y.B.A. for Elements of Archeology and Museology in India in the subject of Ancient Indian Culture is revised as per Appendix and that the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
7<sup>th</sup> July, 2010

L. R. Mane  
Offg. Registrar

To,

The Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning

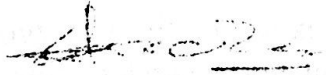
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No. UG/156-A of 2010, MUMBAI-400 032 7<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Arts,
- 2) The Chairman, Ad-hoc Board of Studies in Ancient Indian History Culture, and Archeology,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

Copy to :-

The Director, Board of Colleges and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanaagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum- Director, Institute of Distance and Open Learning Education, (10 copies) the Director University Computer Center (IDE Building), Vidyanaagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) the Assistant Registrar, Academic Authorities Unit (2 copies) and the Assistant Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above circular and that on separate Action Taken Report will be sent in this connection. The Assistant Registrar Constituent College Unit (2 copies), BUCT (1 copy), the Deputy Account, Unit V (1 copy), the In-charge Director, Centralize the Telephone Operator (1 copy), the Secretary MUASA

# UNIVERSITY OF MUMBAI



Syllabus of  
F.Y.B.A. for  
Elements of Archeology & Museology  
In India  
in the Subject of  
Ancient Indian Culture

**(With effect from the academic year 2010-2011)**



# Elements of Archaeology and Museology in India

## Semester I

### Aims and Objectives:

1. Creating awareness about the theoretical foundation of Archaeology.
2. Teaching basics of Field Archaeology.
3. Understanding vast variation in Archaeological data, its context.
4. Methods of interpretation of Archaeological data and analyses.

1	<p><b><u>Definition and Scope of Archaeology</u></b></p> <p>a. <b>Definition</b> (traditional and neo archaeology)</p> <p>b. <b>Scope</b> (Archaeology and Other Sciences: History, Geology, Anthropology, Cultural Systems: Economics, Political Science, Sociology, Mythology, Natural Sciences: Palaeobotany, Palenology, Palaeontology, Physics, Chemistry and Technology)</p>	08  (04)  (04)	
2	<p><b><u>Methods in Archaeology</u></b></p> <p><b>Exploration Methods</b> (Find Spots of Treasure Troves, Arial Photography, Survey Maps, Folk Lore, Local Legends, River Valley Survey, District Survey, Different Evidences – Excavated and Explored sites (Formulation of Hypothesis), Inscriptional Evidence – to define Historical Geography.)</p> <p><b>Excavation Methods</b> (Formulation of Hypothesis, Trial Excavation, Establishing the Cultural Sequence, Comparing it with the evidence in surrounding areas, Horizontal Excavation, Marine Archaeology)</p> <p><b>Dating Methods</b> (Relative Dating Methods: Dendrochronology, Stratigraphy and Cultural Sequence; Absolute Dating Methods: C14,</p>	12  (04)  (06)  (02)	<p><b><u>Total</u></b></p> <p><b><u>4 Credits</u></b></p> <p><b><u>for the</u></b></p> <p><b><u>Semester</u></b></p>



	Thermoluminescence, Potassium-Argon, Paleontology(with special reference to Rajasthan))	
3	<p><b><u>Three streams of Archaeology</u></b></p> <p><b>Prehistorical - Protohistoric Archaeology:</b></p> <p>Lower Palaeolithic- Isampur;</p> <p>Middle Palaeolithic: Gangapur, Chirki- Nevasa;</p> <p>Upper Palaeolithic: ;</p> <p>Mesolithic: Patne (ostrich shells),</p> <p>Neolithic – Chalcolithic: Tuljapur Gadhi, Nevasa, Inamgaon, Daimabad, Prakashbahal.</p> <p>Megalithic: Mahurjhari, Takalghat, Naikund, Bhagimahari, Borgaon, ;</p> <p><b>Historical:</b> Sopara, Ter, Nasik, Kolhapur, Washim, Paithan, Nagra, Bhokardan, Pauni, Mathura, Hastinapur, Taxila, Sisupaigarh;</p> <p><b>Medieval:</b> Chapaner, Hampi, Daulatabad</p>	<p>22</p> <p>(10)</p> <p>(06)</p> <p>(06)</p>
4	<p><b><u>Archaeology as a tool of Cultural History</u></b></p> <p><b>Mythology (include folk lore) and Ethics</b></p> <p><b>Technology and Philosophy</b></p> <p><b>Fine and Performing Arts</b></p>	<p>06</p> <p>(02)</p> <p>(02)</p> <p>(02)</p>
5	<p><b>Field Visits are Compulsory at least one of the Following Sites: Ter, Elephanta, Sopara, Paithan, Daulatabad, Hampi, etc. Or any other important site where in the excavations are going on.</b></p>	12

## Semester II

### Aims and Objectives:

1. Creating awareness about the theoretical foundation of Museology.
2. Understanding various functions and scope of the Museum.
3. Understanding relation between Museum and Society.

1	<b>What is Museum?</b>  a. Definition, aims and Objectives b. Types of Museums c. Museology and Museography	06  (02) (02) (02)	
2	<b>Functions of a Museum</b>  <b>Acquisition:</b> Ways  <b>Documentation:</b> Registrars (General Accession, Gallery, Location) Accession, Photography, Physical and Chemical inspection  <b>Display:</b> Gallery, Types of Showcases, Lighting, Colour Scheme  <b>Security:</b> Store, Gallery, Museum in General  <b>Preservation:</b> Conservation Lab, Preventive, Curative.  <b>Signage:</b> Internal, External	16  (02) (04)  (04)  (02) (02)  (02)	<b><u>Total</u></b>  <b><u>4 Credits</u></b> <b><u>for the</u></b> <b><u>Semester</u></b>
3	<b>Research, Education and Publication</b>  <b>Research and Library</b>  <b>Education:</b> Signage, Out Reach Programmes (Involvement of Children, Museum Shop, Mobile Exhibitions, etc.), Events, Special Exhibitions, Audio Guides.  <b>Publication:</b> Catalogues, Broachers and Hand	12  (02) (06)	

	books	(04)
<b>4</b>	<b>Types of Exhibitions:</b> <b>Permanent Exhibitions:</b> Museum Galleries (Theme and Display) <b>Temporary Exhibitions:</b> Special Exhibitions (Exchange Programme)	<b>04</b> (02) (02)
<b>5</b>	<b>Museums and Personal:</b> Hierarchy, Duties and Responsibilities	<b>04</b>
<b>6</b>	<b>Museums and other six components of art and culture and their inter-relationship</b> Museums and Archaeology; Museums and Archives; Museums and Libraries; Museums and Gazetteers; Museums and Teaching of Fine Arts, Dance-Drama-Music (Culture) Art and culture (with seven components) as a whole and their assimilation and integration into formal Education	<b>08</b> (06) (02)
<b>7</b>	<b>Visit to any one Museum for the better understanding of the components of the syllabi.</b>	<b>10</b>

## Reference Books:

### Archaeology

- Agrawal D. P., *South Asian Prehistory*, Aryan Books, Delhi, 2002.
- Allchin Briget and Raymond, *The Rise of Civilization in India and Pakistan*, Cambridge University Press, First South Asian Edition, 1996.
- Allchin F. R., *Archaeology of Early Historic South Asia, The Emergence of Cities and States*, Cambridge University Press, 1995.
- Chakrabarty D. K., *A History of Indian Archaeology: From Begging to 1947*, Munshiram Manoharlal, Delhi, 1988.
- Daniel G., *A Short History of Archaeology*, Thames and Hudson, London, 1981.
- Dhawalikar M. K., *Indian Protohistory*, Books and Books, New Delhi, 1997.
- Dhawalikar M. K., *Historical Archaeology of India*, Books and Books, New Delhi, 1999.
- Fagan Brian, *In the Beginning, An Introduction to Archaeology*, The Lindbriar, Corporation, USA.
- Ghosh A., *Encyclopedia of Indian Archaeology* (Vols. I and II), Munshiram Manoharlal, 1990.
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— X — X —



UNIVERSITY OF MUMBAI  
No. UG/157 of 2010

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabus relating to the T.Y.B.A. degree course vide Pamphlet No.140 and to this office Circular No.UG/208 of 2004, dated 27<sup>th</sup> May, 2004 the Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Board of Studies in Rural Development at its meeting held on 2<sup>nd</sup> January, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.3 and that, in accordance therewith, the syllabus and Pattern of Question Paper and list of reference books at the S.Y.B.A. Paper-II in the subject of Rural Development is revised as per Appendix and that the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
7<sup>th</sup> June, 2010

L.R.Mane  
Offg. Registrar

To,

The Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning

A.C./4.3/3/03/2010

\*\*\*\*\*

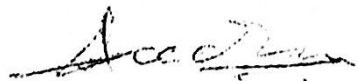
No. UG/157-A of 2010,

MUMBAI-400 032

7<sup>th</sup> June, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Arts,
- 2) The Chairman, Board of Studies in Rural Development,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,



(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanaagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum- Director, Institute of Distance and Open Learning, the Deputy Registrar, University Computer Center (IDE Building), Vidyanaagari, Academic

Closure to Item No. 4.3

03.03.2010

**UNIVERSITY OF MUMBAI**



**REVISED SYLLABUS  
AND  
PAPER PATTERN AT THE  
S.Y.B.A.**

**RURAL DEVELOPMENT  
PAPER-II**

**(With effect from the Academic year 2010-2011 )**

# RURAL DEVELOPMENT

## S.Y.B.A PAPER – II

### RURAL SOCIETY AND ITS DEVELOPMENTAL STRATEGIES.

(To come in to force from the Academic year 2010-2011)

#### SECTION – I RURAL SOCIETY

(To be completed during the First Term)

##### 1) Rural Society

(12)

- (A) Indian Rural Society – Characteristics of Indian Rural Society; Transformation of Rural Society and Emergence of Rural Urban continuum.
- (B) Village Community – Patterns of village settlement, concept of self-sufficient village community.
- (C) Socio-Economic problems of Rural Community.
- (D) Status of Women in Rural Society.

##### 2) Rural Social Institutions.

(12)

- A) Religious Institutions – concept, Nature, Function and Its changing structure.
- B) Educational Institutions – Objectives, Types, Function and Importance.
- C) Co-Operative Institutions – Concept, Nature, Scope, Role and Significance in Rural Development.
- D) Political Institutions – Concept, Nature and Function.

##### 3) Social Processes in Rural Society.

(12)

- A) Sanskritization.
- B) Westernization.
- C) Modernization.
- D) Development and Social change ( Transformation)

## SECTION – II

### DEVELOPMENTAL STRATEGIES

(To be completed during the Second Term)

4) Development of Agriculture.:

A) Role of Technology in Agriculture, Farm Mechanization, High Yielding Variety Seeds (HYV). (12)

B) Irrigation and Water Management, Methods of irrigation – conventional and modern methods.

C) National Agricultural policy 2000, Food security.

D) Role of Agricultural Universities and Krishi Vigyan Kendra (KVK)

5) Rural Employment :

(12)

A) Agro Based Industries :- Concept , Types, Functions and Importance in rural employment generation.

B) Rural Industrialization- concept, Types and Importance.

C) Self help Group- Concept , Characteristics and Functions.

D) Swarnajayanti Gram Swarojgar Yojana (SGSY) – salient features of SGSY Nature and Scope.

6) Tourism Development .

(12)

A) Rural Tourism – Concept, Nature, Scope, Importance and Limitations.

B) Agro – Tourism – Concept, Nature, Scope, Merits and Demerits.

C) Eco – Tourism – Concept, Nature and awareness.

D) Essential factors for Tourism and Governmental Aid for Development of Tourism.

# मुंबई विद्यापीठ

## ग्रामीण विकास

द्वितीय वर्ष कला पेपर क्रमांक - २

ग्रामीण समाज आणि विकासाची व्यूहरचना (सूधारीत अभ्यासक्रम : शैक्षणिक वर्ष  
: २०१०-२०११ पासून अंमलात)

### विभाग - १ : ग्रामीण समाज

(पहिल्या सत्रात अभ्यासक्रम पूर्ण करणे आवश्यक)

#### १. ग्रामीण समाज :-

१२

- अ) भारतीय ग्रामीण समाज :- भारतीय ग्रामीण समाजाची वैशिष्ट्ये - ग्रामीण समाजातील परिवर्तन आणि ग्रामीण - नागरी सातत्य
- ब) ग्रामीण समुदाय - जनवस्त्यांची निर्मिती, स्वयंपूर्ण खेड्याची संकल्पना
- क) ग्रामीण समुदायाच्या सामाजिक व आर्थिक समस्या
- ड) ग्रामीण समाजातील महिलांचे स्थान

#### २. ग्रामीण सामाजिक संस्था :-

१२

- अ) धर्म संस्था - संकल्पना, स्वरूप, कार्य आणि त्यांचे बदलते स्वरूप
- ब) शैक्षणिक संस्था - उद्दिष्ट्ये, प्रकार, कार्य आणि त्यांचे महत्व
- क) सहकारी संस्था - संकल्पना, स्वरूप, व्याप्ती, भूमिका आणि ग्रामीण विकासातील त्यांचे महत्व
- ड) राज्य संस्था - संकल्पना, स्वरूप आणि कार्ये

#### ३. ग्रामीण समाजातील सामाजिक प्रक्रिया :-

१२

- अ) सांस्कृतीकरण
- ब) पाश्चात्यीकरण
- क) आधुनिकीकरण
- ड) विकास आणि सामाजिक बदल (ग्रामीण सामाजिक स्थित्यंतर)

विभाग - २ : विकासाची व्यूहरचना  
(द्वितीय सत्रात अभ्यासक्रम पूर्ण करणे आवश्यक)

४. कृषी विकास :-

अ) कृषी क्षेत्रात तंत्रज्ञानाची भूमिका, शेतीचे यांत्रिकीकरण, अधिक उत्पादन देणारी बी-बियाणे. १२

ब) पाणी पुरवठा व जलव्यवस्थापन - जलसिंचनाच्या पद्धती - पारंपारिक व आधुनिक पद्धती.

क) राष्ट्रीय कृषी धोरण - २००० आणि अन्नसुरक्षा.

ड) कृषी क्षेत्रात कृषी विद्यापीठे आणि कृषी विज्ञान केंद्राची भूमिका..

५. ग्रामीण रोजगार :-

अ) कृषी आधारित उद्योग व्यवसाय : संकल्पना, प्रकार, कार्य आणि ग्रामीण रोजगार निर्मितीत महत्व. १२

ब) ग्रामीण औद्योगिकीकरण : संकल्पना, प्रकार व महत्व.

क) स्वयमसहाय्यता गट - संकल्पना वैशिष्ट्ये व कार्ये.

ड) सुवर्ण जयंती ग्राम स्वयमरोजगार योजना - ठळक वैशिष्ट्ये, स्वरूप व व्याप्ती

६. पर्यटन विकास :-

अ) ग्रामीण पर्यटन - संकल्पना, स्वरूप, व्याप्ती, महत्व आणि मर्यादा. १२

ब) कृषी पर्यटन - संकल्पना, स्वरूप, व्याप्ती व गुण-दोष.

क) पर्यावरणीय पर्यटन - संकल्पना, स्वरूप आणि जागृती.

ड) पर्यटन विकासासाठी आवश्यक घटक आणि शासकीय मदत.



# PRACTICAL WORK & ASSIGNMENTS

## Field work topics (Any three of the following)

- 1) Visit to a Co-operative Institution & write a report of the visit :
- 2) Visit to a Educational Institution & write a report of the visit :
- 3) Visit to the tourist centre and write a report of the visit :
- 4) Study of a Self Help Group or Mahila Bachat Group & write a report :
- 5) Visit to Agricultural Universities / Agricultural Research Institutions & write a report of the visit :
- 6) Visit to KVIC & Write a report of the visit.

\*\*\*\*\*

# REFERENCE BOOK

- (1) Shri. Desai A.R.
  - Rural Sociology in India, Popular Prakashan, Mumbai, 1997
- (2) Dr. I. Satya Sundaram
  - Rural Development (3<sup>rd</sup> Edt.), Himalaya Publishing House, Mumbai - 04
- (3) Shri. Katar Singh
  - Rural Development, (Principles, Policies and Management) Sage Publication, New Delhi, 1986
- (4) Shri. Singh H.K.
  - Challenges in Rural Development (1998) Discovery Publishing House, New Delhi - 110002
- (5) Shri. Dube S.C.
  - Indian Village.
- (6) Shri. Baden Powell
  - Indian Village Community.
- (7) Shri. Punit A.R.
  - Social System in Rural India. Sterling Publication. New Delhi, (1978)
- (8) Shri. Gopal Lal Jain
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- (9) Shri. R. Dattand Sudharam
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  - Indian Economy (Revised Edt.)
- (10) Shri. Mishra - Pura
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- (11) Dr. I. Satya Sundaram

# REFERENCE BOOK

- १२ डॉ. भालेराव देसाई - भारतीय अर्थव्यवस्था  
निराली प्रकाशन, पुणे.
- १३ श्री. गुरुनाथ नाडगोडे - ग्रामीण समाजशास्त्र  
कॉन्टीनेंटल प्रकाशन, पुणे.
- १४ श्री. पुजारी बेडदे - भारतीय समाज  
विद्या प्रकाशन, पुणे.
- १५ श्री. दांडेकर व जगताप - महाराष्ट्राची ग्रामीण समाजरचना .पुणे
- १६ श्री. जयंतराव पाटील - जगाची शेती महाराष्ट्र राज्य साहित्य  
आणि संस्कृती मंडळ, १९८८.
- १७ श्री. चानसे रमेश (संपादक) - महाराष्ट्रातील समाज परिवर्तनाच्या दिशा  
मॅजेस्टिक प्रकाशन, मुंबई, १९८९.
- १८ श्री. के. सी. काटकर - महाराष्ट्र शासनाच्या १००० योजना  
व कार्यक्रम, चंद्रसरू प्रकाशन, कुर्ला, मुंबई.
- १९ श्री. पांडुरंग तावरे - कृषी पर्यटन
- २० श्री. चंद्रकांत भडसावळे - कृषी पर्यटन
- २१- भारत सरकार (माहिती व प्रसारण मंत्रालय) - भारत सरकारच्या कल्याणकारी योजना.
- २२ भारतीय समाज - प्रा. चंद्रकांत खंडागळे  
प्रकाशक, सौ. मायादेवी खंडागळे  
१५३८, गणेशनगर, सांगली
- २३ डॉ. एस. बी. शिंदे - पर्यटन भूगोल-

UNIVERSITY OF MUMBAI  
No. UG/158 of 2010

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabubs relating to the B.Sc. degree course vide Pamphlet No.151 and this office Circular No.UG/93 of 2006 dated 31<sup>st</sup> March, 2006 and the Principals of the affiliated Colleges in Science are hereby informed that the recommendation made by the Board of Studies in Zoology at its meeting held on 17<sup>th</sup> April, 2010 has been accepted by the Academic Council at its meeting held on 10<sup>th</sup> June, 2010 vide item No.4.33 and that, in accordance therewith, the syllabus for the Applied Component viz Fishery Biology, Marine Science and Entomology for the T.Y.B.Sc. examination in the subject of Zoology is revised as per Appendix and the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032

7<sup>th</sup> July, 2010

L. R. Mane  
Offg. Registrar

To,

The Principals of the affiliated Colleges in Science.

A.C./4.33/10/06/2010

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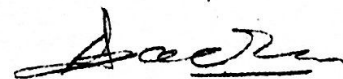
No. UG/158-A of 2010,

MUMBAI-400 032

7<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Science,
- 2) The, Chairman, Board of Studies in Zoology,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,



(D. N. Jadhav)

Ag. Deputy Registrar  
(UG/PG Section)

1/7/10

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro- Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ramnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum- Director, Institute of Distance Education, (10 copies) the Director University Computer Center (IDE Building), Vidyanagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar, (PRO) the Assistant Registrar, Academic Authorities Unit (2 copies) and they are requested to treat this as action taken report on separate Action

UNIVERSITY OF MUMBAI



Revised Syllabus

for

Applied Component

(Fishery Biology, Marine Science & Entomology)

at

T.Y.B.Sc.

In The Subject Of

Zoology

(With effect from the Academic year 2010-2011 )

## PREAMBLE

Applied Component was introduced for T.Y.B.Sc. class in the academic year 1979-80 with a view to enhance entrepreneurial potentials and the skills essential's for employability. The syllabi of Applied Component in Zoology for T.Y.B.Sc. students have been revised keeping the view in forefront whereby exhaustive theory has been diluted giving room for accommodating applied topics having commercial propositions.

The university is poised to introduce credit systems and point grades. Though the same is being debated efforts have been taken to prescribe modular syllabi with the weightage of four units in each paper further divided into two sections which could fit in to the semester system in future. Thus, these revised syllabi are set for evaluation as per the present pattern. This could be converted for internal and external examinations with continuous evaluation through assignments, projects etc., as and when it is required by the university.

Most importantly the said syllabus has inherent flexibility which is a revolutionary step aimed at providing need based training catering to the needs of urban and rural niches. It was taken in to consideration the diverse infrastructure expertise and opportunities spread from Colaba in south Mumbai to Banda in Sindhudurga i.e. the jurisdiction of this esteemed university. This is the reason why the concerned teachers are given freedom to select any two units out of four in each sections thus selecting eight units out of 16 in total as prescribed for two papers in applied component while discussing the same with concerned head of the department and principal to satisfy the need of the student based upon the infrastructure expertise and opportunities in the respective area. The said experimentation is being done only in applied component and not in main papers befitting the intricate nature of applied component alone.

It was a very encouraging experience when the said syllabus committee conducted workshops and meetings at B.N.N. College, Bhiwandi., Mithibai College, Vile Parle., R.Ruia College, Matunga, Institute of Science, Mumbai, Khed College, R.P. Gogate College, Ratnagiri, DBJ College, Chiplun, Dr. Ambedkar College, Mahad, Patkar College, Goregaon, Mumbai and B.N.Bandodkar College, Thane. To take views and suggestions of all the stake holders this includes students, meritorious alumni and teachers.



**Outline of Proposed Curriculum for**  
**T.Y B. Sc (Applied Component)**

**Fishery Biology**

**Pattern**

**Paper I:** ...60 Lect.

**Paper II:** ...60 Lect.

**Practical I :** [Based on Paper I] ...60 Periods.

**Practical II :** [Based on Paper II] ...60 Periods.

**Fishery Biology**  
**Paper I**

**SECTION I –**

**Unit I) Oceanography –**

- i) Navigational & sea safety equipments – Life saving devices, global positioning system, radar, signalling devices.
- ii) Oceanographic Instruments – Nansen's reversing bottle, Peterson's grab, dredges, fish finding instruments / methods, remote sensing.
- iii) Introduction to basic physical, chemical & biological oceanography.

**Unit II) Craft & Gear –**

- i) Basic boat building (Parts, Design, Material used), Methods of protection from foulers & borers.
- ii) Basic studies of marine engines – outboard & inboard engines, sectional view of 2 stroke & 4 stroke diesel engines, winch & deck side equipments.
- iii) Operations – Gill, Trawl, Purse seine nets, Hooks & lines, Turtle exclusion device (TED), Non conventional fishing methods such as light fishing, hose pipe fishing, electric fishing.

**Unit III) Farming of Major Carps –**

- i) Breeding techniques of Major Carps & Common Carps.
- ii) Hatchery & Nursery Management of Indian Major Carps - *Labeo rohita*, *Catla catla*, *Cirrhina mrigala* & Exotic carps – Common Carp - *Cyprinus carpio*, Silver Carp - *Hypophthalmichthys molyxtrics*, Grass Carp - *Ctenopharyngodon idella*.
- iii) Mono culture & poly culture practices – Extensive, Semi-intensive & Intensive.

**Unit IV) Introduction to other Commercial Aquaculture Practices in Fresh Water –**

- i) Fresh water prawn - *Macrobrachium rosenbergii* - Breeding, life cycle, hatchery management & rearing, Composite culture.
- ii) Ornamental fishes - Breeding and rearing of Danio, Angel, Discus, Neon Tetra, Red Sword Tail, Flower Horn, Siamese Fighter).
- iii) Air Breathing Fishes - Breeding & rearing.

**SECTION II –**

**Unit V) Brackish water Prawn - *Penaeus monodon* - Culture –**

- i) Breeding techniques.
- ii) Hatchery & Nursery Management.
- iii) Rearing practices – Extensive, Semi-intensive, Intensive & Sustainable.

Unit VI) Introduction to other Commercial Aquaculture in Brackish / Marine water –

- i) Fin fish culture - *Lates calcarifer*.
- ii) Crab - *Scylla serrata*.
- iii) Pearl - *Pinctada vulgaris*.

Unit VII) Quality Control & Packaging –

- i) Post mortem changes & mechanism of spoilage – Hyperaemia, Rigor Mortis, Autolysis, Rancidity.
- ii) Brief methods for evaluating freshness & quality (Organoleptic, Microbial, and Chemical) of fish & prawns.
- iii) Various packaging materials used in freezing & canning industry – Polyolefin, wax duplex carton, master carton, can, lacquered can.

Unit VIII) Marketing & Finance –

- i) Traditional marketing vis-a-vis role of fishery co-operatives with reference to operations at Satpati, Sasoon Dock & Karanja.
- ii) Global marketing & Export-Import procedures.
- iii) Fund raising – Financial institutions, schemes & subsidies, basic accounting, costing & feasibility report.

## FISHERY BIOLOGY Paper II

### SECTION I –

Unit I) Marine Fin Fish Fisheries of India –

- i) Coastal fisheries (up to 45 fathoms) – *Stromateus sinensis*, *Stromateus cinereus*, *Stromateus niger*, *Polynemus tetradactylus*, *Psuedosciaena diacanthus*, *Trichiurus haumela*, *Syngnis japonicus*, *Scomber microlepeidotus*, *Cybius guttatum*, *Sardinella longiceps*.
- ii) Deep sea fisheries (more than 45 fathoms) of Indian Exclusive Economic Zone – *Thunnus albacore*, *Sarda orientalis*, *Rhincodon typus*.
- iii) Commercial potential & major landing centres of the above fishes.

Unit II) Marine Shell Fish Fisheries of India –

- i) Crustacean fisheries – *Penaeus monodon*; *Metapenaeus affinis*, *Parapenaeopsis stylifera*, *Acetes indicus*, *Panulirus polyphagus*, *Scylla serrata*.
- ii) Molluscan fisheries – *Pinctada vulgaris*, *Sepia pharaonis*, *Loligo duvacei*.
- iii) Commercial potential & major landing centres of the above shell fishes.

Unit III) Nutrition –

- i) Nutritional requirements at various stages of development of fish & crustaceans.
- ii) Culture of natural feed – *Daphnia*, *Chaetoceros* & *Artemia*.
- iii) Formulated / Pelleted feeds.

Unit IV) Diseases –

- i) Bacterial, Fungal, Protozoan infections and treatment.
- ii) Worm & Crustacean infections and treatment.
- iii) Physiological disorders / diseases and treatment.

## SECTION II -

### Unit V) Preservation & Processing -

- i) Traditional methods of icing, drying, salting & their modifications.
- ii) Introduction to refrigeration, types & properties of refrigerants, types of freezers - Brine, air blast, tunnel, contact plate & cryo-quick. Freezing procedures including hygienic washing, dressing, PUD (Peeled & Undeveined), DV (Deveined), packaging and freezing for fishes, prawns & their products.
- iii) Principle & steps involved in can reform & canning of fish & prawns in various media.

### Unit VI) By-products & Value Added Products -

- i) Proximate composition of fish meat & products.
- ii) Introduction to by-products - Fish protein concentrate, Fish maws / Isinglass, Fish hydrolysates, Chitin, Chitosan, Glucosamine hydrochloride, Gelatin, Fish silage, Surimi & Imitation products.
- iii) Value addition - Different types of value added products from fish & shell fish - Fish / Prawn pickle, Fish wafers, Prawn (*Acetes indicus*) chutney, Fish soup powder, Fish / Crab steaks.

### Unit VII) Farm Engineering -

- i) Site selection & construction of hatchery & farms for Extensive, Semi-intensive & Intensive fresh water fishes.
- ii) Site selection & construction of hatchery & farms for Extensive, Semi-intensive & Intensive brackish water fishes.
- iii) Equipments & Accessories used in various aqua farms.

### Unit VIII) Introduction to other Aquaculture Practices -

- i) Raft culture, Rope culture.
- ii) Pen culture, Cage culture.
- iii) Sports fishery, Sewage fed culture.

## INSTRUCTIONS FOR PAPER I & II -

TOTAL FOUR UNITS ARE TO BE SELECTED PER PAPER (02 UNITS FROM EACH SECTION) FOR FORMAL TEACHING BY THE CONCERNED TEACHERS IN CONSULTATION WITH THE HEAD OF THE DEPARTMENT AND HAVING DISCUSSED WITH THE STUDENTS, ENABLING OPTIMUM UTILIZATION OF THE AVAILABLE INFRASTRUCTURE, EXPERTIES OF THE TEACHERS, HUMAN RESOURCES AND OPPORTUNITIES IN THE LOCAL AREA. THUS WORKLOAD OF 60 LECTURES FOR EACH PAPER IS DIVIDED INTO FOUR UNITS, EACH OF 15 LECTURES.

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QUESTIONS WILL BE SET ON EACH UNIT SEPARATELY WITH INTERNAL OPTIONS, ENABLING THE STUDENTS TO ATTEMPT THE ENTIRE PAPER OF 60 MARKS WITH ADEQUATE OPTIONS.

**Fishery Biology**  
**Practical I**

1. Introduction to Oceanographic Instruments - Nansen Reversing Bottle with Thermometer, Peterson's Grab, Dredge.
2. Layout of fishing vessels & Sectional view of 2 strokes & 4 strokes marine engines, life saving equipments, winch & deck side equipments.
3. Identification of various stages of development of carps & Study of sexual dimorphism in adults.  
(Major Carps - *Labeo rohita*, *Catla catla*, *Cirrhina mrigala*, Common Carp - *Cyprinus carpio*.)
4. Identification of various stages of development of *Penaeus monodon*, *Macrobrachium rosenbergii* & Study of sexual dimorphism in adults.
5. Identification of Air Breathing Fishes - *Anabas testudineus*, *Clarius batrachus*, *Lates calcarifer*.
6. Identification of
  - A) Ornamental fishes - Angel, Sword Tail, Neon tetra, Siamese fighter, Danio, Discus and Flower Horn.
  - B) Aquatic plants - Ludwigia, Cobamba, Cork Screw Vallisneria, Aquarose, Amazon Sword plant &
  - C) Aquarium accessories - Aerator, Bottom Filter, Column Filter, Surface Filter, Food dispensers.
7. Eye ablation technique in crustaceans & administration of synthetic hormone injection in a suitable fish for induced breeding.
8. Study of models and functioning of D 81 & Shirgur's hatcheries.
9. Embedding beads in suitable mollusc (Such as *Unio sp*; *Kataysia sp.*) under sterilized conditions for pearl culture.
10. Microbial Studies - i) Dilution of Sample, ii) Gram Staining Technique, iii) Identification of Bacilli, Cocci, Vibrio bacteria and Organoleptic tests for fish & prawn.
11. Total Plate Count (TPC) of bacteria from fish.
12. Identification of packaging materials.  
(Waxed duplex carton, Master carton, Simple cans, Coated [Lacquered] cans, Polyolefin).
13. Group Activities - Assignments, Field Visits & Entrepreneurial Skill Development.

## Fishery Biology Practical II

1. Identification of marine fishes.  
(*Stromateus sinensis*, *Stromateus cinereus*, *Stromateus niger*, *Polynemus tetradactylus*,  
*Pseudosciaena diacanthus*, *Trichiurus haumela*, *Synagris japonicus*, *Scomber microlepidotus*,  
*Cybium guttatum*, *Sardinella longiceps*, *Thunnus albacore*, *Rhincodon typhus*, *Sarda orientalis*).
2. Identification of Crustaceans & Molluscs.  
(*Penaeus monodon*, *Metapenaeus affinis*, *Parapenaeopsis stylifera*, *Acetes indicus*,  
*Panulirus polyphagus*, *Scylla serrata*, *Pinctada vulgaris*, *Sepia pharaonis*, *Loligo duvacei*).
3. Estimation of fish fecundity.
4. Estimation of fat/lipid from fish by Folch's Method & proteins by Lowry's Method.
5. Preparation of formulated feed for fish & prawn.
6. Identification of parasitic infections in aquatic organisms.  
Fungal – Dermatomycosis; Bacterial – Fin/Tail rot & Dropsy; Protozoan – Costiasis & White Spot; Worm – Leech; Crustacean – Argulosis.
7. Fish dressing, filleting, prawn peeling – PUD, DV & grading.
8. Preparation of surimi, fish protein concentrate, fish soup powder.
9. Preparations of fish burger, fish fingers, fish/prawn pickle.
10. Preparation of chitosan, isinglass.
11. Identification of various farm equipments such as feeding cups, trays, paddle wheels, aerators, fountains, Sluice gate models, elbow pipe outlets.
12. Study of models of raft, pen, cage culture & materials used in rope culture.
13. Project.

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- > Course Manual in Fishing Technology By Latha Shenoy, CIFE, Versova, Mumbai.
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- > Financial management By Khan & Jain.
- > Financial management By I. M. Pandey.
- > Project Management By Prasanna Chandra.
- > Marketing Management By Philip Kotler.
- > For Additional and Latest Information on the topics, various Web Sites can be visited.



## **ANNEXURE I** **Suggested Topics For Group Assignments**

1. Study of market survey for various preserved & processed fish / prawns.
2. Handling of fish on board, at landing centre, in secondary market & at consumer level.
3. Preparation of by products from fishes / crustaceans / molluscs & its costing / production cost.
4. Survey of fish markets for fluctuation in the availability & price of fishes.
5. Survey of the local market for the availability of various by products, value added products and its price.
6. Study of economics of brackish water pond culture.
7. Study of working of fisheries co-operative societies.
8. Study of cost of construction of fishing vessel and subsidies available for the same.
9. Study of cost of gear manufacturing with different materials and subsidies available for the same.
10. Study of cost & profit analysis of any one of the following methods - Trawler, Gill netter, Purse seiner, Hooks & lines and Non-mechanised fishing units.
11. Survey of various packaging materials used in fish processing industries.
12. Survey of various feeds used in local aqua farms.
13. Study of economics of pond culture from nearby area.
14. Comparative cost analysis of fingerlings of major carps from your area.
15. Setting up of marine aquarium with various accessories and its costing.
16. Construction of aquaria of different sizes and shapes.
17. Study of various courses run by Institutes in your area in relation to fisheries.

## **ANNEXURE II** **Suggested Topics For Individual Project**

1. Feasibility report of the maintenance of aquarium fishes in high profile residences.
2. Feasibility report of fresh water / brackish water fish / prawn culture for extensive, semi intensive and intensive.
3. Probability report of maintenance of a culture of Chaetoceros & Artemia by the fish farmers.
4. Project report for the establishment of small / medium / large scale ice factory, freezing and canning industry.
5. Feasibility report of various packaging materials in freezing / canning industry.
6. Feasibility report for establishing an aquarium shop.
7. Feasibility report for establishing a fish feed industry.

1. Monitoring various physico-chemical parameters of an aquarium / pond / lake / river / sea.
- 2.

### **ANNEXURE III** **Suggested Topics For Entrepreneurial Skill Development**

**(Year round group activity)**

1. Curing & drying of jew fish (Dhoma), Ribbon fish, Bombay-duck.
2. Preparation / Collection of different fibres & their specifications.
3. Preparation of aquarium fish feed.
4. Setting & Maintenance of fresh water aquarium.
5. Setting & Maintenance of marine aquarium.
6. Breeding of various aquarium fishes.
7. Collection of various types of Hooks used in fishing.
8. Maintenance of Daphnia Culture and Tubifex worms, Rotifer culture, Artemia Culture.
9. Study of shelf life of desired products such as prawn pickle, fish wafers, fish burger.
10. Breeding of Prawns.
11. Breeding of aquarium fishes.
12. Rearing of aquarium fishes.
13. Propagation of aquatic plants.

### **ANNEXURE IV** **Suggested Field Visits**

Field visits are to be organised to facilitate students to have firsthand experience and exposure to technology / production / functioning of an organisation / unit or witness a relevant activity.

Each student must make at least 01 (One) such visits to the units/markets/sea shores out of 2 to 3 such visits organised by the college.

- I) Visit to one of the units with one or multiple activities such as .
  - Ornamental / Brackish water / Fresh water fish farm / hatchery.
- II) Visit to witness one of the activities such as
  - Fish angling / trawling / purse seining / gill netting.
  - Fish finding operations, etc. (Echo Sounder/Sonar/Fish Magnifier).
- III) Visit any production units such as
  - Food / Fish processing and preservation.
  - Ornamental articles.
- IV) Hi-tech and multinational total export oriented units such as
  - IQF plant.

- Surimi plant.
- Fishery plant.
- Microbiological units.
- Hi-tech fish / prawn / chick hatcheries.
- Fish consumer product industries.

V) Others –

- Self Sale Groups.
- Co-operative Societies.

VI) Govt. Offices such as

- Fishery Department.
- MPEDA.
- Wild-life Authority.
- CITES.
- JDEI(Jt. Director-Export & Import).
- Sales Tax.
- Income Tax.
- Excise Dept.
- Customs Authority of India.
- Local Self Govt. (BMC).
- Clearing Agencies /Agents.
- FDA.
- ISI.
- Ag Mark, etc.

VII) Visit any ancillary unit such as

- Ice plant.
- Can reforming.
- Packaging.
- Cold storage.

VIII) Visit to National Laboratories, National Research Labs & Training Institutes such as NIO, CIFE, CMFRI, CIFT, FSI, IFP, CIFI, CIFNET, NBFGR, etc.

(Field visit is desirable to know the organisation; however guest lecturers could also be helpful in understanding functioning).

ALL THE ABOVE TOPICS SUGGESTED IN ANNEXURE I, II, III & IV ARE SUGGESTIVE IN NATURE AND MORE CREATIVE AND INNOVATIVE NEW TOPICS ARE EXPECTED FROM THE STUDENTS UNDER ABLE GUIDANCE OF CONCERNED TEACHERS, TO SUIT THE EXPERTISE, HUMAN RESOURCES, INFRASTRUCTURE AND LOCAL NEEDS AS ALSO THE INTEREST OF THE STUDENTS.

**Outline of Proposed Curriculum For**  
**T Y B Sc : (Applied Component)**  
**Marine Science**

**Pattern**

**Paper I**

**Paper II**

**Practical I (Based on Paper I)**

**Practical II (Based on Paper II)**

**(60 Lectures)**

**(60 Lectures)**

**(60 Lectures)**

**(60 Lectures)**

**Paper I**

**SECTION - I**

**Unit 1: Zonation of the Sea and Marine Biodiversity**

- 1.1 Zonation of the Sea – Vertical and Horizontal
- 1.2 a. Plankton Classification and Adaptations  
b. Nekton Adaptations
- 1.3 Benthos Adaptations
  - a. Intertidal organisms (rocky, muddy & sandy shores)
  - b. Deep Sea

**Unit 2: Physical Oceanography And Ocean Related Climatic Changes.**

- 2.1 **Effect of the following physical parameters of sea water**
  - a) Density
  - b) Illumination
  - c) Temperature
- 2.2 **Influence of the following water movement in sea**
  - a) Currents – Wind Driven and Thermohaline Circulation
  - b) Types of Waves (including Tsunami)
  - c) Tides
- 2.3 **Influence of the following climatic parameters / phenomena**
  - a) Monsoon
  - b) Cyclone ( including Phyan)
  - c) El Nino

**Unit 3: Chemical Oceanography**

- 3.1 **Effect of the following chemical parameters of sea water**
  - a) Salinity
  - b) pH
  - c) Dissolved Gases (Oxygen and Carbon dioxide)
- 3.2 **Effect of the following nutrients in sea water**
  - a) Minor constituents ( Nitrates, Phosphates and Silicates)
  - b) Dissolved Organic Matter.
- 3.3 **Ecological Cycles in the Ocean**
  - a) Oxygen Cycle.
  - b) Nitrogen Cycle.
  - c) Sulphur Cycle.
  - d) Phosphorus Cycle.

**Unit 4: Fishing Craft and Gear.**

- 4.1 **Traditional and Modern Fishing Craft.**
  - a) Non mechanized craft – dug out canoe, plank built boats and FRP boats.
  - b) Motorized Craft with outboard and inboard engines.

- c) Mechanized craft and their various operations- bag net, large gill net, bottom trawl, Purse seine, long line and squid jigging.
- 4.2 Types of gill nets (surface, drift, bottom set) Dol net, Purse seine, Cast net, Tuna long line, Squid jigs, Rampani net, and Hooks & line.
- 4.3 Pelagic and Bottom trawl.

## SECTION – II

### Unit 5: Oceanographic Instruments

#### 5.1. Instruments used for Marine Biological Sampling

- a. Nansen Reversing Water Bottle
- b. Dredge and Petersen Grab
- c. Plankton net ( Typical Plankton Net, Hensen Net & Indian Ocean Standard Net)

#### 5.2 Instruments used for Measurement of Physical Factors

- a. Protected and Unprotected reversing thermometer
- b. Current meter
- c. Secchi disc and Echosounder

#### 5.3 Fishing methods with respect to location and harvesting

- a. GPS
- b. SONAR
- c. Remote Sensing and Satellite Imagery

### Unit 6 : Regulation And Deep Sea Exploration.

- 6.1 Regulation: Marine fisheries Acts, CCRF (Code of Conduct for Responsible Fisheries), Problems of Overfishing and its regulation: Closed seasons, closed area, capture size restrictions.
- 6.2 Exclusive Economic Zone and Deep Sea Fishing
- 6.3 Study of the following expeditions
  - a) Challenger
  - b) Indian Ocean
  - c) Antarctica

### Unit 7 : Entrepreneurship opportunities and status of research in marine science

- a) Maintenance of marine aquarium
- b) Research Institutes  
NIO, CMFRI, CIFE , FSI, CIBA and MPEDA.
- c) Introduction to web sites related to marine science

### Unit 8 : Protection and conservations

- 8.1 Endangered, threatened and vulnerable marine species.
- 8.2 Marine protected areas. (MPA)
- 8.3 Marine park and bio reserve.

### Practical I

1. Chemical Analysis of Sea Water : Silicates, Phosphates, Nitrates, Carbon Dioxide, pH and Salinity
2. Study of Oceanographic Instruments
  - Nansen Reversing water bottle
  - Dredge and Petersen Grab
  - Reversing thermometer
  - Current meter
  - Secchi disc
  - Standard Plankton net
  - Echosounder and Trawl

3. Ecological Adaptations
  - Intertidal Animals
  - Porifera-sponge (Sycon)
  - Coelenterata-Obelia / Sertularia, Sea-anemone, Coral
  - Annelida-Nereis, Arenicola, Chaetopterus, Sabella
  - Arthropoda-Balanus, Lepas, Hermit Crab
  - Mollusca-Patella, Chiton, Trochus, Oyster, Mytilus, Sepia, Octopus,
  - Loligo, Teredo
  - Echinodermata- Brittlestar, Starfish, Sea urchin, Holothurian, Sea-lily
  - Deep Sea Animals – Solefish (Psettodes, Cynoglossus), Angler Fish
4. Study of Zooplankton : Sorting, Mounting and Identification
5. Estimation of Plankton Biomass : Displacement / Settlement Method
6. Setting of marine aquarium (case study)
7. Endangered marine species. Identification & ecological status of Sea-lion, Seal, Whale, Salmon, Sturgeon etc.
8. Visit to any of the Research Institutes and Submission of Report

## Paper II

### SECTION I

(60 Lectures)

#### Unit 1 : Organic Production in the Sea

- 1.1 Concept of Productivity, Standing Crop and Biomass
- 1.2 Brief outline of Measurement of organic production
  - a) Standing stock measurement
  - b) Measurement of nutrient uptake
  - c) Measurement of photosynthesis.
- 1.3 Factors Regulating Production
  - a) Light,
  - b) Temperature,
  - c) Nutrients
  - d) Grazing Rate

#### Unit 2 : Culture of *Penaeus monodon*

- 2.1 Identification of various stages of Life Cycle
- 2.2 Breeding techniques and hatchery management
- 2.3 Rearing practices – Extensive, semi-intensive and intensive

#### Unit 3 : Introduction to other Commercial Aquaculture

- 3.1 Rearing of Fin fish (*Lates calcarifer*)
- 3.2 Culture of Marine algae
- 3.3 Culture of molluscs.
  - a) Mytilus
  - b) Oyster (edible and Pearl oyster)

#### Unit 4 : Specialized Marine Ecosystem and Anthropogenic Impact on marine Environment

- 4.1 Specialized Marine Ecosystem
  - a) Mangroves and wetlands
  - b) Coral reef
  - c) Salt marshes and backwaters.



#### 4.2 Anthropogenic impact due to claiming of land

a) Reclamation

b) Destruction of Mangroves

#### 4.3 Anthropogenic stresses due to dumping of waste

Domestic Sewage, Oil Spillage, Pesticides, Radio active and Thermal Wastes

### SECTION II

#### Unit 5 : Introduction to Quality Control, Preservation and Processing

##### 5.1 Determining quality & spoilage

a) Brief method of evaluating fish freshness and quality (Organoleptic, Microbial and chemical) of fish and prawn.

b) Mechanism of spoilage (Hypernemia, Rigor mortis, Autolysis, Rancidity)

##### 5.2 Traditional and modified methods of preservation

a) Icing,

b) Drying,

c) Salting

d) Canning

e) Pickling

f) Refrigeration

#### Unit 6: Fish as food

6.1 a) Biochemical composition of raw fish & nutritional value of raw, preserved and processed fish.

6.2 Fish by product: Fish protein concentrate, fish maws, ising glass, oils (body and liver), citosan, shark fin rays

6.3 Value added products: Fish / Prawn pickle and chutney, fish wafers, surimi, imitation products.

#### Unit 7 Fish pathology

a) Fish diseases caused by

i) Protozoan

ii) Bacteria

iii) Fungal

iv) Worms

v) Crustaceans

vi) Non parasitic diseases.

b) Symptoms and treatment of the above diseases

#### Unit 8: Financial Management and Marketing

##### 8.1 Procuring Finance

a) Financial Institutions and Funding Agencies

b) Schemes and basic subsidies

8.2 Financial Management- Costing, Budgeting Fund Flow , Auditing and Preparation of Feasibility report

8.3 a) Traditional marketing vis-à-vis operations of fishery co-operatives (Sasoon, Karanja, Satpati Model)

b) Global Marketing

c) Export-Import Procedures

## Practical II

1. Organic Production : Estimation of Primary Production using Dark and Light Bottle
  2. Estimation of Biological Oxygen Demand (BOD)
  3. Estimation of Chemical Oxygen Demand (COD)
  4. Identification of Common Fishery Specimens  
Carcharius sps, Polynemus sps, Clupea toli, Lates calcarifer Sciaena sps, Pampus chinensis and Pampus argentieus, Formio niger, Rastrelliger kanagurta, Cybium guttatum, Harpodon nehereus, Chirocentrus dorab, Muraenesox sps, Coilea dussumieri, Upenoides sps, Sardinella longiceps, Katelaysia sps, Oyster, Sepia, Penaeus monodon, Lobster, Crab (Scylla serrata)
  5. Identification of Shells  
Littorina, Turitella, Trochus, Umbonium, Nerita, Babylonia, Murex, Oliva, Natica, Conus, Xancus, Telescopium, Arca, Mytilus (Perna), Ostrea, Donax, Katelaysia.
  6. Determining feeding habits of fish from jaws, gills & gut contents.
  7. Identification of common marine algae – Ulva, Enteromorpha, Sargassum, Padina, Caulerpa, Fucus, Polysiphonia, Batrachospermum, Codeum, Laminaria.
  8. Identification of common mangroove – Avicenia, Exoecorea, Sonneratia Rhizophora.
  9. Prawn Pickling.
  10. Fish Diseases – Identification from photograph / specimen.
  11. Project
- Project should be based on any applied topic from Paper I or Paper II, to be assigned to individual student. The assessment will be done through examination of project report, presentation of data and viva-voce

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- Glimpses of the Indian Ocean – S.Z. Qasim, University Press (India Ltd. 1998)
- Handbook Fish Biology and Fisheries, Ed. J.B. Hart & John Reynold
- Modern Fishing Gear Technology – N. Shahul Hameed, Boopendranath – Daya Publishing House, 2000)
- Fisheries Bioeconomics – Theory, Modeling and Management – FAO Fisheries Technical Paper 368 – FAO, 2001
- Wealth of India: Vol. 4 CSIR Publication.
- Fish and Fisheries – Chandy, National Book Trust.
- The Book of Indian Shells – Deepak Apte, Oxford University Press.
- Understanding The Sea – Dr. B.F. Chhapgar, Oxford University Press.
- History Of Marine Sciences in India - Dr. B.F. Chhapgar Centenary issue BNHS.
- Crafts and Gear of India – Y.Shrikrishna & Latha Shenoy – ICAR Publication.
- Prawn and Prawn Fisheries – Kurian & Sebestian.
- Ecological Methods for Field and Laboratory Investigations – P.Michael.
- Course Material in Fishing Technology - Latha Shenoy, CIFE, Versova, Mumbai.
- Financial Management – Prasanna Chandra, 7<sup>th</sup> Edition.
- Financial Management – Khan & Jain .
- Financial Management –I .M. Pandey .
- Project Management - Prasanna Chandra.
- Marketing Management – Philip Kotler.
- For additional and latest information on the topics, various websites can be visited.
- Refrigeration by Arora
- Text book of fish biology and Indian Fisheries by Dr. R.P. Parihar, Central Publication House, Allhabad.

## EVALUATION

### A : Theory

a) Paper I	120 Marks
b) Paper II	60 Marks
	60 Marks

### B : Practicals

a) Practical I	80 Marks
b) Practical II	40 Marks
	40 Marks

### Total

200 Marks

## PRACTICALS

A: Practical I		40 Marks
Q 1: Estimate the amount of Silicates / Nitrates / Phosphates / CO <sub>2</sub> / Salinity/pH	A to E	10 Marks
Q 2: Identify Specimens	(1 Instrument, 4 Adaptations of Marine Organisms)	10 Marks
Q 3 a: Make a Temporary preparation of any four Planktonic organisms from the given sample. Identify and make a report		04 Marks
b Estimation of Plankton Biomass by Displacement or Settlement Method		04 Marks
Q 4: Viva based on Field Visit and Play & Ponder		06 Marks
Q 5: Journal and Field Report		06 Marks
B: Practical II		40 Marks
Q 1: Estimate Primary productivity / BOD / COD of the given water sample	A to F	10 Marks
Q 2: Identify specimens	(2 Fish, 1 Mollusc, 1 Crustacean, 1 Molluscan Shell)	10 Marks
Q 3: Project and Viva		20 Marks

### Annexure 1 : Suggested topics for projects.

1. Prepare feasibility report for setting up an aquarium shop on a small / large scale.
2. Prepare feasibility report on setting up an industry and manufacturing any one or more fish byproducts.
3. Prepare feasibility report on building up a fish culture unit.
4. Prepare feasibility report on building up a prawn culture unit.
5. Prepare feasibility report on building up a p... culture unit.
6. Prepare feasibility report on various aspect... fish processing unit.
7. Prepare feasibility report on various aspect... ice factory and refrigeration units.
8. Prepare feasibility report on fish preservation unit.
9. Collection and display of shore shells of any coast.
10. Study of seasonal variation in nutrient content of marine water of any coast (silicates, phosphates, nitrates).
11. Analysis of marine water samples collected from different beaches (DO / BOD / COD / Salinity / pH).
12. Comparative study of sand samples from different beaches.
13. Study of Mangroves of coastal region
14. Survey of fish byproduct in Cosmetic industry.
15. Survey of fish byproduct in Pharmaceutical industries.

### Annexure 2 : Suggested topics for assignments

1. Survey of marine fishes in Mumbai markets.
2. Study of funding agencies for purchase of trawlers.
3. Survey of marine fish by products on a commercial basics
4. Report on preservation methods of marine fishes
5. Marine water pollution- causes and remedies
6. Survey of funding agencies and formalities of setting up any Marine byproduct industry

### Annexure 3 : Suggested topics for entrepreneurial skill development

1. Collection of economically important marine shells and preparing artifacts.
2. Preparation of any of the fish by products like pickles/chutneys.
3. Model making of locally available fishing nets.
4. Setting up and maintenance of marine aquarium.
5. Preparation of herbarium and greeting cards of marine algae.

#### **Annexure 4 : Suggested Field Visits**

1. Visit to net manufacturing industry
2. Visit to boat building industry
3. Visit to fish preservation / processing industries
4. Visit to local fish market
5. Visit to fish landing centre
6. Visit to shore for studying economically important intertidal organisms.

Paper 1. (60 Lectures.)

Section-I

Unit 1

General morphology and development of insects.

- i) External morphology of Head, Thorax and Abdomen.
- ii) Appendages of head, thorax and abdomen including antennae, legs, mouth parts and wings.
- iii) Types of Metamorphosis. Types of larvae and pupae.

Unit 2

Apiculture –

- i) Details including management and economics.
- ii) Different types of bees *Apis dorsata*, *Apis mellifera*, *Apis florea* & *Apis indica*. Stingless bees.
- iii) The Apiculture business: structure of artificial bee hive, method of cultivation, tools used, management of apiary. Disease of bees and their natural enemies.
- iv) Products: honey, wax, royal jelly, venom, propolis & economics of bee keeping.

Unit 3

General anatomy of insects.

Brief outline of ---

- i) Digestive system, Respiratory system
- ii) Circulatory system, Reproductive systems of male and female.
- iii) Excretory system, Nervous system, Endocrine system.

Unit 4

- i) Sericulture techniques -- Details including management and economics.
- ii) Different types of silk moths. Life cycle of Mulberry silk moth.
- iii) The Sericulture business: cultivation of mulberry, laboratory setup, rearing of worms (procuring eggs, incubation, hatching and maintenance of larvae), overall management, diseases of silk worms.
- iv) Process of obtaining silk from cocoons and variations with reference to other silk moths; Uses of silk and economics of sericulture.

Section - II

Unit 5

- i) Insect classification.
- ii) Broad characteristics and few examples of-
  - a) Thysanura, Orthoptera, Isoptera
  - b) Hemiptera, Lepidoptera, Diptera
  - c) Hymenoptera, Coleoptera, Odonata

Unit 6

Lac culture.

- i) The lac insect, hosts, culture techniques.
- ii) Natural enemies of lac insects. Processing of raw lac to fine lac and uses of lac.
- iii) Management and economics of lac culture business.



## Unit 7

Insects in relation to their environment.

- i) Effect of temperature, light, humidity.
- ii) Mimicry; diapause.
- iii) Communication in insects [Tactile, chemical, visual (light and dance) and by sound].

## Unit 8

Generalized management topics.

Brief idea about--

- (i) Awareness of - Labor laws, Taxation, Regulatory authorities / organizations such as: Local self Government., Government Agencies, FDA.
- (ii) Fund Raising - Financial institutions & funding agencies (loans and subsidies) Financial management - [Costing, budgeting, fund flow, auditing, feasibility report]
- (iii) Marketing, Cooperative and self help group, MAVM ( Mahila Aarthik Vikas Mahamandal), KVIC, Khadi and Village Industry Corporation ).

## Practical 1

Mountings:

1. Head sclerites, thoracic segments, abdominal segments of cockroach.-
2. Types of antennae. Filiform, Moniliform, Aristate, Capitate, Clavate, Clubbed, Plumose, Pilose, Pectinate, Bipectinate, Setaceous and Geniculate, Lamellate, Serrate. (Any two mountings and rest for study with photo/permanent slides).
3. Halter and wing of house fly, wings of honey bee.  
Study of wing types -membranous, hemitegmina, tegmina, hemielytra, elytra with photos or permanent slides.
4. Types of legs- Typical, Cursorial, Fossorial, Saltatory, Natatorial and Scansorial (Mountings of any two and rest for study with photo/permanent slides).
5. Abdominal appendages- Styles, cerci. Sting of honey bee.  
Study of abdominal gills using photos/ permanent slides.)
6. Cornea (Cockroach or Housefly)
7. Mouth parts of Cockroach
8. Malpighian tubules (cockroach)
9. Haemocytes from cockroach.  
Dissections:
10. Reproductive system - Housefly.
11. Digestive system - Cockroach or Housefly.
12. Nervous system - Cockroach.  
Study:
13. Any one sound producing organ (Photo / specimen).
14. Insect types- *Lepisma*, cricket, winged termite, giant water bug, any one type of butterfly and moth, *Sarcophaga*, potter wasp, long horn beetle or water beetle, damselfly. - use Photo/specimen.
15. Types of larvae and pupae, Types of metamorphosis.
16. Life cycle of bee, silk moth.
17. Products - lac, bee wax, silk.
18. Equipments used in apiculture, sericulture, lac culture.
19. Examples of mimicry, camouflage and concealment. (Specimens or photos)
20. Collection, preservation and display of 5 insect types of 5 different insect orders.  
( Collection and preservation of insects other than pests be discouraged )
21. Field visit / Assignment / Play and ponder.  
Give actual handling of bees/ silk moth / lac insect or visit to any one of these units.

Unit 1

Damage caused by insects -

- i) To plants and stored grains- Grasshoppers, bugs, caterpillars, scale insects, leaf hoppers, rice weevil, *Bruchus*, meal moth, *Tenebrio*, *Trogoderma*.
- ii) To animals - bird louse, *Hypoderma*, screw worms. *Gastrophilus*.
- iii) To man- flea, Anopheles, Culex, Aedes, Glossina, Phlebotomus.

Unit 2

Control of house hold pests --

- i) Cockroaches, flies, fleas, ants.
- ii) Silverfish, book lice, cloth moth, carpet damaging insects.
- iii) Powder post beetle, Termites.

Unit 3

Social life and other useful activities of insects.

- i) Social life in Bees, Ants and wasps.
- ii) Social life in Termites.
- iii) Insects as pollinators and scavengers.

Lectures 15

Unit 4

Important insecticides.

- i) Broad classification of insecticides. Inorganic insecticides ( Arsenicals, Lime - sulphur, Mercury compounds, Fluorine compounds) , Fumigants ( Para dichlorobenzene, Methyl bromide , Hydrogen cyanide)
  - ii) Natural organics - oils, insecticides of plant origin( Pyrethrums, Nicotine, Azadiractin) Synthetic Organics – Chlorinated Hydrocarbons ( BHC, Methoxychlor) Organophosphate ( Malathion, Parathion, Dicrotophos, Chlorpyrifos) Carbamates (Carbaryl, Propoxur) and Pyrethroids (Allethrin, Cypermethrin).
- (Give mode of action and applications of insecticides. Mention important characters of insecticides and precautions to be taken during applications)

Section II

Unit 5

Insecticide formulations and equipments.

- i) Insecticide Formulations (Dust, Granules, Emulsifiable concentrates, Wettable powders, Aerosols.)
- ii) Techniques of fumigation.
- iii) Equipments used for insecticide applications. - Dusters, Sprayers (Hand operated, Back snap, Foot operated) Precautions and maintenance of the equipments.

Unit 6

Other methods of insect control.

- ii) Advantages and disadvantages of insecticides.
- iii) Biological control by [predators, parasites and microbes (Bacteria, viruses), fungi, Nematodes]
- iv) Use of Hormones and Pheromones.
- v) Sterile male technique.

## Unit 7

- A) Integrated pest management (IPM).  
What is IPM? Need for IPM. Planning of IPM.  
Different techniques used in IPM.  
Few examples and advantages of IPM.

## Unit 8

### Forensic Entomology.

- i) Brief mention of Common insects of Forensic importance -  
Order Diptera- Calliphoridae, Sarcophagidae, & Muscidae  
Order Coleoptera -Staphylinidae, Histeridae, Silphidae, Dermestidae, & Cleridae
- ii) Collection of entomological evidence during a death investigation.  
Temperature and climatic records, collection, preservation and handling of insects/maggots from the crime scene.
- iii) Analysis of entomological evidence and estimating PMI  
(Post Mortem Index) using Maggot age and Insect succession.

## PRACTICAL 2

1. Mounting of legs of honey bee.
2. Mounting of mouth parts of mosquito.
3. Study of LC50 on suitable insect. Preferably mosquito larvae/rice weevil/flour beetle/  
Chironomus larvae.
4. Study the effect of following insecticides on suitable insects. (Behavioural parameters and mortality)
  - Contact poison.
  - Stomach poison.
  - Fumigant.

### Study of --

5. Damage caused and control of - Grasshopper, plant bug, caterpillar, scale insect. Leaf hopper, Rice weevil, *Bruchus*, Meal moth, Flea, Bird louse, *Anopheles*, *Culex*, *Aedes*, *Glossina*, *Phlebotomus*, *Hypoderma*, Screw worm fly.
6. Insecticide formulations. (Dust, Granules, Emulsifiable concentrates, sprays, wettable Powders)
7. Equipments – Sprayers, Dusters as in theory.
8. Castes of termites.
9. Organisms important in Biological control - Braconid or Ichneumonid wasp, Red ant, Wood pecker
10. Any two insect types breeding in flesh of dead body. One Diptera, one Coleoptera.
11. Demo of Household pest control (Use of different equipments such as drills, sprayers, dusters and insecticides).
12. A project based on any applied topic from paper 1 or paper 2, to be assigned to individual student. The assessment will be done during practical 2 through examination of project report, presentation of data and viva-voce.

## INSTRUCTIONS FOR PAPER I & II –

TOTAL FOUR UNITS ARE TO BE SELECTED PER PAPER (02 UNITS FROM EACH SECTION) FOR FORMAL TEACHING BY THE CONCERNED TEACHERS IN CONSULTATION WITH THE HEAD OF THE DEPARTMENT AND HAVING DISCUSSED WITH THE STUDENTS, ENABLING OPTIMAL UTILIZATION OF THE AVAILABLE INFRASTRUCTURE, EXPERTISES OF THE TEACHERS, HUMAN RESOURCES AND OPPORTUNITIES IN THE LOCAL AREA. THUS WORKLOAD OF 60 LECTURES FOR EACH PAPER IS DIVIDED INTO FOUR UNITS, EACH OF 15 LECTURES.

THOUGH IT IS DESIRABLE TO ENCOURAGE THE STUDENTS TO UNDERTAKE ASSIGNMENTS / SEMINARS / LEARNING THROUGH GUEST LECTURES / ENTREPRENEURIAL SKILL DEVELOPMENT / FIELD VISITS, ETC. FROM THE TOPICS WHICH ARE NOT FORMALLY TAUGHT BY THE TEACHER/S IN ORDER TO HAVE AN OVERVIEW OF THE SUBJECT. IT IS NOT COMPULSORY TO DO SO AND THAT ASSIGNMENTS / SEMINARS / LEARNING THROUGH GUEST LECTURES / ENTREPRENEURIAL SKILL DEVELOPMENT / FIELD VISITS, ETC. TOO ALSO BE BASED ON THE TOPICS FORMALLY TAUGHT BY THE TEACHER/S. THE DECISION IN THIS MATTER CAN BE TAKEN WITH FULL FREEDOM AS MAY BE ACADEMICALLY DESIRED.

QUESTIONS WILL BE SET ON EACH UNIT SEPARATELY WITH INTERNAL OPTIONS, ENABLING THE STUDENTS TO ATTEMPT THE ENTIRE PAPER OF 60 MARKS WITH ADEQUATE OPTIONS

### REFERENCE BOOKS :

- A Text book of insect morphology, physiology and endocrinology – Tembhare D B – S. Chand Publication.
- Principles of insect morphology- Snodgrass R E – Tata McGraw Hill.
- Text book of Entomology—Ross – John Wiley publ.
- General and applied Entomology – David and Ananthakrishnan. Tata McGraw Hill
- Principles of insect physiology – Wigglesworth. – ELBS Publication.
- A General textbook of entomology -- A D Imms. Asia Publication.
- Insect endocrinology and physiology – Tembhare D B – S Chand publication.
- Applied Entomology – Awasthi. Scientific Publication.
- Forensic Entomology-The utility of Arthropods in legal investigations. –Jason H. Byrd and James L. Castner. CRC Press.
- Agricultural insect pests and their control. V.B. Awasthi. Scientific Publication.
- A manual of practical entomology. – M M Trigunayat. Scientific Publication.
- Laboratory manual of entomology – Alaka Prakash . New Age Publishers.
- Applied Entomology – Alaka Prakash and Fennemore. New Age Publishers.
- Photographic Atlas of Entomology and guide to insect identification.-Castner. Seline press Florida. Marketed by Scientific Publication.
- The Insects - Structure and Function - 4th Edition Edited by R. F. Chapman. Cambridge University Press 1998.
- Entomology and Pest Management –Larry P. Pedigo. Pearson Education.
- Destructive and Useful Insects.- Metcalf and Flint. McGraw Hill Publication.
- Insect Year Book of Agriculture- American Agriculture Department Publication.
- Economic Zoology- Shukla, Upaddhaya and Srivastava. S. Chand Publication.

### Books in Marathi –

- Keetak nirikshakancha sobati- Purushottam Joshi, Continental publication, Pune.
- Gharopadravi Keetak wa upay- Purushottam Joshi, Continental publication, Pune.
- Keetak Parichay wa Sangraha- Purushottam Joshi, Continental publication, Pune.
- Pikanvareel Keed – Keetak- Purushottam Joshi, Continental publication, Pune.
- Madhmashya – Jeevan aani Palan. R. V. Ranade, Continental publication, Pune.

- Practical 1. Exam. — Total 40 marks.
- Q1. Identification -- (5 specimens from study specimens) - 10 marks.  
- 3+ 2 = 5marks.
- Q2. (a and b)- Mountings- - 5 marks.  
c) Submission of 5 insects. - 6 marks.
- Q3. Dissection - 8 marks.
- Q4. Viva (by examiner + Internal Examiner) on field visit and play and ponder, assignment. - 6 marks.
- Q5. Journal and field report.

- Practical 2. Exam. --Total marks 40.
- Q1. Identification. (5 specimens from study specimens or Formulations or equipments) - 10 marks.
- Q2. a) Determination of LC50 for a given toxicant or effect of given insecticide.- -7 marks.  
b) Mounting of legs of worker Honey bee or mouth parts of mosquito - -3 marks.
- Q3. Viva voce on project - 10 marks.
- Q4. Project evaluation submitted by the project supervisor. - 10 marks.

### Key for practical questions.

#### Practical 1.

- Q. 1. Identification- 2marks each total 10 marks.
- a. Identify and describe.- (Types of antennae / wings /legs/ sound producing organs.)
- b & c. Identify, classify and describe.- (taxonomy insect types.)
- d. Identify and describe - life cycle/type of mimicry Types of larvae/ pupae/metamorphosis.)
- e. Identify and describe - (Products from insects, equipments.)
- Q. 2. Mountings -
- a. 3 marks – Head sclerites, Thorasic segments, wings of honey bee, mouth parts of cockroach, haemocytes, sting of honey bee, wings of housefly.
- b. 2 marks –Any Antenna type, abdominal segment, Malpighian tubules, cornea, styles, cerci. Halter of housefly, any leg type.
- Q. 3. Any one dissection – 6 marks.

#### Practical 2.

- Q.1. Identification –
- a, b, c. - Identify and describe the damage caused and control. --(from the study of insects causing damage and their control.)
- d. Identify and describe. --(Insecticide formulation / equipments – sprayers, dusters etc.)
- e. Identify and describe.-- (Castes of termites/ insects with ref. to Biological control and forensic entomology.)



## Annexure 1 -

### Projects. For individual student.

- Prepare feasibility report on apiculture unit - small/ medium/large scale.
- Prepare feasibility report on sericulture unit - small/ medium/large scale.
- Prepare feasibility report on lac culture unit - small/ medium/large scale.
- Prepare feasibility report on setting pest control business.
- Study of behaviour of pest insects.
- Collect dead insects to find the infection by fungi, bacteria, viruses and other pathogens.
- To compare the toxicity of insecticide using different insect models or stages of insects.
- To prepare different types of baits and test their efficacy.
- To try different plant extracts/ chemicals for their synergistic activity.
- Monitor the life cycle of insects of forensic importance, throughout the year to record seasonal differences.

## Annexure 2 -

### Group Assignments. (Maximum 5 students in a group)

1. Visit Govt. office to find subsidies for different entomology related industries.
2. Collect information on available pesticides.
3. Study the wholesale and retail marketing of the insecticide.
4. Study the production of insecticides in the industry.
5. Study marketing of insecticides by interacting with the salesmen/ others concerned.
6. Study any one unit of sericulture/ lac culture/ apiculture.
7. Survey recent research trends in biological control of insect pests.
8. Survey the institutes actively guiding on Biological control.
9. Study the insecticide/ formulations available in the market and decide their demand in the market.
10. Obtain from internet/ books/ journals, taxonomic keys for different insect orders.
11. Species of Bees (solitary & social) and their role as pollinators.
12. Diseases and natural enemies of bees.
13. Bee products and their uses.
14. Types of silk moths (wild & semi domesticated) and their contribution to the National silk production.
15. Diseases and natural enemies of silk moths.
16. Comparison of the current status of lac industry in Bihar and Maharashtra.
17. Diseases of lac insects and uses of lac in industry.
18. Role of Mahila Aarthik Vikas Mahamandal in Insect related small scale enterprise. (sericulture, Lac culture).
19. Role of Khadi and Village Industry in encouraging Insect related enterprises. (Apiculture, Biocontrol).
20. Damage caused by insects to stored grain, cattle, poultry and man.
21. Feasibility of Biocontrol for household pests. (Godrej case study)
22. Comparative study of social life of Bees, Ants and Termites.
23. Insecticide formulations and applications.
24. Maintenance and working of equipments used in insecticide application.
25. Advantages of IPM quoting successful case studies.



**Annexure 3 -**

**Play and Ponder.**

Maintain a bee hive.

Maintain a stingless bee colony.

Behaviour studies.

Toxicological studies.

Grow larvae / nymphs of insects to study life cycle.

Maintain silk moth larvae.

Study lac culture.

Grow in laboratory, flies/ beetles breeding on flesh and note the details of their behaviour

9. Does the scent or colour of a flower attract an insect?

10. Temperature prediction by recording cricket chirps per minute.

11. Effect of sex pheromones on insects.

12. Inter species communication- talking to fireflies.

13. Maintain an ant hill to understand community living.

**Annexure 4 -**

**Field visits.**

Visit the to an apiculture unit.

Visit the to a sericulture unit.

Visit the to a lac culture unit.

Collect insects from the given area to study diversity.

Collect and study aquatic insects.

Collect different types of mosquitoes.

The topics listed in annexure 1 to 4 are suggestions only, leaving scope for further identifying suitable topics in the relevant areas.

**EVALUATION (Earlier pattern)**

**A] THEORY**

Paper I .....	60	<b>120 marks</b>
Paper II .....	60	

**B] PRACTICALS**

Pract I .....	40	<b>80 marks</b>
Pract II .....	40	

**TOTAL**

**200 marks**

CIRCULAR:-

A reference is invited to the Scheme of Papers relating to the Bachelor of Commerce (T.Y.B.Com.) degree course under the revised pattern vide this office Circular No. UG/479 of 2006 dated 4<sup>th</sup> December, 2006 and the Principals of the affiliated Colleges in Commerce and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Board of Studies in Psychology at its meeting held on 29<sup>th</sup> January, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.23 and that, in accordance therewith, the Syllabus and the pattern of Question paper for 'Psychology of Human Behaviour at Work' (Applied Component) at T.Y.B.Com. examination in the subject of Psychology, is revised as per Appendix and the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
8<sup>th</sup> July, 2010

L.R.Mane  
Offg. Registrar

To:

The Principals of the affiliated Colleges in Commerce and the Professor-cum-Director, Institute of Distance and Open Learning

A.C./4.23/03/03/2010

\*\*\*\*\*

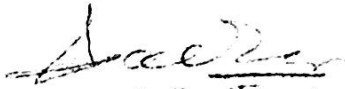
No. UG/161-A of 2010,

MUMBAI-400 032

8<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Commerce,
- 2) The Chairperson, Board of Studies in Psychology,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

Copy to :-

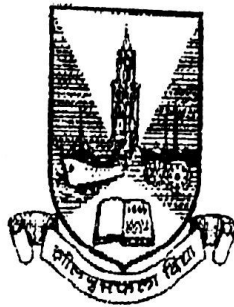
The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Rainagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (3 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanaigari (2 copies), the Professor-cum-Director, Institute of Distance and Open Learning.

Enclosure to Item No. 4.23

03.03.2010

UNIVERSITY OF MUMBAI



**REVISED SYLLABUS**

For

**'PSYCHOLOGY FOR HUMAN  
BEHAVIOUR AT WORK'  
(APPLIED COMPONENT)**

At

**T.Y.B.COM Examination**

In

**Psychology**

**(With effect from the academic year 2010-2011)**

**Objectives:**

1. To impart knowledge and understanding of the basic concepts and modern trends in the field of Psychology of Human Work Behaviour and to foster interest in the field
2. To create awareness about the role and importance of Psychological factors and processes in the world of work

(3 lectures per week; 36 lectures per Term; 7 lectures for each of the 10 topics; 2 lectures in the first term for an Orientation to the paper)

Section 1

Topic I. What is organizational behaviour?

- a) The importance of interpersonal skills; What managers do
- b) Definition of organizational behaviour
- c) Complementing Intuition with Systematic Study
- d) Disciplines that contribute to the OB Field
- e) There are few Absolutes in OB
- f) Challenges and Opportunities for OB; Developing an OB model

Topic II. Attitudes and job Satisfaction

- a) Attitudes
- b) Job Satisfaction
- c) Global Implications

Topic III. Motivation Concepts

- a) Defining Motivation
- b) Early Theories of Motivation
- c) Contemporary Theories of Motivation
- d) Integrating Contemporary Theories of Motivation
- e) Global Implications

Topic IV. Foundations of Group Behaviour

- a) Stages of Group development
- b) Group Properties: Roles, Norms, Status, Size and Cohesiveness
- c) Group Decision Making
- d) Group Behaviour: An Asian Perspective
- e) Global Implications

Topic V. Relationships at Work

- a) Introduction
- b) Relationships in the Workplace
- c) Relationship Issues
- d) Developing effective Relationships

Section 2

Topic VI. Communication

- a) Functions of Communication and the communication Process
- b) Direction of Communication
- c) Interpersonal and Organizational Communication

- d) Choice of Communication Channel; Barriers to Effective Communication.  
e) Global Implications

### Topic VII. Basic Approaches to Leadership

- What is Leadership?
- Trait theories and Behavioural theories
- Contingency theories: Fiedler model and situational leadership theory
- Leader-member exchange (LMX) theory
- Decision theory: Vroom and Yetton's Leader-Participation model
- Gender and Leadership
- Global Implications

### Topic VIII. Power and Politics

- Definition of power; Contrasting leadership and power; Bases of power
- Dependency: the key to power
- Power tactics
- Sexual harassment: Unequal power in the workplace
- Politics: power in action; Causes and consequences of political behaviour; The ethics of behaving politically
- Global Implications

### Topic IX. Conflict and Negotiation

- Definition of conflict
- Transitions in Conflict Thought
- The Conflict Process
- Negotiation
- Global Implications

### Topic X. Psychological Health in the Workplace

- Introduction
- Organizational Responsibility for Psychological Health
- Moderating Factors
- Organizational Interventions

### Books for study

- Matthewman, L., Rose, A., & Hetherington, A. (2009). Work Psychology: An introduction to Human Behaviour in workplace. Oxford university press
- Robbins, S. P., Judge, T. A., & Sanghi, S. (2009). Organizational Behavior. (13<sup>th</sup>ed.), Pearson Education, Dorling Kindersley, New Delhi

### Books for reference

- Aamodt, M. G. (2004). Applied Industrial/Organizational Psychology. (4<sup>th</sup> ed). Wadsworth/ Thomson Learning
- Aswathappa, K. (2005). Human Resource and Personnel Management – Text and Cases. 4<sup>th</sup> ed, New Delhi, Tata McGraw-Hill Publishing Co. Ltd.

- 3) French, W. L., Bell, C. H. Jr, & Vohra, V. (2006). Organization Development: Behavioural science interventions for organization improvement. 6<sup>th</sup> ed., Pearson Education, Dorling Kindersley India, New Delhi
- 4) Hellriegel, D., & Slocum, J. W. (2004). Organizational Behavior.( 10<sup>th</sup> ed.). South Western/ Thomson Learning
- 5) Hersey, P., Blanchard, K. H., & Johnson, D. E. (2001). Management of Organisational Behaviour. 8<sup>th</sup> ed., Pearson, Dorling Kindersley India, New Delhi. 3<sup>rd</sup> Indian reprint 2009
- 6) Hoyer, W.D., MacInnis, D.J., & Dasgupta, P. (2008). Consumer Behaviour. Biztantra, New Delhi
- 7) Jones, G.R., & Mathew, M. (2009). Organisational theory, design, and change. 5<sup>th</sup> ed., Pearson Education, Dorling Kindersley India, New Delhi
- 8) Landy, F. J., & Conte, J. M. (2004). Work In The 21<sup>st</sup> Century. (International ed.), McGraw Hill co.
- 9) Luthans, F. (2005). Organizational Behavior.( 10<sup>th</sup> ed.). McGraw Hill.
- 10) McKenna, E. (2006). Business Psychology and Organisational Behaviour: A student's handbook. 4<sup>th</sup> ed., Psychology Press, 1<sup>st</sup> Indian reprint 2009
- 11) Miner, J.B. (2002). Organisational Behaviour: Foundations, theories, analyses. New York: Oxford university press
- 12) Muchinsky, P.M. (2003). Psychology Applied to Work.( 7<sup>th</sup> ed.). Wadsworth/ Thomson Learning
- 13) Newstrom, J. W., & Davis, K. (2002). Organizational Behavior: Human Behavior at work (11<sup>th</sup>ed.). Tata McGraw- Hill
- 14) Pareek, U. (2003). Training Instruments in HRD and OD. (2nd ed.), Tata McGraw-Hill Publishing Company, Mumbai.
- 15) Sanghi, S. (2007). Towards personal excellence: psychometric tests and self-improvement techniques for managers. 2<sup>nd</sup> ed., Response books, Sage publications
- 16) Schultz, D., & Schultz, S. E. (2010). Psychology and Work Today. (10<sup>th</sup> ed.). Pearson Prentice Hall
- 17) Sekaran, U., (2004). Organisational Behaviour : Text And Cases.( 2<sup>nd</sup> ed.). New Delhi: Tata McGraw- Hill
- 18) Singh, D. (2006). Emotional intelligence at work: A professional guide. 3<sup>rd</sup> ed., New Delhi, Sage publications



Pattern of Question Paper for the Revised syllabus for examinations March 2011 onwards

There will be 5 questions in Section I and 5 questions in Section II. All the 10 questions carry 20 marks. No question is compulsory. In all 5 questions are to be attempted, but not more than 3 questions from a single Section. Thus, the students can answer 'Any 3 questions from Section I and any 2 questions from Section II' or 'Any 2 questions from Section I and any 3 questions from Section II'.

Four questions out of the 10 will be full length, essay-type. They will be on the following 4 topics of the syllabus – No. III (Motivation), V (Relationships at Work), VII (Basic Approaches to Leadership), and X (Psychological Health in the Workplace). Thus, Q. 3 and 5 in Section I, and Q. 7 and 10 in Section II will be full-length, essay-type. Any 2 questions out of these 4 (1 per Section) may be of A-B type, each having 10 marks.

Six questions out of the 10 questions will be Short Answer type, of the following nature –

1. Explain the terms briefly (any 4 terms out of 6, each having 5 marks)
2. Give reasons for the following (any 4 out of 6, each having 5 marks).
3. State whether the following statements are True or False and give the reasons (any 4 out of 6, each having 5 marks).
4. Write Short Notes on (any 4 out of 6, each having 5 marks)
5. Explain the following statements (any 4 out of 6 given statements which will be in quotation marks "-----", each having 5 marks).

Only one of the 5 Short Answer types given above can be used more than once within a question paper, according to suitability to the particular topic, convenience and the need to vary the combination of topic and question across 3 sets, in different academic years.

The Short Answer types of questions will be asked on 6 Topics - no. I, II, IV, VI, VIII, and IX of the syllabus. Example:

Section I	Set 1	Set 2	Set 3
Q. 1 On topic I	Explain the terms	Give reasons	True or False with reasons
Q. 2 On topic II	True or False with reasons	Explain the terms	Give reasons
Q. 3 On topic III	Full length Essay-type Or A-B type	Full length Essay-type	Full length Essay-type Or A-B type
Q. 4 On topic IV	Give reasons	True or False with reasons	Explain statements
Q. 5 On topic V	Full length Essay-type	Full length Essay-type Or A-B type	Full length Essay-type
Section II			
Q. 6 On topic VI	Short Notes	Explain statements	Give reasons
Q. 7 On topic VII	Full length Essay-type	Full length Essay-type Or A-B type	Full length Essay-type Or A-B type
Q. 8 On topic VIII	Explain statements	Short Notes	Explain the terms
Q. 9 On topic IX	Explain the terms	Give reasons	Short Notes
Q. 10 On topic X	Full length Essay-type Or A-B type	Full length Essay-type	Full length Essay-type

UNIVERSITY OF MUMBAI

No. UG/174 of 2010

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the T.Y.B.A. degree course vide this Office Circular No.UG/174 of 2005, dated 16<sup>th</sup> May, 2005 and the Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Board of Studies in Psychology at its meeting held on 29<sup>th</sup> January, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.22 and that, in accordance therewith, the syllabi and the pattern of Question papers for Papers IV, V, VI, VII, VIII, and IX at T.Y.B.A. examination in the subject of Psychology is revised as per Appendix and that the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
13<sup>th</sup> July, 2010

L.R.Mane  
Offg. Registrar

To,

The Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning

A.C./4.22/3/03/2010

\*\*\*\*\*

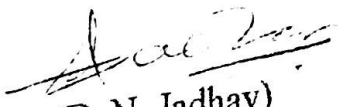
No. UG/174-A of 2010,

MUMBAI-400 032

13<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Arts,
- 2) The Chairperson, Board of Studies in Psychology,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

Copy to :-

The Director, Institute of Distance and Open Learning, University Development, the Deputy Registrar (Eligibility and Migration), the Secretary to the Vice-Chancellor, the Registrar, the Controller of Examinations, the Co-Ordinator, University Computerization Centre, Ratnagiri for information.

Enclosure to Item No. 4.22  
03.03.2010

UNIVERSITY OF MUMBAI



**REVISED SYLLABI**

And

**PATTERN OF QUESTION PAPERS**

For

**Papers – IV, V, VI, VII, VIII & IX**

at

**T.Y.B.A Examination**

In

**Psychology**

**(With effect from the academic year 2010-2011)**

## Appendix A

Revised syllabi for Psychology Papers IV, V, VI, VII, VIII and IX at T.Y.B.A.  
To be brought into effect from June 2010 and the patterns of Question paper for them

### T.Y.B.A. Paper IV – Psychological Testing and Statistics 100 marks

#### Objectives -

- 1) To impart knowledge and understanding of the nature, uses, technical features, and the process of construction of Psychological Tests
- 2) To create awareness about Measurement of Intelligence and Assessment of Personality
- 3) To impart knowledge and understanding of the basic concepts in Statistics and the various measures of Descriptive Statistics - their characteristics, uses, applications and methods of calculation
- 4) To create a foundation for advanced learning of Psychological Testing, Assessment, and Statistics

(4 lectures per week; 48 lectures per term; 11 lectures per topic in Section I, 7 lectures per topic in Section II, and 6 lectures for the Orientation to Psychological Testing)

#### Section I - Psychological Testing - 50 marks

##### Topic I. Psychological Testing, Assessment and Norms

- a) Testing and Assessment - definitions and tools
- b) The parties and types of settings involved
- c) How are Assessments conducted?
- d) Reference sources for authoritative information about tests
- e) Various assumptions about Psychological Testing and Assessment
- f) What is a 'Good Test'?
- g) Norms –sampling to develop norms, types of norms, fixed reference group scoring systems, norm-referenced versus criterion-referenced evaluation
- h) Inference from Measurement – meta analysis; culture and inference

##### Topic II. Reliability

- a) The concept of Reliability
- b) Reliability estimates –Various methods
- c) Using and interpreting a coefficient of Reliability
- d) Reliability and individual scores

##### Topic III. Validity

- a) The concept of Validity
- b) Content Validity
- c) Criterion-related Validity
- d) Construct Validity
- e) Validity, bias, and fairness

##### Topic IV. Test Development

- a) Test conceptualization
- b) Test construction

- c) Test tryout
- d) Item analysis
- e) Test revision

Topic V. Measurement of Intelligence and Assessment of Personality

- a) What is Intelligence? - Definitions and theories
- b) Measuring Intelligence
- c) The Stanford-Binet Intelligence Scales
- d) The Wechsler Tests
- e) Definitions of Personality and Personality Assessment
- f) Personality Assessment – some basic questions
- g) Developing instruments to assess Personality – logic and reason, theory, data reduction methods, Criterion groups
- h) Personality Assessment and culture
- i) Objective methods of Personality Assessment
- j) Projective methods of Personality Assessment

Section II Statistics - 50 marks

Topic VI. Types of scores, Types of scales, Frequency Distribution and Graphic representations

- a) Continuous and discrete scores – meaning and difference
- b) Nominal, ordinal, interval and ratio scales of measurement
- c) Preparing a Frequency Distribution
- d) Advantages and disadvantages of Preparing a Frequency Distribution
- e) Frequency polygon, histogram, cumulative frequency curve, ogive
- f) Smoothing a Frequency polygon – method of running averages

Topic VII Measures of central tendency

- a) Calculation of mean, median and mode
- b) The assumed mean method for calculating the mean
- c) Merits, limitations, and uses of mean, median and mode
- d) Comparison of the 3 Measures of central tendency

Topic VIII. Measures of Variability, Percentiles, and Percentile Ranks

- a) Range and Average Deviation
- b) Quartile Deviation and Standard Deviation
- c) Calculation of the 4 Measures of Variability
- d) Merits, limitations, and uses of Range, AD, QD, and SD
- e) Comparison of the 4 Measures of Variability
- f) Percentiles – nature, merits, limitations, and uses
- g) Calculation of Percentiles and Percentile Ranks

Topic IX. Probability, Normal Probability Curve and Standard scores

- a) The concept of Probability
- b) Characteristics, importance and applications of the Normal Probability Curve
- c) Area under the Normal Curve
- d) Skewness- positive and negative, causes of Skewness, formula for calculation
- e) Kurtosis - meaning and formula for calculation

Standard scores – z, T, stanine; linear and non-linear transformation; Normalised Standard scores

### Topic X. Correlation

- a) Meaning and types of Correlation – positive, negative and zero
- b) Graphic representations of Correlation - Scatterplots
- c) The steps involved in calculation of Pearson's product-moment correlation coefficient
- d) Calculation of rho by Spearman's rank-difference method
- e) Uses and limitations of Correlation coefficient
- f) Simple Regression and multiple Regression

### Book for study

Cohen, J.R., & Swerdlik, M.E. (2010). Psychological Testing and Assessment: An introduction to Tests and Measurement. (7<sup>th</sup> ed.). New York. McGraw-Hill International edition

Note – Chapter no. 2 – 'Historical, Cultural, and Legal/Ethical Considerations of Testing' will not have a question set on it. However, it should be taught as an orientation to Psychological Testing.

### Books for reference

- 1) Aiken, L. R., & Groth-Marnat, G. (2006). Psychological Testing and Assessment. (12<sup>th</sup> ed.). Pearson. Indian reprint 2009, by Dorling Kindersley, New Delhi
- 2) Anastasi, A. & Urbina, S. (1997). Psychological Testing. (7<sup>th</sup> ed.). Pearson Education, Indian reprint 2002
- 3) Aaron, A., Aaron, E. N., & Coups, E. J. (2006). Statistics for Psychology. (4<sup>th</sup> ed.). Pearson Education, Indian reprint 2007
- 4) Gregory, R. J. (2004). Psychological Testing: History, Principles, and Applications. (4<sup>th</sup> ed.). Pearson Indian reprint 2008, by Dorling Kindersley India pvt ltd, New Delhi
- 5) Hoffman, E. (2002). Psychological Testing at Work. New Delhi: Tata McGraw-Hill
- 6) Hollis-Sawyer, L.A., Thornton, G. C. III, Hurd, B., & Condon, M.E. (2009). Exercises in Psychological Testing. (2<sup>nd</sup> ed.). Boston: Pearson Education
- 7) Kaplan, R. M., & Saccuzzo, D. P. (2005). Psychological Testing – Principles, Applications and Issues. (6<sup>th</sup> ed.). Wadsworth Thomson Learning, Indian reprint 2007
- 8) Kline, T.J.B. (2005). Psychological Testing: A Practical approach to design and evaluation. New Delhi: Vistaar (Sage) publications
- 9) Mangal, S.K. (1987). Statistics in Psychology and Education. New Delhi: Tata McGraw Hill Publishing Company Ltd.
- 10) McBurney, D.H. (2001). Research Methods. (5<sup>th</sup> ed.). Bangalore: Thomson Learning India



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T.Y.B.A. Paper V - Abnormal Psychology. 100 marks

Objectives

- 1) To impart knowledge and understanding of the basic concepts in Abnormal Psychology and the theories about Abnormality
- 2) To impart knowledge and understanding of the different Psychological Disorders – their symptoms, diagnosis, causes and treatment
- 3) To create awareness about Mental Health problems in society
- 4) To create a foundation for higher education and a professional career in Clinical Psychology

(4 lectures per week; 48 lectures per term; 9 lectures per topic and 6 lectures for Orientation to the Paper)

Topic I: Understanding Abnormality: Definition, classification, and Assessment

- a) What is Abnormal Behaviour?
- b) The Diagnostic and Statistical Manual of Mental Disorders
- c) Psychological Assessment – Clinical interviews and Mental Status Examination
- d) Behavioural, Multicultural, Environmental, and Physiological assessment

Topic II: Theoretical Perspectives

- a) The purpose of Theoretical Perspectives in Abnormal Psychology
- b) Psychodynamic Perspective
- c) Humanistic Perspective
- d) Sociocultural Perspective
- e) Behavioral and Cognitively Based Perspectives
- f) Biological Perspective
- g) Biopsychosocial Perspectives on Theories and Treatments: An Integrative Approach

Topic III: Anxiety Disorders

- a) The Nature of Anxiety Disorders
- b) Panic Disorder and Agoraphobia
- c) Specific Phobias
- d) Social Phobia
- e) Generalized Anxiety Disorder
- f) Obsessive-Compulsive Disorder
- g) Acute Stress Disorder and Post Traumatic Stress Disorder
- h) Anxiety Disorders: The Biopsychosocial Perspective

Topic IV: Somatoform Disorders, Psychological Factors Affecting Medical Conditions and Dissociative Disorders

- a) Somatoform Disorders
- b) Psychological Factors Affecting Medical Conditions
- c) Dissociative Disorders
- d) Somatoform Disorders, Psychological Factors Affecting Medical Conditions and Dissociative Disorders: The Biopsychosocial Perspective

### Topic V: Sexual Disorders

- a) What is Abnormal Sexual Behavior?
- b) Paraphilias
- c) Gender Identity Disorder
- d) Sexual Dysfunctions
- e) Sexual Disorders: The Biopsychosocial Perspective

### Topic VI: Mood Disorders

- a) General Characteristics of Mood Disorders
- b) Depressive Disorders
- c) Disorders Involving Alterations in Mood
- d) Theories and Treatments of Mood Disorders
- e) Suicide – who and why
- f) Mood Disorders: The Biopsychosocial Perspective

### Topic VII: Schizophrenia and Related Disorders

- a) Characteristics of Schizophrenia
- b) Other Psychotic Disorders
- c) Theories and Treatment of Schizophrenia
- d) Schizophrenia: The Biopsychosocial Perspective

### Topic VIII. Personality Disorders

- a) The Nature of Personality Disorders
- b) Antisocial Personality Disorder
- c) Borderline Personality Disorder
- d) Histrionic, Narcissistic, Paranoid, Schizoid, Schizotypal, Avoidant, Dependent, and Obsessive-Compulsive Personality Disorders
- e) Personality Disorders: The Biopsychosocial Perspective

### Topic IX. Development-Related, Aging-Related and Cognitive Disorders

- a) Introductory Issues
- b) Mental Retardation
- c) Pervasive Developmental Disorders
- d) Attention Deficit and Disruptive Behavior Disorders
- e) Learning, Communication and Motor Skills Disorder
- f) Separation Anxiety Disorder
- g) Other Disorders that Originate in Childhood
- h) Development- Related Disorders: The Biopsychosocial Perspective
- i) The Nature of Cognitive Disorders
- j) Delirium, Amnesic Disorders, Traumatic Brain Injury, Dementia
- k) Cognitive Disorders: The Biopsychosocial Perspective

### Topic X: Eating Disorders and Impulse Control Disorders

- a) Eating Disorders
- b) Impulse Control Disorders
- c) Internet Addiction
- d) Self Injurious Behaviors
- e) Eating Disorders and Impulse Control Disorders: The Biopsychosocial Perspective

6

Note – As an Orientation to this paper, the following sub-topics should be taught in brief (questions will not be set on these sub-topics)

- a) Abnormal Psychology throughout History; Research Methods in Abnormal Psychology; Impact of Psychological Disorders on the individual, family, community and society; Reducing stigma
- b) Experiences of client and clinician; The diagnostic process; Treatment Planning and Implementation
- c) Some Ethical and Legal Issues relevant in India

#### Book for study

Halgin, R. P., & Whitbourne, S.K. (2010). Abnormal Psychology: Clinical Perspectives on Psychological Disorders. (6<sup>th</sup> ed.). McGraw-Hill

#### Books for Reference

- 1) Barlow, D.H., & Durand, V.M. (2005). Abnormal Psychology: An Integrative Approach. (4<sup>th</sup> ed.). New Delhi: Wadsworth Cengage Learning
- 2) Beidel, D. C., Bulik, C. M., & Stanley, M.A. (2010). Abnormal Psychology. New Jersey: Pearson Prentice Hall
- 3) Bennet, P. (2003). Abnormal and Clinical Psychology: An Introductory Textbook. Open University Press
- 4) Carson, R. C., Butcher, J. N., Mineka, S., & Hooley, J. M. (2007). Abnormal Psychology. (13<sup>th</sup> ed.). Indian reprint 2009 by Dorling Kindersley, New Delhi
- 5) Compas, B. E., & Gotlib, I. H. (2002). Introduction to Clinical Psychology: Science and Practice. McGraw- Hill
- 6) Dhanda, Amita. (2000) Legal Order and Mental Disorder. New Delhi, Sage publications pvt ltd
- 7) Nolen-Hoeksema, S. (2008). Abnormal Psychology. (4<sup>th</sup> ed.). New York: McGraw-Hill.
- 8) Mash, E. J., & Wolfe, D.A. (2005). Abnormal Child Psychology. (3<sup>rd</sup> ed.). Wadsworth / Thomson Learning
- 9) Oltmanns, T. F., & Emery, R. E. (2010). Abnormal Psychology. 6<sup>th</sup> ed., New Jersey: Pearson Prentice Hall

T.Y.B.A. Paper VI – Industrial and Organizational Psychology  
(Applied component) Theory = 80 marks; Project = 20 marks  
(100 marks paper for students of Distance Education)

Objectives: -

1. To impart knowledge and understanding of the basic concepts in and various facets of Industrial and Organizational Psychology

2. To create awareness about the role and importance of Psychological factors and processes in the world of work

3. To create a foundation for higher education and a professional career in Industrial Psychology and Organizational Behaviour

(3 lectures per week; 36 lectures per term; 8 lectures for each of the 8 topics; 5 lectures in the first term for Orientation to the paper, and 3 lectures for Orientation to projects)

### Topic I. Employee Selection Principles and Techniques

- a) Manpower planning
- b) Job and Work Analysis
- c) What's your Ideal Job?
- d) The Recruitment Process
- e) An Overview of the Selection Process
- f) Fair Employment Practices
- g) Biographical Information, Interviews, References and Letters of Recommendation
- h) Assessment Centers

### Topic II. Performance Appraisal

- a) Fair Employment Practices
- b) Why Do Performance Appraisal?
- c) Objective, Subjective, or Judgmental Performance Appraisal Techniques
- d) Performance Appraisal Methods for Managers
- e) Sources of Bias in Performance Appraisal
- f) Ways to Improve Performance Appraisals
- g) The Post-Appraisal Interview
- h) Performance Appraisal: a poor rating?

### Topic III. Training and Development

- a) The Scope and Goals of Organizational Training
- b) Staffing for Organizational Training
- c) The Pre-Training Environment
- d) How People Learn: Psychological Issues
- e) Types of Training Programs
- f) Career Development and Planning
- g) Evaluating Organizational Training Programs

### Topic IV. Leadership

- a) The Quality of Modern Leadership
- b) Leadership Theories and Leadership Styles
- c) The Role of Power and The Role of Expectations
- d) Leadership Functions
- e) Characteristics of Successful Leaders
- f) Pressures and Problems of Leaders
- g) Diversity Issues in Management

### Topic V. Motivation, Job Satisfaction, and Job Involvement

- a) Content Theories of Motivation
- b) Process Theories of Motivation

- 8
- c) Job Satisfaction: The Quality of Life at Work
  - d) The Relationship between Job Satisfaction and Pay
  - e) Job Involvement and Organizational Commitment

#### Topic VI. The Organization of the Organization

- a) The Bureaucratic Organizations of the Past
- b) High-Involvement Management and Employee Participation
- c) Total Quality Management
- d) Organizational Change
- e) Socialization of New Employees
- f) Organizational Culture
- g) Labor Unions
- h) Informal Groups: The Organization within the Organization
- i) Technological Change and Organizational Structure

#### Topic VII. Stress in the Workplace

- a) Occupational Health Psychology
- b) Physiological Effects of Stress
- c) Individual Differences in Responding to Stress
- d) Work-Family Balance
- e) Stressors in the Work Environment
- f) Stress-Management Programs
- g) Employee welfare Programs

#### Topic VIII. Consumer Psychology

- a) The Scope of Consumer Psychology
- b) Research Methods in Consumer Psychology
- c) The Nature and Scope of Advertising
- d) Consumer Behavior and Motivation

Note – As an Orientation to this paper, the following sub-topics should be taught in brief (questions will not be set on these sub-topics)

- a) Would people work if they did not have to? Industrial-Organizational Psychology on the job and in Everyday Life; What I-O Psychology Means to Employers; An Overview of the Development of I-O Psychology; Challenges for I-O Psychology; Careers in I-O Psychology; Practical Problems for I-O Psychologists
- b) Requirements and Limitations of Psychological Research; Research Methods - Experimental Method, Naturalistic Observation, Surveys and Public Opinion Polls, Virtual Laboratories: Web-Based Research
- c) Problems with Using Psychological Tests

#### Book for study

Schultz, D., & Schultz, S. E. (2010). Psychology and Work Today. (10<sup>th</sup> ed.). Pearson Prentice Hall

#### Books for reference

- 1) Aamodt, M.G. (2004). Applied Industrial/Organizational Psychology. (4<sup>th</sup> ed). Wadsworth/ Thomson Learning



- 2) Aswathappa, K. (2005). Human Resource and Personnel Management – Text and Cases. 4<sup>th</sup> ed, New Delhi, Tata McGraw-Hill Publishing Co. Ltd.
- 3) Dessler, G., & Verkey, B. (2009). Human Resource Management. 11<sup>th</sup> ed., Pearson Education, Dorling Kindersley India, New Delhi
- 4) French, W.L., Bell, C.H. Jr, & vohra, V. (2006). Organization Development: Behavioural science interventions for organization improvement. 6<sup>th</sup> ed., Pearson Education, Dorling Kindersley India, New Delhi
- 5) Greer, C.R. (2001). Strategic Human Resource Management; A general managerial approach. 2<sup>nd</sup> ed., Pearson Education, 6<sup>th</sup> Indian reprint 2004
- 6) Hellriegel, D., & Slocum, J.W. (2004). Organizational Behavior. (10<sup>th</sup> ed.). South Western/ Thomson Learning
- 7) Hersey, P., Blanchard, K. H., & Johnson, D. E. (2001). Management of Organisational Behaviour. 8<sup>th</sup> ed., Pearson, Dorling Kindersley India, New Delhi. 3<sup>rd</sup> Indian reprint 2009
- 8) Hoyer, W.D., MacInnis, D.J., & Dasgupta, P. (2008). Consumer Behaviour. Biztantra, New Delhi
- 9) Jones, G.R., & Mathew, M. (2009). Organisational theory, design, and change. 5<sup>th</sup> ed., Pearson Education, Dorling Kindersley India, New Delhi
- 10) Landy, F. J., & Conte, J. M. (2004). Work In The 21<sup>st</sup> Century. (International ed.), McGraw Hill co.
- 11) Landy, F. J., & Conte, J. M. (2009). Work In The 21<sup>st</sup> Century: An Introduction to Industrial and Organizational Psychology, 3rd Edition Wiley-Blackwell
- 12) Luthans, F. (2005). Organizational Behavior. (10<sup>th</sup> ed.). McGraw Hill.
- 13) Matthewman, L., Rose, A., & Hetherington, A. (2009). Work Psychology: An introduction to Human Behaviour in workplace. Oxford university press
- 14) McKenna, E. (2006). Business Psychology and Organisational Behaviour: A student's handbook. 4<sup>th</sup> ed., Psychology Press, 1<sup>st</sup> Indian reprint 2009
- 15) Miner, J.B. (2002). Organisational Behaviour: Foundations, theories, analyses. New York: Oxford university press
- 16) Muchinsky, P.M. (2003). Psychology Applied to Work. (7<sup>th</sup> ed.). Wadsworth/ Thomson Learning
- 17) Newstrom, J.W., & Davis, K. (2002). Organizational Behavior: Human Behavior at work (11<sup>th</sup> ed.). Tata McGraw- Hill
- 18) Pareek, U. (2003). Training Instruments in HRD and OD (2nd ed.), Tata McGraw-Hill Publishing Company, Mumbai



- 19) Pareek, U., Rao, T.V., Pestonjee, D.M. (1981). Behavior Process in Organizations: Readings, Cases, Instruments. Oxford and IBH Publishing Co., New Delhi
- 20) Pareek, U. (2008). Understanding Organizational Behaviour. Oxford University Press, New Delhi
- 21) Sanghi, S. (2007). Towards personal excellence: psychometric tests and self-improvement techniques for managers. 2<sup>nd</sup> ed., Response books, Sage publications
- 22) Schultz, D., & Schultz, S. E. (2002). Psychology and Work Today. (8<sup>th</sup> ed.). Pearson Indian reprint 2008, by Dorling Kindersley India pvt ltd, New Delhi
- 23) Sekaran, U., (2004). Organisational Behaviour : Text And Cases.( 2<sup>nd</sup> ed.). New Delhi: Tata McGraw- Hill
- 24) Shani, A. B., & Lau, J.B., (2005). Behavior in Organizations: An Experiential Approach. (8<sup>th</sup> ed.). McGraw Hill
- 25) Singh, D. (2006). Emotional intelligence at work: A professional guide. 3<sup>rd</sup> ed., New Delhi, Sage publications
- 26) Sinha, J. B. P. (2008). Culture and Organisational Behaviour. New Delhi, Sage publications.

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### T.Y.B.A. Paper VII - Cognitive Psychology. 100 marks

#### Objectives

- 1) To impart knowledge and understanding of the fundamental concepts of Cognitive Psychology and the basic Cognitive processes
- 2) To create awareness about the various applications of Cognitive processes in everyday life and a foundation to enable understanding of their applications in other fields - Social, Educational, Industrial, Abnormal, Counseling, Sports, Health, Education, and Neuro-Psychology
- 3) To provide the theoretical orientation and background for Practicals in Cognitive Processes (Paper VIII)
- 4) To create a foundation for higher education and a career in the field of Cognitive Psychology

(4 lectures per week; 48 lectures per term; 9 lectures for each of the 10 topics and 3 lectures in each term for computer-assisted demonstrations with the Coglab CD)

#### Topic I. Cognitive Psychology: An Introduction

- a) Thinking about Thinking,
- b) Memory and Cognition Defined
- c) An Introductory History of Cognitive Psychology
- d) Cognitive Psychology and Information Processing

#### Topic II. The Cognitive Science Approach

- a) Guiding Principles and Themes
- b) Measuring Information Processes
- c) The Information-Processing Approach

- d) The Modern Cognitive Approach: Cognitive Science
- e) Neurocognition: The Brain and Cognition Together
- f) Neural Net Models: Connectionism

### Topic III. Perception and Pattern Recognition

- a) Visual Perception
- b) Pattern Recognition
- c) Object Recognition and Agnosia
- d) Auditory Perception

### Topic IV. Attention

- a) Multiple Meanings of Attention
- b) Basics of Attention
- c) Basic Input Attentional Processes
- d) Controlled, Voluntary Attention
- e) Attention as a Mental Resource
- f) Automatic and Conscious Processing Theories

### Topic V. Short-Term Working Memory

- a) Short-Term Memory: A Limited-Capacity Bottleneck
- b) Short-Term Memory Retrieval
- c) Working Memory
- d) Assessing Working Memory
- e) The Impact of Working Memory on Cognition

### Topic VI. Learning and Remembering

- a) Preliminary Issues
- b) Storing Information in Episodic Memory
- c) Retrieving Episodic Information
- d) Amnesia and Implicit Memory

### Topic VII. Knowing

- a) Priming in Semantic Memory
- b) Semantic Memory
- c) Schemata and Scripts
- d) Concepts and Categorization
- e) Connectionism and the Brain

### Topic VIII. Using Knowledge in the Real World

- a) The Seven Sins of Memory
- b) Facts about the World
- c) Situation Models and Embodied Cognition
- d) Metamemory
- e) False Memories, Eyewitness Memory, and "Forgotten Memories"
- f) Autobiographical Memories

### Topic IX. Decisions, Judgments, and Reasoning

- a) Formal Logic and Reasoning
- b) Decisions
- c) Decisions and Reasoning under Uncertainty

- d) Limitations in Reasoning
- e) Algorithms for coin tosses and hospital births

#### Topic X. Problem Solving

- a) The Status of the Problem-Solving Area
- b) Gestalt Psychology and Problem Solving
- c) Insight and Analogy
- d) Basics of Problem Solving
- e) Means-End Analysis: A Fundamental Heuristic
- f) Improving Your Problem Solving

#### Book for study

Ashcraft, M. H. & Radvansky, G. A. (2009). Cognition. (5<sup>th</sup> ed), Prentice Hall, Pearson education

#### Books for reference

- 1) Francis, G., Neath, I., & VanHorn, D. (2008). Coglab 2.0 on a CD. Wadsworth Cengage Learning, international student edition
- 2) Galotti, K. M. (2004). Cognitive Psychology: In and Out of the Laboratory. (3rd ed.). Wadsworth/ Thomson Learning
- 3) Galotti, K.M. (2008). Cognitive Psychology: Perception, Attention, and Memory. Wadsworth New Delhi: Cengage Learning
- 4) Galotti, K.M. (2007). Cognitive Psychology in and out of the Lab. (4<sup>th</sup> ed.). Thomson Learning
- 5) Goldstein, E. B. (2007). Psychology of sensation and perception. New Delhi: Cengage learning India, Indian reprint 2008
- 6) Goldstein, E. B. (2005). Cognitive Psychology: Connecting Mind, Research, and Everyday Experience. Wadsworth/ Thomson Learning
- 7) Matlin, M.W. (1995). Cognition. 3<sup>rd</sup> ed., Bangalore: Prism Books pvt. Ltd.
- 8) Reed, S. K. (2004). Cognition: Theory and Applications. (6<sup>th</sup> ed.), Wadsworth/ Thomson Learning
- 9) Robinson-Riegler, B., & Robinson-Riegler, G. L. (2008). Cognitive Psychology - Applying the science of the Mind. (2<sup>nd</sup> ed.). Pearson Education. New Delhi: Indian edition by Dorling Kindersley India pvt ltd.
- 10) Srinivasan, N., Gupta, A. K., & Pandey, J. (Eds). (2008). Advances in Cognitive Science. Volume 1, New Delhi, Sage publications
- 11) Sternberg, R.J. (2009). Applied Cognitive Psychology: Perceiving, Learning, and Remembering. New Delhi: Cengage learning India, Indian reprint 2009

- 12) Surprenant, A.M., Francis, G., & Neath, I. (2005). Coglab Reader. Thomson Wadsworth

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T.Y.B.A. Paper VIII  
Practicals in Cognitive Processes and Psychological Testing - 100 marks

Objectives

- 1) To introduce the students to Experimentation through exposure to and experience of experimental designs, methodology and conduct of experiments, statistical analysis, interpretation and discussion of data.
- 2) To introduce the students to Psychological Testing: administration, scoring and interpretation of test scores as well as a procedural understanding of concepts related to psychological testing
- 3) To familiarize the students with computer-based experiments (Coglab) and sensitize them to aspects of control, precision of exposure and measurement
- 4) To stimulate interest in the process of scientific inquiry with an analytical attitude and To create a foundation for advanced Experimentation and Research in Psychology and applications of advanced Statistical techniques

(6 lectures per week per Batch of 8 students)

Part I. Orientation to Paper VIII – Basics of Experimentation and Statistics in Psychological Research

- a) The distinction between descriptive statistics and inferential statistics; sampling methods, types of variables, conceptual and operational definition of variables; Experimental designs; Randomization and counterbalancing; null and alternative hypotheses, directional and non-directional hypotheses
- b) Identification of the research question, variables in studies, writing of various types of hypotheses, understanding of the relationship between the research question and the directionality of the hypothesis and understanding the role of extraneous variables on interpretation and listing the same in studies, sampling error, significant difference, rejection of the null hypothesis, one-tailed vs. two-tailed tests, Type I and Type II decision errors
- c) Application of inferential statistics - The t test - Significance of difference between 2 means as applied to Repeated measures designs and Randomized group designs; the chi square test; One-way ANOVA as applied to Repeated measures designs and Randomized group designs
- d) Use of Excel or SPSS: coding in data entry and basic statistical procedures
- e) Report writing: APA style for research reports

Part II. Five Experiments to be conducted, one each on the following topics –

- 1) Perception/Attention
- 2) Short-term Memory
- 3) Models of memory
- 4) Language comprehension
- 5) Thinking/problem solving

Part III. Exercises in Psychological Testing



- 1) Use of scales of measurement – nominal, ordinal, interval and ratio
- 2) Administration of 2 tests - 1 of Ability (Raven's Progressive Matrices) and 1 of Personality (Levenson's Locus of Control scale) and calculation of scores
- 3) Calculation of reliability coefficients – Odd-even and KR-20
- 4) Process of determining predictive validity

#### Part IV. Two computer-based Experiments on Coglab CD 2.0

##### Books for reference

- 1) Anastasi, A. & Urbina, S. (1997). Psychological Testing. (7<sup>th</sup> ed.). Pearson Education, New Delhi, first Indian reprint 2002
- 2) Aaron, A., Aaron, E. N., & Coups, E. J. (2006). Statistics for Psychology. (4<sup>th</sup> ed.). Pearson Education, Indian reprint 2007
- 3) Carver, R. H., & Nash, J. G. (2009). Data Analysis with SPSS version 16. Brooks/Cole, Cengage Learning, first Indian reprint 2009
- 4) Cohen, J.R., & Swerdlik, M.E. (2010). Psychological Testing and Assessment: An introduction to Tests and Measurement. (7<sup>th</sup> ed.). New York. McGraw-Hill International edition
- 5) Elmes, D.G., Kantowitz, B.H., & Roediger, H.L. (1999) Research Methods in Psychology. (6<sup>th</sup> ed.). Brooks/Cole, Thomson Learning
- 6) Francis, G., Neath, I., & VanHorn, D. (2008). Coglab 2.0 on a CD. Wadsworth Cengage Learning, International student edition
- 7) Garrett, H.E. (1973). Statistics in Psychology and Education (6<sup>th</sup> ed.) Bombay: Vakils, Feffer, and Simons Pvt. Ltd.
- 8) Guilford, J. P. (1954). Psychometric Methods (2nd ed.). New York: McGraw-Hill
- 9) Guilford, J.P. Fruchter, B. (1973). Fundamental statistics in psychology and education. (5th ed.) New York : McGraw-Hill
- 10) Goldstein, E. B. (2005). Cognitive Psychology: Connecting Mind, Research, and Everyday Experience. Wadsworth/ Thomson Learning
- 11) Gaur, A. J., & Gaur, S. S. (2009). Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS. 2<sup>nd</sup> ed., Response books, Sage Publications
- 12) Harris, P. (2008). Designing and Reporting Experiments In Psychology. 3<sup>rd</sup> ed., Open University Press, McGraw-Hill Education
- 13) Heppner, P. P., Wampold, B. E., & Kivlighan, D. M. Jr. (2007). Counseling research. Brooks/ Cole, Indian reprint 2008 by Cengage Learning, New Delhi
- 14) Hollis-Sawyer, L.A., Thornton, G. C. III, Hurd, B., & Condon, M.E. (2009). Exercises in Psychological Testing. (2<sup>nd</sup> ed.). Boston: Pearson Education
- 15) Kaplan, R. M., & Saccuzzo, D. P. (2005). Psychological Testing – Principles, Applications and Issues. (6<sup>th</sup> ed.). Wadsworth Thomson Learning, Indian reprint 2007
- 16) McBurney, D. H. (2001). Research Methods. (5<sup>th</sup> ed.). Bangalore: Thomson Learning India
- 17) Mangal, S. K. (1987). Statistics in Psychology and Education. New Delhi : Tata McGraw Hill Publishing Company Ltd.
- 18) Martin, D. W. (2004). Doing Psychology Experiments. (6<sup>th</sup> ed.). Belmont: Thomson Wadsworth
- 19) Matlin, M. W. (1995). Cognition. 3<sup>rd</sup> ed., Bangalore: Prism Books Pvt. Ltd.
- 20) Minium, E. W., King, B. M., & Bear, G. (2001). Statistical Reasoning in Psychology and Education. Singapore: John-Wiley

- 21) Pareek, U. (2003). Training Instruments in HRD and OD (2nd ed.), Tata McGraw-Hill Publishing Company, Mumbai
- 22) Snodgrass, J. G., Levy-Berger G. V., & Haydon, M. (1985). Human Experimental Psychology. New York: Oxford University Press.
- 23) Solso, R. L., & McLin, M. K. (2002). Experimental Psychology: A case approach. 7<sup>th</sup> ed., Allyn Bacon, Pearson Education New Delhi, Indian reprint 2003
- 24) Steinberg, W. J. (2008). Statistics Alive! Los Angeles: Sage Publications, Inc.
- 25) Surprenant, A.M., Francis, G., & Neath, I. (2005). Coglab Reader. Thomson Wadsworth

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**T.Y.B.A. Paper IX - Counseling Psychology**  
(Applied Component) Theory = 80 marks; Project = 20 marks

**Objectives: -**

1. To impart knowledge and understanding of the nature, process, goals, techniques, ethical issues and major theories in Counseling Psychology
2. To generate interest in the various applications and fields of counseling
3. To create a foundation for higher education in Counseling and a career as a professional counselor

(3 lectures per week; 36 lectures per term; 8 lectures for each of the 8 topics; 5 lectures in the first term for Orientation to the paper, and 3 lectures for Orientation to projects)

**Topic I. Personal, Professional, Ethical and Legal Aspects of Counseling**

- a) The Personality and Background of the Counselor; Professional Aspects of Counseling – levels of helping, professional helping specialties; Attribution and Systematic Framework of the Counselor; Engaging in Professional Counseling-Related Activities – continuing education, supervision, advocacy, portfolios
- b) Definitions of Ethics, Morality, and Law; Ethics and Counseling; Professional Codes of Ethics and Standards; Making Ethical Decisions; Educating Counselors in Ethical Decision Making; Ethics in Specific Counseling Situations; Multiple Relationships; Working with Counselors who may act unethically
- c) The Law and Counseling; Legal Recognition of Counseling; Legal Aspects of the Counseling Relationship; Civil and Criminal Liability; Legal Issues involved When Counseling Minors; Client Rights and Records; The Counselor in Court; Ethics and the Law: Two Ways of Thinking

**Topic II. Counseling in Multicultural Society and with Diverse Populations**

- a) Counseling across Culture and Ethnicity; Defining Culture and Multicultural Counseling; History of Multicultural Counseling; Difficulties and Issues in Multicultural Counseling
- b) Counseling Aged Populations; Gender-Based Counseling; Counseling and Sexual Orientation; Counseling and Spirituality

**Topic III. Building a Counseling Relationship**

- a) Factors that influence the Counseling Process
- b) Types of Initial Interviews
- c) Conducting the Initial Interview



- d) Exploration and the identification of Goals

Topic IV. Working in a Counseling Relationship

- a) Counselor Skills in the Understanding and Action Phases
- b) Transference and Counter-transference
- c) The Real Relationship

Topic V. Testing, Assessment, Diagnosis and Termination in Counseling

- a) A Brief History of the Use of Tests in Counseling; Tests and Test Scores; Problems and Potential of Using Tests; Classification, Administration and Interpretation of Tests; Assessment and Diagnosis
- b) Function, Timing and Issues of Termination; Resistance to Termination; Premature Termination; Counselor-Initiated Termination; Ending on a Positive Note; Issues Related to Termination - Follow-up and Referral

Topic VI. Psychoanalytic, Adlerian, and Humanistic Theories of Counseling

- a) Theory
- b) Psychoanalytic Theories
- c) Adlerian Theory
- d) Humanistic Theories

Topic VII. Behavioral, Cognitive, Systemic, Brief, and Crisis Theories of Counseling

- a) Behavioral Counseling
- b) Cognitive and Cognitive-Behavioral Counseling
- c) Systems Theories
- d) Brief Counseling Approaches
- e) Crisis Counseling Approaches

Topic VIII. Groups in Counseling

- a) A Brief History of Groups; Misperceptions and Realities about Groups
- b) The Place of Groups in Counseling
- c) Benefits, Drawbacks and Types of Groups
- d) Theoretical Approaches in Conducting Groups; Stages and Issues in Groups
- e) Qualities of Effective Group Leaders
- f) The Future of Group Work

Note - As an Orientation to this paper, the following sub-topics should be taught in brief (questions will not be set on these sub-topics) -

- a. Definition and History of Counseling; b. Current Trends in the New Millennium

Book for study

Gladding, S. T. (2009). Counseling: A Comprehensive Profession. (6<sup>th</sup> Ed.). Pearson Education. New Delhi: Indian edition by Dorling Kindersley India pvt ltd.

Books for reference

- 1) Arulmani, G., & Nag-Arulmani, S. (2004). Career Counseling – a handbook. New Delhi: Tata McGraw-Hill

- 2) Capuzzi, D., & Gross, D. R. (2007). Counseling and Psychotherapy: Theories and Interventions. (4<sup>th</sup> ed.). Pearson Prentice Hall. First Indian reprint 2008 by Dorling Kindersley India pvt ltd.
- 3) Capuzzi, D., & Gross, D. R. (2009). Introduction to the Counseling Profession. (5<sup>th</sup> ed.). New Jersey: Pearson Education
- 4) Corey, G. (2005). Theory and practice of counseling and psychotherapy (7<sup>th</sup> ed.). Stamford, CT: Brooks/Cole
- 5) Corey, G. (2008). Group Counseling. Brooks/Cole. First Indian reprint 2008 by Cengage Learning India
- 6) Cormier, S. & Nurius, P.S. (2003). Interviewing and change strategies for helpers: Fundamental skills and cognitive behavioural interventions. Thomson Brooks/Cole
- 7) Dryden, W., & Reeves, A. (Eds). (2008). Key issues for Counselling in Action. 2<sup>nd</sup> ed. London: Sage publications
- 8) Ellis, A. & Abrams, M. (2009). Personality Theories: Critical perspectives. California, Sage publications
- 9) Gelso, C.J., & Fretz, B.R. (2001). Counseling Psychology: Practices, Issues, and Intervention. First Indian reprint 2009 by Cengage Learning India
- 10) Gibson, R.L., & Mitchell, M.H. (2008). Introduction to Counseling and Guidance. 7<sup>th</sup> ed., Pearson Education, Dorling Kindersley India, New Delhi
- 11) Heppner, P. P., Wampold, B. E., & Kivlighan, D. M. Jr. (2007). Counseling research. Brooks/ Cole, Indian reprint 2008 by Cengage Learning, New Delhi
- 12) Jena, S.P.K. (2008). Behaviour Therapy: Techniques, research, and applications. Sage publications, New Delhi
- 13) Kinara, A. K. (2008). Guidance and Counseling. Pearson, New Delhi: Dorling Kindersley India pvt ltd.
- 14) McLeod, J. (2009). An Introduction to Counseling. (4<sup>th</sup> ed.). Open University Press/ McGraw-Hill Higher Education
- 15) Nelson-Jones, R. (2008). Basic Counselling Skills: A helper's manual. 2<sup>nd</sup> ed., Sage South Asia edition
- 16) Nelson-Jones, R. (2009). Introduction to Counselling Skills: Text and Activities. 3<sup>rd</sup> ed., London: Sage publications
- 17) Nugent, F.A., & Jones, K.D. (2009). Introduction to the Profession of Counseling. (5<sup>th</sup> ed.). New Jersey: Pearson Education
- 18) Rao, N. S. (1991). Counseling and Guidance. (2nd ed.). New Delhi: Tata McGraw-Hill. (17<sup>th</sup> reprint – 2004)
- 19) Simmons, J. & Griffiths, R. (2009). CBT for Beginners. London: Sage publications
- 20) Welfel, E. R., & Patterson, L. E. (2005). The Counseling Process: A Multi-theoretical Integrative Approach. (6<sup>th</sup> ed.). Thomson Brooks/ Cole

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Patterns of Question paper for T.Y.B.A. Revised Syllabi of Psychology  
(To be brought into effect from March 2011 University examination)

T.Y.B.A. Paper IV - Psychological Testing and Statistics -  
100 marks, Duration = 3 hours

There will be 5 questions in each Section, 10 questions in all. Three questions from each Section, 6 questions in all, are to be attempted. The use of calculators is allowed.

Question no. 1 in Section I on Topic I (Psychological Testing, Assessment and Norms) and Question no. 10 in Section II on Topic X (Correlation) carry 18 marks and are compulsory.

The remaining 8 questions carry 16 marks each. Any 4 questions are to be attempted out of these 8 questions, 2 questions from each Section.

Section I - Psychological Testing - Q. No. 1, 2, 3, 4, and 5, will be on the 5 respective topics. The first 4 questions will be essay-type. Q. No. 5 will be a-b type (8 + 8 marks), with a) on Measurement of Intelligence and b) on Assessment of Personality.

Example -

Sec. I. Psychological Testing - 50 marks			Marks
Q. 1	On topic I	Psychological Testing, Assessment and Norms	18
Q. 2	On topic II	Reliability	16
Q. 3	On topic III	Validity	16
Q. 4	On topic IV	Test Development	16
Q. 5	On topic V	Measurement of Intelligence	08
		Assessment of Personality	08
Sec. II Statistics - 50 marks			
Q. 6	On topic VI	a = 3 marks. Theoretical question b = 10 marks. Preparing a Frequency Distribution c = 3 marks. Plot a Frequency polygon or a Histogram	16
Q. 7	On topic VII	a = 3 marks. Theoretical question b = 5 + 5 + 3 = 13 marks - Calculation of Mean = 5, median = 5, and mode = 3.	16
Q. 8	On topic VIII	a = 3 marks. Theoretical question b. = 9 marks Calculation of QD or SD c. 2 + 2 marks - Calculation of 1 Percentile = 2, and 1 Percentile Rank = 2 marks	16
Q. 9	On topic IX	Probability, Normal Probability Curve and Standard scores Theoretical question - Write Short Notes - any 4/6, each for 4 marks.	16
Q. 10	On topic X	a. = 4 marks Theoretical question b. = 13 marks. Calculation of rho by Spearman's rank-difference method c. = 1 mark. Interpretation of answer	18

T.Y.B.A. Paper V - Abnormal Psychology and  
Paper VII - Cognitive Psychology Both of 100 marks, Duration = 3 hours

Question no. 1 will be of 40 marks with internal choice, with 3 full-length essay-type sub-questions in it, A, B, and C. These 3 sub-questions will be on any 3 topics out of the 10 topics in the syllabus. Each sub-question will carry 20 marks. Any 2 sub-questions are to be attempted out of the 3 given in Question no. 1.

The combination of 3 topics in Questions no. 1 will vary across the 3 sets in an academic year and across examinations in different academic years. For example, Question no. 1 can be on topics III, V, and IX, or II, VI, and X, or I, IV, and VIII, or IV, VII and IX or II, III, and VI, and so on, on any one combination of all the possible combinations of 3 different topics.

The remaining 7 questions, each carrying 20 marks, will be on the remaining 7 topics in the syllabus which are not covered in Question no. 1. Any 1 of these may be of Short Notes (any 4 out of 6, each having 5 marks) and the remaining 6 will be full-length essay-type.

Students can attempt Question no. 1 and any 3 more questions from the Questions numbered 2 to 8, or any 5 questions from Questions no. 2 to 8. No question is compulsory.

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### T.Y.B.A. Paper VI –Industrial-Organisational Psychology

80 marks, Duration 2 1/2 hours for Regular students

100 marks, Duration 3 hours for Distance Education students

There will be 2 Sections in the paper, with 6 questions in Section I and 1 question in Section II. Section I will have 80 marks. Regular students have to attempt questions only from Section I. Section II will have 20 marks. Distance Education students have to attempt questions from both the Sections.

#### Section I

Question no. 1 will be of 40 marks with internal choice, with 3 full-length essay-type sub-questions in it, A, B, and C. These 3 sub-questions will be on any 3 topics out of the 8 topics in the syllabus. Each sub-question will carry 20 marks. Any 2 sub-questions are to be attempted out of the 3 given in Question no. 1.

The combination of 3 topics in Questions no. 1 will vary across the 3 sets in an academic year and across examinations in different academic years. For example, Question 1 can be on topics I, III, and V or III, V, and VI, or I, IV, and VII, or II, IV, and VI, or II, VI, and VIII and so on, on any one combination of all the possible combinations of 3 different topics.

The remaining 5 questions, each carrying 20 marks, will be on the remaining 5 topics in the syllabus which are not covered in Question no. 1. Any 1 of these may be of Short Notes (any 4 out of 6, each having 5 marks) and the remaining 4 will be full-length essay-type.

Students can attempt Question no. 1 and any 2 more questions from Questions numbered 2 to 6, or any 4 questions from Questions no. 2 to 6. No question is compulsory.

Section II (only for Distance Education students) will have Question no. 7 of 20 marks - Write Short Notes on any 4 out of the 8 given. There will be 1 Short Note from each of the 8 topics in the syllabus.



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T.Y.B.A. Paper VIII  
Practicals in Cognitive Processes and Psychological Testing 100 marks

The distribution of marks at the examination - The 100 marks assigned to Paper VIII Practicals will be distributed under the following headings -

1. Internal Assessment = 15 marks
2. Instructions given to the Subjects and Conduct of the experiment = 25 marks
3. Viva = 10 marks
4. Short Written test based on the Basics of Experimentation and Statistics in Psychological Research and Exercises in Psychological Testing (Parts I and III of the syllabus) = 15 marks
5. Written Report of the experiment conducted = 35 marks (Introduction = 10; Methodology = 10; Discussion of Individual Data = 8; Discussion of Group Data = 7)

1. Internal Assessment marks out of 15 - the factors to be considered are – Punctuality and Regularity (class attendance and report submission); Seriousness and sincerity of purpose (preparation for conduct, other assignments like reading, mock viva, contributions to discussions); Quality of performance through the year (conduct of the experiments and reports/discussions, Terminal/Preliminary examination performance, improvement shown during the year); Initiatives taken during the year (online/library reference beyond the Manual, volunteering for preparation of materials or tables for data entry/demonstration of conduct etc). A student rating high on these dimensions may be given a maximum of 14 marks out of 15.

2. For marking Instructions and Conduct, examiners will use prior prepared Checklists specifying the weightage to be given to different aspects of Instructions and Conduct of the experiment being conducted by the student.

3. Discussion of Group Data = 7 marks

Group data will be given in terms of Means, SDs, Percentages. The student has to interpret the data with reference to the hypothesis of the experiment and mention which statistical technique should be used for analyzing those data, and why.

4. Viva = 10 marks

5 marks for Viva based on the Coglab experiments

5 marks for Viva based on the Group Data Table for any experiment other than the one the student has conducted, focusing on interpretation of the data with reference to relevant theory and research, designs and controls.

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T.Y.B.A. Paper IX - Counselling Psychology 80 marks, Duration 2 1/2 hours

Question no. 1 will be of 40 marks with internal choice, with 3 full-length essay-type sub-questions in it, A, B, and C. These 3 sub-questions will be on any 3 topics out of the 8 attempted out of the 3 given in question no. 1.

The combination of 3 topics in Questions no. 1 will vary across the 3 sets in an academic year and across examinations in different academic years. For example, Question 1 can be on topics II, III, and V or III, V, and VII, or I, IV, and VIII, or II, III, and VI, or I, II,

and III and so on, on any one combination of all the possible combinations of 3 different topics.  
 The remaining 5 questions, each carrying 20 marks, will be on the remaining 5 topics in the syllabus which are not covered in Question no. 1. Any 1 of these may be of Short Notes (any 4 out of 6, each having 5 marks) and the remaining 4 will be full-length essay-type.

Students can attempt Question no. 1 and any 2 more questions from Questions numbered 2 to 6, or any 4 questions from Questions no. 2 to 6. No question is compulsory.

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### Guidelines for T.Y.B.A. Projects - Psychology Papers VI and IX

1. A Minimum of 7 marks out of 20 is required for passing in project.
  2. Each student has to do a Project in each Paper individually; group projects are not allowed.
  3. Types of Projects that can be done -
    - 1) Small survey (using interviews / questionnaires)
    - 2) Field visits to an Institute and report of the visits
    - 3) Review of Literature
    - 4) Book review
    - 5) Case studies – 3 or 4
    - 6) Preparation of charts/posters (educational aids), and class presentation / exhibition
    - 7) Conduct a workshop for a small group
  4. If a student makes a Presentation in class of any of the first 6 types of Projects or conducts a workshop, marks out of 10 will be assigned for the class presentation/workshop, and marks out of 10 will be assigned for the written report of it. However, making a class presentation is not compulsory.
  5. The topic of the project may be from the syllabus of the respective papers, or closely related to the syllabus.
  6. The project report -
 

Word limit – 2000 to 4000 words; Size of the paper – A-4; font size 14, Times New Roman  
 Page limit - 10 to 20 pages only, for the Main Body of the Report (excluding the preliminary section of the report which contains the Title page, Index, Declaration, Acknowledgements, List of Tables and Figures etc and the last section which contains Bibliography and Appendix).

The project report can be either typed or hand-written.
  7. The students should submit the Project Proposal to the Teacher-in-charge and get their plan of work approved before 31<sup>st</sup> August. The final project reports should be submitted on or before January 10.
  8. Projects of a very high quality may be given a maximum of 18-19 marks out of 20.
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CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the T.Y. B.Sc. degree course vide Circular No.UG/59 of 2004, dated 24<sup>th</sup> February, 2004 and the Principals of the affiliated Colleges in Science are hereby informed that the recommendation made by the Board of Studies in Physics at its meeting held on 9<sup>th</sup> February, 2010 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No.4.44 and that, in accordance therewith, the Syllabus and Question paper pattern for the T.Y.B.Sc. Examination in the subject of Physics is as per Appendix and that the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
13<sup>th</sup> July, 2010

L.R.Mane  
Offg. Registrar

To,  
The Principals of the affiliated Colleges in Science.

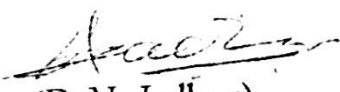
A.C./4.44/3/03/2010

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No. UG/175 -A of 2010, MUMBAI-400 032 13<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Science,
- 2) The Chairman, Board of Studies in Physics,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

Copy to :-

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

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Enclosure to Item No. 4.44

03.03.2010

**UNIVERSITY OF MUMBAI**



**Revised Syllabus  
and  
Paper Pattern at the  
T.Y.B.Sc. Examination  
in  
Physics**

**(With effect from the Academic year 2010-2011 )**

# REVISED SYLLABUS IN PHYSICS

--1--

(Theory and Practical)

T. Y. B. Sc.

(with effect from 2010-2011)

1. The revised syllabus in the subject of Physics at the T. Y. B. Sc. Physics (Single / Double Major Subject) examination will be implemented from the academic year 2010 - 2011.
2. The scheme of examination for the revised course in Physics at the third year B.Sc. examination will be as follows :

Paper	Topic	Marks
I	Mathematical and Statistical Physics, Classical Mechanics and Chaos.	100
II	Solid State Physics and Electronics	100
III	Atomic and Molecular Physics, Nuclear Physics.	100
IV	Special theory of relativity and Cosmology, Electrodynamics.	100
<b>PRACTICALS</b>		
I	Group - I Experiment	40
II	Group - II Experiment	40
III	Group - III Experiment	40
IV	Short Experiments (3 skills)	40
	<b>Certified Journal :</b> Regular Experiments + Demonstration Experiments + Skills	20
	VIVA - VOCE	20
	<b>Total Marks : Theory</b>	<b>400</b>
	<b>: Practicals</b>	<b>200</b>
	<b>Aggregate marks in the subject of Physics</b>	<b>600</b>



1. For 6 unit stream (Single Major) all four theory papers are compulsory. For 3 unit stream (Double Major) Paper I and Paper II are compulsory.
2. Each theory paper shall be of THREE hour duration. Each paper shall consist of FIVE questions. All questions are compulsory and will have internal option.

- Q - I is from Unit - 1,
- Q - II is from Unit - 2,
- Q - III is from Unit - 3,
- Q - IV is from Unit - 4,

Q - V will consist of questions from all the FOUR units with equal weightage of marks allotted to each unit.

3. FOUR periods per week per theory paper is allocated in the work load.
4. A candidate will be allowed to appear for the practical examination only if the candidate submits a certified journal of TYBSc Physics or a certificate from the Head of the Department to the effect that the candidate has completed the practical course of TYBSc Physics as per the minimum requirements.
5. The details of the scheme of Practical Examination for both 6-Unit and 3-Unit streams is given along with the syllabus for practicals.

PAPER – I  
Mathematical and Statistical Physics, Classical Mechanics.

UNIT – 1 : (Mathematical Physics)

- Differential equations : (30 periods)
1. Introduction, Ordinary differential equations, First order homogeneous and nonhomogeneous equations with variable coefficients, Second-order homogeneous equations with constant coefficients, Second order nonhomogeneous equations with constant coefficients.
  2. Partial differential equations :  
Introduction, Some important partial differential equations in Physics, An illustration of the method of direct integration, Method of separation of variables.
  3. Fourier series :  
Introduction, Fourier cosine and sine series, Change of interval, Fourier Integral, Complex form of the Fourier series, Generalised Fourier series and the Dirac delta function.
  4. Fourier transforms :  
Introduction, Formal development of the complex Fourier transform, Cosine and Sine transforms, The transforms of derivatives (without proof), The Convolution theorem (without proof), Parseval's relation.

References :

1. CH : 5.1, 5.2.1 (omit D), 5.2.3, 5.2.4
2. CH : 5.3.1, 5.3.2, 5.3.3, 5.3.4.
3. CH : 7.1, 7.1.1, 7.1.2, 7.1.3, 7.1.4, 7.2.
4. CH : 8.1, 8.2.1, 8.2.2, 8.2.4, 8.2.5, 8.2.6.

References :

CH : Introduction to Mathematical Physics : Charlie Harper 2009 (EEE)  
PHI Learning Pvt. Ltd.

Additional References :

1. Mathematical Physics : A K Ghatak, Chua – 1995  
Macmillian India Ltd.
2. Mathematical Method of Physics : Riley, Hobson and Bence.  
Cambridge (Indian edition).
3. Mathematical Physics : H. K. Dass,  
S. Chand & Co.
4. Mathematical Methods of Physics : Jon Mathews & R. L. Walker,  
W A Benjamin inc.

**UNIT-2 : (Statistical Physics)**

1. Description of a system :  
Why statistical approach, Particle-states, System-states, Microstates and Macrostates of a system, Equilibrium and Fluctuations, Irreversibility, The equiprobability postulate, Statistical ensemble, Number of states accessible to a system, Phase space, Reversible processes.
2. Thermal and Adiabatic Interactions :  
Thermal interaction, Canonical distribution, Energy fluctuations, Entropy of a system in a heat bath, Helmholtz free energy, Adiabatic interaction and enthalpy, General interaction and the first law of thermodynamics, Infinitesimal general interaction, Gibbs free energy, Phase transitions.
3. Statistical Mechanics :  
Phase space, The probability of a distribution, The most probable distribution, Maxwell-Boltzmann statistics, Molecular speeds.
4. Quantum Statistics :  
Bose-Einstein statistics, Black-body radiation, The Rayleigh-Jeans formula, The Planck radiation formula, Fermi-Dirac statistics, Comparison of results, Transition between states.

**References :**

1. LG : 1.1 to 1.11
2. LG : 2.1, 2.3 to 2.11
3. AB : 15.1 to 15.5
4. AB : 16.1 to 16.7

1. LG. : Statistical and Thermal Physics- an introduction : S. Lokanathan and R. S. Gambhir. (Prentice Hall of India : 2008)

2. AB. : Perspectives of Modern Physics : Arthur Beiser. (Mc Graw Hill International)

**Additional References :**

1. A treaties on heat : Saha and Srivastava. (Indian press, Allahabad)
2. Fundamentals of Statistical and Thermal Physics : F. Reif. (Mc Graw - Hill)



(30 periods)

1. Motion under a central force, The central force inversely proportional to the square of the distance, Elliptical orbits. The Kepler problem. Hyperbolic Orbits : The Rutherford problem – Scattering cross section.
2. Moving origin of co-ordinates, Rotating co-ordinate systems, Laws of motion on the rotating earth, Foucault pendulum, Larmor's theorem (without proof).
3. Kinematics of moving fluids, Equation of motion for an ideal fluid, Conservation laws for fluid motion, Steady flow.

UNIT - 4

(30 periods)

1. Lagrange's equations : Generalized coordinates, Lagrange's equations, Examples, Systems subject to constraints, Examples of systems subject to constraints, Constants of motion and ignorable coordinates.
2. The rotation of a Rigid body : Motion of a rigid body in space, Euler's equations of motion for a rigid body, Euler's angles, Heavy symmetrical top (without nutation).
3. Non linear mechanics : Qualitative approach to chaos, The anharmonic oscillator, Numerical solution of Duffing's equation, Transition to chaos: Bifurcations and strange attractors, Aspects of chaotic behavior.

References :

UNIT - 3

1. KRS : Art. 3.13 to 3.16
2. KRS : Art. 7.1 to 7.5
3. KRS : Art. 8.6 to 8.9

UNIT - 4

1. KRS : Art. 9.1 to 9.6
2. KRS : Art. 11.1, 11.2, 11.4, 11.5, BO : 6.7
3. BO : Art. 11.1, 11.3 to 11.5

References :

KRS : Mechanics

: Keith R. Symon.  
(Addison Wesley) 3<sup>rd</sup> Ed.

BO : Classical Mechanics-  
a Modern perspective

: V. D. Barger and M. G. Olsson.  
(Mc Graw Hill International 1995 Ed.)

Additional References :

1. Classical Mechanics

: Herbert Goldstein  
(Narosa 2<sup>nd</sup> Ed.)

2. An Introduction to Mechanics

: Daniel Kleppner & Robert Kolenkow  
Tata Mc Graw Hill (Indian Ed. 2007)

3. Chaotic Dynamics-  
an introduction.

: Baker and Gollup.

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**PAPER – II**  
**Solid State Physics and Electronics**

(Solid State Physics)

**UNIT – 1 :**

(30 periods)

1. Electrical properties of metals :  
Classical free electron theory of metals, Drawbacks of classical theory, Relaxation time, Collision time and mean free path, Quantum theory of free electrons, Fermi-Dirac statistics and electronic distribution in solids, Density of energy states and Fermi energy, The Fermi distribution function, Heat capacity of the electron gas, Mean energy of electron gas at 0 K, Effect of temperature on Fermi distribution function, Electrical conductivity from quantum mechanical considerations, Thermionic emission.
2. Superconductivity :  
A survey, Mechanism of Superconductors, Effects of magnetic field, The Meissner effect, The penetration depth, Type I and Type II Superconductors.
3. Band theory of solids, The Kronig- Penney model (Omit eq. 6.184 to 6.188), Brillouin zones, Number of wave functions in a band, Motion of electrons in a one-dimensional periodic potential, Distinction between metals, insulators and intrinsic semiconductors.

**UNIT - 2**

(30 periods)

1. Magnetic properties of Matter :  
Diamagnetism and Paramagnetism, The origin of permanent magnetic dipoles, Diamagnetism and Larmor precession, The static paramagnetic susceptibility. Ferromagnetism- the Weiss molecular field, Comparison of the Weiss theory with experiment, Qualitative remarks about domains, Qualitative idea about antiferromagnetism and ferrites.
2. Conduction in Semiconductors.  
Electrons and Holes in an Intrinsic Semiconductor, Conductivity, Carrier concentrations, Donor and Acceptor impurities, Charge densities in a Semiconductor, Fermi level in extrinsic semiconductors, Diffusion, Carrier lifetime, The continuity equation, The Hall effect.
3. Semiconductor-diode Characteristics :  
Qualitative theory of the p-n junction, The p-n junction as a diode, Band structure of an open-circuit p-n junction, The current components in a p-n junction diode, Quantitative theory of p-n diode currents, The Volt-Ampere characteristics, The temperature dependence of p-n characteristics, Diode resistance.

References :

UNIT - 1

1. SOP : Ch. 6 Art : I to V, XIV to XX, XXXI.
2. SOP : Ch. 8 Art : II, III, IV, VII, XII and XIII.
3. SOP : Ch. 6 Art : XXXVI to XXXXI.

UNIT - 2.

1. D : Art 18.1 to 18.4, 19.1 to 19.3, 19.5, 19.9, 19.12.
2. MH : Art 4.1 to 4.10
3. MH : Art 5.1 to 5.8

References :

1. SOP : Solid State Physics : S. O. Pillai  
New Age International.
2. SOP : Modern Physics and Solid State Physics : Problems and solutions  
New Age International.
3. D : Solid State Physics : A. J. Dekker  
Macmillan India Ltd.
4. MH : Electronic Devices and Circuits : Millman, Halkias &  
Satyabrata Jit. (2<sup>nd</sup> Ed.)  
Tata McGraw Hill.

Additional References :

1. Solid State Physics : S. P. Kakani and Amit Kakani.  
New Age International.
2. Semiconductor Physics and Devices : Donald Neamen (3<sup>rd</sup> Ed.)  
Tata McGraw Hill.
3. Introduction to Solid State Physics : Ali Omer.  
Addison Wesley Longman.



(Electronics)

(30 periods)

### UNIT 3 :

1. Field effect transistors :  
JFET : Basic ideas, Drain curve, The transconductance curve, Biasing in the ohmic region and the active region, Transconductance, JFET common source amplifier, JFET analog switch multiplexer, voltage controlled resistor, Current sourcing.  
MOSFET : Depletion and enhancement mode, MOSFET operation and characteristics, digital switching.
2. Thyristors : SCR – Working, Equivalent circuit, important terms, I-V Characteristics, SCR as a switch, Half wave rectifier and Full wave rectifier.  
TRIAC : Construction, Operation, I-V Characteristics, Applications.  
DIAC : Construction, Operation, Characteristics and applications.
3. Optoelectronic Devices :  
Photo-diode, Phototransistor, Optocoupler.
4. Differential Amplifier using transistor :  
The Differential Amplifier, DC and AC analysis of a differential amplifier, Input characteristic-effect of input bias, Offset current and input offset voltage on output, common mode gain, CMRR.
5. Transistor Multivibrators :  
Astable, Monostable and Bistable Multivibrators, Schmitt trigger.

### UNIT – 4

(30 periods)

1. Op Amp Applications :  
Log amplifier, Instrumentation amplifiers, Voltage-controlled current sources (grounded load), First order Active filters, astable using OP AMP, square wave and triangular wave generator using OP AMP, Wein-bridge oscillator using OP AMP.
2. 555 Timer :  
Block diagram, Monostable and Astable operation (with VCO), Triggered linear ramp generator.
3. Logic families :  
Standard TTL NAND, TTL NOR, Open collector gates, Three state TTL devices, MOS inverters, CMOS NAND and NOR gates, CMOS characteristics.
4. Application of JK flip flops :  
Types of registers, 4-bit shift register (serial in-serial out), Asynchronous counters, 4-bit up-down counter, MOD-3, MOD-5, Decade counter, Shift counter.
5. Regulated DC power supply :  
Supply characteristics, series voltage regulator, short circuit protection (current limit and fold back) Monolithic linear IC voltage regulators (LM 78XX, LM 79XX, LM 317).

6. Electronic communication techniques :  
 Radio broadcasting, Transmission and reception, Modulation, Amplitude modulation, Modulation factor, Analysis of amplitude modulated wave, Side band frequencies in AM wave, Transistor amplitude modulator, Power in AM wave, Limitations of AM, Frequency modulation. (qualitative)

### References :

#### Unit -3 :

1. MB : Art. 13.1 to 13.9, 14.1, 14.2, 14.4, 14.6.
2. VKM : Art. 20.1 to 20.10, 21.1 to 21.6, 21.8, 21.9, 21.10.
3. VKM : Art 7.7 to 7.11. MB : 7.10.
4. MB : Art 17.1 to 17.5.
5. KVR : Art. 14.5.2.1, 14.5.2.5, 14.5.2.6, 14.5.4.1.

#### Unit -4 :

1. MB : Art. 20.5, 20.8, 21.4, 22.7, 22.8, 23.2. MH : 16.14.
2. MB : Art. 23.7 to 23.9.
3. ML : Art. 6.2, 6.4, 6.6, 6.7, 7.2 to 7.4.
4. ML : Art 10.1, 10.2, 11.1, 11.3 to 11.5, 11.7.
5. MB : Art 24.1, 24.3, 24.4.
6. VKM : Art. 16.1 to 16.11.

### References :

1. MB : Electronic Principles : A. P. Malvino and D.J. Bates (7<sup>th</sup> Ed.) – (TMH).
2. VKM : Principles of Electronics : V. K. Mehta and Rohit Mehta. S. Chand Publications. (11<sup>th</sup> Ed.).
3. KVR : Functional Electronics : K. V. Ramanan (TMH).
4. ML : Digital Principles and Applications : Malvino and Leach (4<sup>th</sup> Ed) (TMH).
5. MH : Integrated Electronics : Millman and Halkias Mc Graw Hill International.

### Additional References :

1. Electronic Devices and Circuits : S. Salivahanan, N. Suresh Kumar and A. Vallavaraj. (2<sup>nd</sup> Ed.) (Tata McGraw Hill)
2. Pulse, Digital & Switching Waveforms. : Millman & Taub. (TMH)

## Atomic and Molecular Physics, Nuclear Physics.

(Atomic and Molecular Physics)

### UNIT – 1 :

(30 periods)

1. (i) Schrödinger's equation for Harmonic oscillator, its solution by operator method.  
(ii) Graphical representation of its energy level and wave functions.
2. Hydrogen atom :  
Schrödinger's equation for Hydrogen atom, Separation of variables, Quantum Numbers : Total quantum number, Orbital quantum number, Magnetic quantum number. Angular momentum, Electron probability density (Radial part).
3. Electron Spin :  
The Stern-Gerlach experiment, Pauli Exclusion principle-Symmetric and Antisymmetric wave functions.
4. (i) Spin orbit coupling, Hund's Rule, Total angular momentum, Vector atom model, L-S and j-j coupling.  
(ii) Origin of spectral lines, Selection rules.

### UNIT – 2.

(30 periods)

1. Effect of Magnetic field on atoms, The normal Zeeman effect and its explanation (Classical and Quantum), The Lande g factor, Anomalous Zeeman effect.
2. Paschen-Back effect, Paschen-Back effect of principle series doublet, Selection rules for Paschen-Back effect.
3. Molecular Spectra (Diatomic Molecules) :  
Rotational energy levels, Rotational spectra, Vibrational energy levels, Vibrational-Rotational spectra.  
Electronic Spectra of Diatomic molecules : The Born-Oppenheimer approximation, Intensity of vibrational-electronic spectra : The Franck-Condon principle.
4. Raman Effect :  
Quantum Theory of Raman effect, Classical theory of Raman effect, Pure Rotational Raman spectra : Linear molecules, symmetric top molecules, Asymmetric top molecules, Vibrational Raman spectra : Raman activity of vibrations.



References :

UNIT - 1.

- 1. (i) M : 5.2 (ii) B : 8.7.
- 2. B : 9.1 to 9.9.
- 3. B : 10.1, 10.3.
- 4. (i) B : 10.2, 10.6, 10.7, 10.8, 10.9. (ii) B : 11.1 and 11.2.

UNIT - 2.

- 1. SA : 9.14, 9.15, 9.16, 9.17.
- 2. W : 10.7, 10.8, 10.9
- 3. B : 14.1, 14.3, 14.5, 14.7 BM : 6.11, 6.1.3.
- 4. BM : 4.1.1, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.3.1.

References :

- 1. B : Perspectives of Modern Physics : Arthur Beiser  
McGraw Hill.
- 2. SA : Introduction to Atomic & Nuclear Physics : H. Semat & J. R. Albright  
(5<sup>th</sup> Ed.)  
Chapman & Hall.
- 3. W : Introduction to Atomic Spectra : H. E. White.  
McGraw Hill.
- 4. BM : Fundamentals of Molecular Spectroscopy : C. N. Banwell &  
E. M. McCash (TMH).  
(4<sup>th</sup> Ed.)
- 5. M : Introduction to Quantum Mechanics : P. T. Mathews (TMH).

UNIT – 3 :

(30 periods)

1. **Review** : Nuclear composition, Some nuclear properties, Stable nuclei, Binding energy, Meason theory of nuclear forces.

Rutherford scattering & measurement of nuclear size, Measurement of nuclear radius(Hofstadter experiment).

2. Alpha decay :

Range of alpha particles, Disintegration energy, Alpha decay paradox : Barrier penetration( Gamow's theory of alpha decay and Geiger-Nuttal law), Velocity and energy, Absorption of alpha particles: Range, Ionization and stopping power, Nuclear energy levels.

3. Beta decay :

Introduction, Continuous beta ray spectrum-Difficulties encountered to understand it, Pauli's neutrino hypothesis, Detection of neutrino, Velocity and energy of beta particles, Energy levels and decay schemes, Energetics of beta decay.

4. Gamma decay :

Introduction, Internal conversion, Nuclear isomerism, Mossbauer effect.

UNIT –4

(30 periods)

1. Nuclear radiation detectors :

Proportional counter, Scintillation counter, Cloud and Bubble chamber , Ionization chamber, Proportional and GM counter.

2. Nuclear models :

Liquid drop model, Weizsacher's semi-empirical mass formula, Mass parabolas - Prediction of stability against beta decay for members of an isobaric family, Stability limits against spontaneous fission.

3. Nuclear energy :

Introduction, Asymmetric fission - Mass yield, Emission of delayed neutrons, Nuclear release in fission, Nature of fission fragments, Energy released in the fission of  $U^{235}$ , Fission of lighter nuclei, Fission chain reaction, Neutron cycle in a thermal nuclear reactor (Four Factor Formula), Nuclear reactors, Natural fusion, Possibility of controlled fusion.

4. Elementary particles :

Introduction, Classification of elementary particles, Electrons and positrons, Protons and anti-protons, Neutrons and anti- neutrons, Neutrinos and anti-neutrinos, Photons, Mesons.

References :

UNIT - 3 :

1. AB : 11.1 to 11.4, 11.7      P : 5.2      K : 8.5, 9.5      P : 4. I. 2, 4. I. 3.
2. P : 4. II. 1, 4. II. 2, 4. II. 3, 1.II.3      K : 13. 1, 13.2, 13.5.
3. P : 4. III. 1, 4. III. 2, 4. III. 3, 4. III. 5      K : 14.1, 14.7      G : 5.5.
4. P : 4. IV. 1, 4. IV. 3, 4. IV. 4, 9.4.

UNIT - 4 :

1. P : 1. I. 3      K : 2.8.
2. P : 5.1, 5.3, 5.4, 5.5.
3. P : 6.1, 6.3 to 6.9, 9.6, 9.7.
4. T : 16.1, 16.2, 16.5 to 16.9.

References.

1. AB : Concepts of Modern Physics      : Arthur Beiser (6<sup>th</sup> Ed.) (TMH).
2. P : Nuclear Physics      : S.B. Patel (Wiley Eastern Ltd.).
3. K : Nuclear Physics      : Irving Kaplan (2<sup>nd</sup> Ed.)  
(Addison Wesley).
4. G : Nuclear Physics      : S. N. Ghoshal  
(S. Chand & Co.)
5. T : Nuclear Physics      : D. C. Tayal  
(Himalayan Publishing House)

Additional References.

1. Modern Physics      : Kenneth Krane (2<sup>nd</sup> Ed.)  
John Wiley & Sons.
2. Atomic & Nuclear Physics      : N Subrahmanyam, Brij Lal.  
(Revised by Jivan Seshan.)  
S. Chand.
3. Atomic & Nuclear Physics      : A B Gupta & Dipak Ghosh  
Books & Allied (P) Ltd.

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**PAPER – IV**  
**Special Theory of Relativity and Cosmology, Electrodynamics.**

(Special theory of Relativity and Cosmology)

(30 periods)

**UNIT – 1 :**

1. Relativistic Kinematics :  
The postulates of the special theory of relativity, Simultaneity, Derivation of Lorentz transformation equations, Some consequences of the Lorentz transformation equations : length contraction, time dilation and meson experiment, The observer in relativity, The relativistic addition of velocities and acceleration transformation equations, Aberration and Doppler effect in relativity, The common sense of special relativity.
2. Relativistic Dynamics :  
Mechanics and Relativity, The need to redefine momentum, Relativistic momentum, Alternative views of mass in relativity, The relativistic force law and the dynamics of a single particle, The equivalence of mass and energy, The transformation properties of momentum, energy and mass.
3. The Geometric Representation of Space-Time :  
Space-Time Diagrams, Simultaneity, Length contraction and Time dilation, The time order and space separation of events, The twin paradox, The principle of equivalence and general relativity, Gravitational red shift.

(30 periods)

**UNIT – 2**

1. Relativity and Electromagnetism :  
Introduction, The interdependence of Electric and Magnetic fields, The Transformation for  $\mathbf{E}$  and  $\mathbf{B}$ , The field of a uniformly moving point charge, Force and fields near a current-carrying wire, Force between moving charges, The invariance of Maxwell's equations.
2. Cosmology :  
The large scale structure of the Universe :  
Types of galaxies, radio sources, Quasars, Doppler shift and expansion of the Universe, Hubble's law, Radiation background.
3. From Relativity to Cosmology :  
Newtonian Cosmology, Weyl's postulates, Cosmological principle, Red shift.
4. Relics of the Big Bang :  
Radiation dominated Universe, Matter versus radiation, Synthesis of light nuclei, Microwave background.

References :

- UNIT - 1 :
1. RR : Chapter - I.
  2. RR : Chapter - II.
  3. RR : Supplementary topics A, B and C.

- UNIT - 2 :
1. RR : Chapter - IV.

Relevant sections from the following:

2. JVNI : Chapter - 1, JVNE : Chapter - 1.
3. JVNI : Chapter - 3, (Omit 3.3, 3.4) JVNE : Chapter - 2.
4. JVNI : Chapter - 5, JVNE : Chapter - 3.

References :

1. RR : Introduction to Special Relativity : Robert Resnick  
(Wiley Student Edition)  
Reprint 2007, New Delhi.
2. JVNI : Introduction to Cosmology : J. V. Narlikar. 3<sup>rd</sup> Ed. 2002  
(Cambridge University Press).
3. JVNE : Elements of Cosmology : J. V. Narlikar, 1996  
(University Press).

Additional References :

1. Special theory of Relativity : A. P. French.
2. General Relativity & Cosmology : S. K. Srivastava  
(Prentice Hall of India).



(Electrodynamics)

(30 periods)

**UNIT – 3 :**

1. Field lines, Flux and Gauss' law, The divergence of  $\mathbf{E}$ , Applications of Gauss' law, The curl of  $\mathbf{E}$ .  
Introduction to potential, Comments on potential, Poisson's equation and Laplace's equation, The potential of a localized charge distribution.
2. Laplace's equation in one, two and three dimensions, Boundary conditions and Uniqueness theorems (without proof), conductors.  
The classic image problem, Induced surface charge, force and energy.
3. Dielectrics, Induced Dipoles, Alignment of polar molecules, Polarization, Bound charges and their physical interpretation, Gauss' law in presence of dielectrics, A deceptive parallel, Susceptibility, Permittivity, Dielectric constant, Energy in dielectric systems.
4. Straight-line currents, The Divergence and Curl of  $\mathbf{B}$ , Applications of Ampere's Law in the case of a long straight wire and a long solenoid, Comparison of Magnetostatics and Electrostatics.
5. Diamagnets, Paramagnets and Ferromagnets, Magnetization, Bound currents and their physical interpretation, Ampere's law in magnetized materials, A deceptive parallel, Magnetic susceptibility and permeability.

**UNIT – 4**

(30 periods)

1. Energy in magnetic fields, Electrodynamics before Maxwell, Maxwell's correction to Ampere's law, Maxwell's equations, Magnetic charge, Maxwell's equations in matter, Boundary conditions.
2. The continuity equation, Poynting's theorem, Newton's third law in electrodynamics.
3. The wave equation for  $\mathbf{E}$  and  $\mathbf{B}$ , Monochromatic Plane waves, Energy and momentum in electromagnetic waves, Propagation in linear media, Reflection and transmission of em waves at normal and oblique incidence.
4. Electromagnetic waves in conductors, Reflection at a conducting surface, The frequency dependence of permittivity.



References :

UNIT - 3

1. DG : 2.2.1 to 2.2.4, 2.3.1 to 2.3.4.
2. DG : 3.1.1 to 3.1.6, 3.2.1 to 3.2.3.
3. DG : 4.1.1 to 4.1.4, 4.2.1, 4.2.2, 4.3.1, 4.3.2, 4.4.1, 4.4.3.
4. DG : 5.3.1 to 5.3.4.
5. DG : 6.1.1, 6.1.4, 6.2.1, 6.2.2, 6.3.1, 6.3.2, 6.4.1.

UNIT - 4

1. DG : 7.2.4, 7.3.1 to 7.3.6.
2. DG : 8.1.1, 8.1.2., 8.2.1.
3. DG : 9.2.1 to 9.2.3, 9.3.1 to 9.3.3.
4. DG : 9.4.1 to 9.4.3.

References :

DG : Introduction to Electrodynamics : David J. Griffiths (3<sup>rd</sup> Ed)  
Prentice Hall of India.

Additional References :

1. Introduction to Electrodynamics : A. Z. Capria and P. V. Panat.  
Narosa Publishing House.
2. Engineering Electrodynamics : William Hayt Jr. & John H. Buck  
(TMH).
3. Electricity and Magnetism : Navina Wadhvani  
(PHI - 2010).

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**REVISED SYLLABUS IN T. Y. B. Sc. PHYSICS PRACTICALS**  
(with effect from 2010 – 2011)

The T. Y. B. Sc. Syllabus integrates the regular practical work with a series of demonstration and skill experiments.

- i) Regular Physics Experiments** : A minimum of 8 experiments from each of the groups I, II, and III are to be performed and reported in the journal.
- ii) Skill Experiments** : All the skills are compulsory and must be reported in the journal. Skills will be tested during the examination as 3 short experiments each for a duration of 45 minutes.
- iii) Demonstration Experiments** : The demonstration experiments are to be performed by the teacher in the laboratory and students should be encouraged to participate and take observation wherever possible. Demonstration experiments are designed to bring about interest and excitement in Physics. Students are required to enter details of these 'demo' experiments in their journal.

The certified journal must contain a minimum of 24 regular experiments (8 from each group), 6 Demonstration experiments along with all Skills.

There will be four turns of four periods each per batch for practicals in one week.

During the teaching and examination of Physics laboratory work, simple modifications of experimental parameters may be attempted. Attention should be given to basic skills of experimentation which include :

- i) Understanding relevant concepts.
- ii) Planning of the experiments.
- iii) Layout and adjustments of the equipments.
- iv) Recording of observations and plotting of graphs.
- v) Calculation of results and estimation of possible errors in the observation of results.

**NOTE :**

**For Students taking Three Unit Course in Physics :**

There shall be two practical groups (I, II) and a minimum of 8 experiments from each group have to be performed and reported in the journal. In addition, the students will observe and participate in a minimum of 3 demonstration experiments. These are also to be reported in the journal.

Group – I

**Mechanics and Properties of Matter, Heat, Optics and Sound :**

1. Kater's Pendulum : determination of  $g$
2. Quincke's method : determination of surface tension of Mercury.
3. Flat spiral spring : determination of  $Y, \eta, \sigma$ .
4.  $Y$  by Koenig's method.
5. Lee's method : determination of coefficient of thermal conductivity of a bad conductor.
6. Determination of Stefan's constant  $\sigma$ .
7. R. P. of prism.
8. Goniometer.
9. Lloyd's mirror : determination of  $\lambda$ .
10. Double refraction.
11. Rydberg's constant.
12. Velocity of sound using speaker, microphone and CRO.

Group – II

**Electricity, Magnetism and Solid State Devices :**

1. Mutual inductance by BG.
2. Hysteresis using magnetometer.
3. Capacitor Parallel bridge.
4. Maxwell's bridge.
5. Hall effect measurement.
6. FET Characteristics and its use as V V R.
7. SCR Characteristics.
8. Energy band gap of Ge diode.
9. Photodiode and photo transistor characteristics.
10. Diode as temperature sensor.
11. M / C by BG.

Group – III

**Electronics :**

1. Transistorized Bistable multivibrator or Schmitt trigger.
2. Astable multivibrator using OP-AMP.
3. Log amplifier using OP-AMP.
4. Wein Bridge Oscillator (OPAMP).
5. High Pass or Low Pass active filter : OP AMP (1<sup>st</sup> order only).
6. Transistor voltage regulator with current limit / fold back limit.
7. Three terminal current / voltage regulator.
8. 555 Timer : Linear triggered Ramp Generator.
9. 555 Timer : Monostable or Astable.
10. To Fourier Analyse a square / triangular waveform.
11. Counter divided by 2, 5, 10.
12. Study of 4 bit shift register.

**Skills :**

1. Drawing advanced level graphs.
2. Estimation of errors.
3. Soldering advanced circuit.
4. Bread board circuit using IC's.
5. Optical Levelling of Spectrometer.
6. Laser beam profile.
7. Obtaining fringes without lateral shift using Biprism.
8. Use of electronic balance : radius of small ball bearing.
9. Dual trace CRO : Phase shift measurement.
10. BG :  $C_1 / C_2$  by comparing  $\theta_1 / \theta_2$ .

**Demonstration Experiments :**

1. Open CRO, Power Supply, Signal Generator : Discuss block diagram.
2. Data sheet reading for diodes, Transistor, Op amp and Optoelectronic devices.
3. Circuit designing – single stage amplifier, Transistor Multivibrator etc. and testing on breadboard.
4. Equation solver.
5. Amplitude Modulation.
6. Frequency Modulation.
7.  $e / m$ .
8. Millikan's oil drop experiment.
9. Zeeman effect.
10. Michelson's interferometer.
11. Iodine absorption spectra.
12. Standing waves in liquid using Ultrasonic waves.
13. PC simulation of 8085.
14. Use of PC /  $\mu P$  to control real world parameters.
15. Seven segment display.
16. Demonstration of chaos using CRO.
17. Study of GM counter.

**References :**

1. Advanced course in Practical Physics : D. Chattopadhyaya, PC. Rakshit & B. Saha (8<sup>th</sup> Edition) Book & Allied Pvt. Ltd.
2. BSc Practical Physics : Harnam Singh  
S. Chand & Co. Ltd. – 2001.
3. A Text book of Practical Physics : Samir Kumar Ghosh  
New Central Book Agency (4<sup>rd</sup> edition).
4. B Sc. Practical Physics : C. L. Arora (1<sup>st</sup> Edition ) – 2001  
S. Chand & Co. Ltd.
5. Practical Physics : C. L. Squires – ( 3<sup>rd</sup> Edition)  
Cambridge University Press.
6. University Practical Physics : D C Tayal. Himalaya Publication.
7. Advanced Practical Physics : Worsnop & Flint.

**University of Mumbai**  
**T. Y. B. Sc. Computer Science (Applied component)**  
**Revised Syllabus- Effective from 2010-2011**

**Computer Science (Applied Component)**  
**Third Year B.Sc. Physics (Single/Double Major Subject).**

The revised syllabus in the subject of Computer Science (Applied Component) For Third Year B.Sc. Physics (Single/Double major subject) will be implemented from Academic Year 2010-2011, under the Revised Pattern of the Course of study for the Third year B.Sc. Degree

The scheme of examination in the subject of Computer Science will be as follows:

**SCHEME OF EXAMINATION**  
**Computer Science (Applied Component)**

Paper	Section	Title	Marks
Paper CS - I	----	PC Hardware and Microprocessor	60
Paper CS - II	----	Programming in C <sup>++</sup>	60
Practicals		Practical Paper CSP - I	30
		Practical Paper CSP - II	30
		Certified Journal	10
		Viva Voce	10

Total Marks: Theory: 120  
 Practical: 80  
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 Total 200

**N.B.**

- Duration of the Theory papers will be 3 Hours.
- Duration of Practical paper will be 3 Hours.
- A certified journal of Computer Science must contain a minimum of 16 Experiments with at least 8 from each practical paper.
- Every candidate will be required to perform two experiments, one each from each practical paper. Further each practical will be of two parts Part A and Part B.
- A candidate will be allowed to appear for the Practical Examination only if the candidate submits his/her certified journal from the Head of Department of Physics stating that the candidate has performed and completed the practical of Computer science as per the requirements in syllabus.
- Each theory paper shall consist of 5 (Five) questions, one per unit with internal choice and one question with questions from all four units.
- Two periods per week per theory paper and four periods per week per practical batch are to be allocated in the work load.

**T.Y.B.Sc. Computer Science(Applied component)**  
**Computer Science (Applied Component)**

**Paper I : PC Hardware, Microprocessor**

**Unit I:**

(15 Lectures)

- Evolution of computers, classification, computer system,
- Computer organization and architecture-CPU, internal communication, machine cycle, buses, instruction set.
- Memory and storage systems-memory representation, RAM, ROM, magnetic storage, optical storage, solid state storage,
- Peripheral devices- input and output devices
- Basic idea of number systems: integers, real numbers, floating point representation and binary arithmetic. Computer codes
- Computer software, types, operating systems, MS-WORD, MS-EXCEL, ACCESS, POWER POINT , PROGRAMMING LANGUAGES
- Data communication and networking, network topologies and benefits, protocols

Ref: Fundamentals of Computers by E.Balagurusamy

**Unit –II**

(15 Lectures)

**8085 Microprocessor**

1. Features of Intel 8085 and Pin diagram of 8085
  2. 8085 CPU Architecture
    - Arithmetic and Logical Group
    - ALU, Accumulator, Temporary Register, Flag Register (PSW) Register Group
    - Temporary Registers (Wand Z), General purpose Registers, Special purpose Registers
    - Interrupt Control
    - Serial I/O Control Group
    - Instruction Register, Decoder and Control Group
    - Instruction Register, Instruction Decoder, Timing and Control
  3. Logic devices for interfacing: Tri state devices, Buffers, Encoder, Decoder, Latch
- Ref: RG; Ramesh Gaonkar

**Unit –III**

(15 Lectures)

**8085 Instruction Set**

1. Addressing Modes
  - Immediate Addressing, Register Addressing, Direct Addressing, Indirect Addressing, Implied Addressing or Inherent Addressing
2. Classification of Instruction Set
  - Data Transfer Group, Arithmetic Group, Logical Group, Branching Group, Stack and Machine Control Group
  - Notations used in Instructions and Opcode



- Data Transfer Group:  
MOV R<sub>d</sub>, R<sub>s</sub>; MOV R, M or MOV M,R; MVI R, Data; MVI M, Data;  
LXI R<sub>p</sub>, Data 16 bit; LDA Address; STA Address, IN, OUT
- Arithmetic Operation Group:  
ADD R; ADD M; ADC M; ADI Data; ACI Data; SUB R; SUB M; SBB R;  
SUI Data; INR R; INR M; DCR M; INX R<sub>p</sub>; DCX R<sub>p</sub>
- Logical Group:  
CMP R, CMP M, RLC, RRC, RAL, RAR
- Branch Group:  
JMP Address, Conditional Jump instructions, RST N, Concept of Looping,  
Operating on Block of Data

3. Instruction set summary.

Ref: RG:

Unit-IV Study of special devices, interfacing and Internet

(15 Lectures)

1. Multimedia Devices: Color Monitor, Sound card, Digital cameras, MP3 player.
2. Interfacing peripheral devices with PC: Comparison of serial, parallel, USB and firewire ports for interfacing.
3. Familiarity with Internet, WWW and Web Search engines
4. Computer viruses: types and protection

References:

JA "Enhanced Guide to managing and maintaining your PC"

And websites

EB E. Balagurusamy, "Fundamentals of Computers", 2009, TMH

RG Ramesh Gaonkar "Microprocessor Architecture Programming and Applications with the 8085" (RG) 5th edition Penram

WS William Stallings "Computer Organization and Architecture" 6th Edition Pearson Publication

VB Vibhute and Borole "8085 microprocessors", Tech-media

MM Mark Minassi "PC upgrade and maintenance" 10th edition BPB

TB Thomas Bartee "Digital Computer Fundamentals" TMH

JA Jean Andrews "Enhanced Guide to managing and maintaining your PC"

Thomson Learning (Chapter 9 and 10)

(In addition to these books internet web-sites can be used wherever necessary.)

Sample web-sites for Paper – I

<http://www.howstuffworks.com>

<http://www.intel.com>

<http://www.hardwarecentral.com>

<http://www.mdronline.com>

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**T.Y.B.Sc. Computer Science(Applied component)**  
**Computer Science (Applied Component)**

**Paper -II: Programming in C++**

**Unit 1**

**(15 Lectures)**

**Introduction to Computers and Programming:** Programs and programming languages, the programming process, Procedural and object oriented programming

**Object oriented terms:** object, class, data hiding, encapsulation, inheritance and polymorphism

**Chapter 1.3 to 1.7**

**Website for Object oriented terms**

<http://java.sun.com/docs/books/tutorial/java/concepts/>

**Introduction to C++:** The parts of a C++ program, The cout object, preprocessor directive (#include), variables and constants, Identifiers and rules for naming identifiers, Data types( integer, char, floating point, bool), variable assignment and initialization, scope of a variable, Arithmetic operators, comments.

**Chapter 2.1 to 2.14 [exclude 2.10]**

**Expressions and Interactivity:** The cin object, entering multiple values, reading strings, mathematical expressions, operator precedence and associativity, type coercion, overflow and underflow, typecast operator, #define directive, multiple and combined assignment, formatting input and output, precision, mathematical library functions.

**Chapter 3.1 to 3.11**

**Making Decisions:** Relational operators, if statement, flags, concept of compound statement, if/else statement, if/else if statement, trailing else, nested if statements, logical operators, validating user input, scope of a variable, comparing strings, conditional operator, switch statement.

**Chapter 4.1 to 1.16**

**Unit 2**

**(15 Lectures)**

**Looping:** Increment and decrement operators, while loop, sentinels, do-while loop, for loop, nested loops, break and continue statement.

**Chapter 5.1 to 5.11**

**Functions:** need for functions, defining and calling functions, function prototypes, sending information into a function (parameter passing), changing the value of the parameter, the return statement, returning a value from a function, local and global variables, static local variables, default arguments to a function, reference arguments, overloaded functions.

**Chapter 6.1 to 6.5 and 6.7 to 6.14**

**Arrays:** Concept of arrays, accessing array elements, array initialization, processing array contents, copying and printing contents of an array, arrays as function arguments, two-dimensional arrays, arrays of strings.

**Chapter 7.1 to 7.5 and 7.8 to 7.11**

**Pointers:** concept of a pointer, pointer variables, relationship between arrays and pointers, pointer arithmetic, Initializing pointers, comparing pointers, pointers as function parameters, dynamic memory allocation.

**Chapter 9.1 to 9.8**

**Introduction to classes:** Introduction to class, access specifiers(private and public) defining member functions, instance of a class(object), need for private members, inline member functions.

**Chapter 13.1 to 13.8**

Unit 3

(15 Lectures)

**Object initialization and cleanup:** constructors, destructors, constructors that accept arguments, overloaded constructors, default constructor and destructor, arrays of objects

**Chapter 13.9 to 13.14**

**More about classes:** static members, friends of classes, member wise assignment, copy constructors.

**Chapter 14.1 to 14.4**

**Operator Loading:** Overloading assignment operator, this pointer, Overloading Math operators, overloading relational operators.

**Chapter 14.5 [exclude >> and << operators]**

(15 Lectures)

Unit 4:

**Inheritance:** Basics of inheritance, types of inheritance, protected members and class access, constructors and destructors, Overriding base class functions.

AP

**Polymorphism and virtual member functions:** Concept of polymorphism, abstract base class and pure virtual functions, base class pointers, classes derived from derived classes, Multiple inheritance (concept only).

### **Chapter 15.1 to 15.9**

All topics are from the book Tony Gaddis "Programming in C++" 3<sup>rd</sup> Edition

#### **Additional References:**

1. Garry Bronson
2. Schaum series "Programming in C++"
3. Robert Lafore
4. H. Schildt
5. Cohoon & Davidson "C++ Program Design"
6. Tanenbaum et. al. "Data Structures in C++" (Prentice Hall)

## **PRACTICALS :**

### **Important :**

- **Internet facility with easy access should be provided in the Computer Science laboratory**
- **Not more than 2 students per computer should be allowed.**

### **Practicals Paper I**

**A1 :** MS Office Word and Excel – Computer generated report of a Physics experiment actually performed by the student in the T.Y.B.Sc. lab. (This should include formulae, diagram, data table, graph, results etc)

**A2:** Powerpoint: Presentation of any one Physics topic from T.Y.B.Sc. syllabus to be brought on floppy disk / CD

**A3: MS Access :** Creating a database file. Adding, deleting, updating and querying the database.

**A4: Linux shell commands**

- Logging in and out of Linux
- **File system commands :** ls command with options, pwd, passwd, cd, ln, cat, mkdir, rmdir, chmod, cp, mv, rm
- **General purpose utilities:** more , wc, cmp, diff, comm., date , who

**B. Microprocessor experiments: Any four**

- ISR program( use VI key)
- Addition and subtraction of 2 bit 8 bit numbers with carry and borrow
- Sum of n numbers ( $n \leq 10$ ). Find smallest /greatest number
- Transfer of memory block
- Multiplication of two positive numbers with product greater than 255.

Note: Observation of registers by single stepping is expected.

## Practicals Paper II:

### C++ Programming Exercises:

Part - A : Structured programming using C++.  
Perform minimum 1 experiment from each A1 to A4)

#### A-1 Control structures:

1. Temperature Conversion (Page 151 GB)
2. Triangle classification problem
3. A function calculator (Rational expression evaluator) (Page 125 RL)
4. Binary, Hex, Octal equivalents of decimal numbers in range 1 through 256 (page 154 DD)

#### A-2 Functions:

5. Use functions: a) To find if an integer is a perfect number &  
b) Print all perfect numbers in the range 1 to 1000 (page 232 DD)
6. Use functions: a) To find if a given integer is a prime or not  
b) Print all prime numbers between 1 and 500 (page 232 DD)
7. Use functions: To find GCD of two integers (page 232 DD)

#### A-3 Arrays:

8. Mean, Variation and Deviance of a set of numbers (page 299 GB)
9. Linear Search / Binary Search
10. Selection Sort / Bubble Sort / Insertion Sort

#### A-4 String Manipulation:

11. a) To find if a given string is a palindrome or not  
b) Reversing a string ( Print a string backwards) (page 303 DD)
12. Use of string-compare & string-copy
13. To arrange names alphabetically

## Part-B: Object Oriented Programming using C++

(Perform minimum 4 experiments from the list given below)

1. Rectangle Class (page 494 GB)
2. Complex class for performing arithmetic with complex numbers (page 449 DD)
3. Class called Rational for addition, subtraction & multiplication (page 449 DD)
4. Time Class (page 502 GB) / Date class
5. Function overloading: Absolute value of integer, float, double
6. Operator overloading – Unary operators prefix/postfix
7. Operator overloading – Binary operators – Addition of distances (Robert Lafore)
8. Rectangle to Polar Co-ordinate conversion & vice versa. (Robert Lafore – 2 Dimension)
9. Functionality of INT (refer Robert Lafore)
10. Inheritance problems (Garry Bronson – Base class circle, Derived class – cylinder)
11. Quadratic equation using Object Oriented techniques
12. Traffic lights ( ref. Garry Bronson)
13. Polymorphism and Virtual function problems. (Garry Bronson)

### **Demonstration Experiments: (Any four)**

- Microprocessor 8085 timing diagram
- Interfacing through 8255
- Interfacing PC with real world using parallel port. Linkage with temperature, light, EM relays, stepper motor, D.C. motor, solenoid, seven segment display, etc.
- Installation of device drivers (e.g. Web Cam., joystick, mouse...)
- Microprocessor simulation on PC using 8085 simulator floppy disk from Gaonkar textbook
- Internet usage ( Physics search/Technical literature)
- VB program demo
- Graphics with C++



GB: Garry Bronson  
DD: Deital & Deital  
RL: Robert Lafore

**Practical Examination:**

- 1. Practical I Part A (15 marks) – Access/ Linux  
Part B (15 Marks) - Microprocessor

Total 30 Marks ( 3 hours)

- 2. Practical II Part A ( 15 Marks) Structured programming using C++  
Part B (15 Marks) OOP using C++

Total 30 Marks (3 hours)

**Note:** Algorithms ,Flowchart optional. Printout of source code and output compulsory.

**Note :** For both practical papers there is no time differentiation between part A and B

## T.Y.B.Sc.

PROPOSED SYLLABUS (with effect from 2010-11 )

### APPLIED COMPONENT - ELECTRONIC INSTRUMENTATION

The revised syllabus in the subject of Electronic Instrumentation (Applied Component) for Third Year B.Sc. Physics (Single/Double major subject) will be implemented from the academic Year 2010-11.

The scheme of examination in the subject of Electronic Instrumentation will be as follows:

#### SCHEME OF EXAMINATION ELECTRONIC INSTRUMENTATION

Paper	Section	Title	Marks
Paper E.I.- I	----	Analog Circuits and Instruments	60
Paper E.I.- II	----	Digital Electronics, Microprocessor and its applications, Programming in C++	60
Practicals		Practical Paper EIP- I	30
		Practical Paper EIP- II	30
		Certified Journal	10
		Viva Voce	10

Total Marks: Theory: 120

Practical: 80

-----  
Total 200

N.B.

- Duration of each Theory paper will be of 3 Hours.
- Duration of each Practical paper will be of 3 Hours.
- A certified Journal of Electronic Instrumentation must contain a minimum of 16 Experiments with at least 8 from each practical paper. At least TWO experiments from each sub group as mentioned in the syllabus should be performed.
- Every candidate will be required to perform two experiments, one from each Practical paper.
- A candidate will be allowed to appear for the Practical Examination only if the candidate submits his/her certified Journal or a certificate from the Head of the Department of Physics stating that the candidate has completed the practical Course of Electronic Instrumentation as per requirements.
- Each theory paper shall consist of five questions, one from each unit and the fifth question will be from all the units. All questions are compulsory and will have internal choice.
- Two periods per week per theory paper and four periods per week per practical batch are to be allocated in the work load.

## PAPER – I: ANALOG CIRCUITS AND INSTRUMENTS

### Unit 1: Electronic Components, Transducers and Display Devices (15 Lectures)

[ Review of passive components: resistor, capacitor, and Inductor  
Ref. BKG: 1.4 & 1.4.1 Introduction to Transducers Ref. K: 1.3.1 & 1.3.2 ]

(i) Temperature measurements:

Resistance thermometer, thermocouple & thermistor.

Ref. H & C: 11.5.1, 11.5.2 & 11.5.4

(ii) Pressure & Displacement Transducers:

Strain Gauges (derivation of gauge factor is not expected), LVDT, Capacitive transducers, Load Cell.

Ref. K: 13.6, 13.11, 13.13 & 13.14

(iii) Optical Transducers & display devices: LED, LCD, and Dot Matrix Display.

Seven segment LED display, BCD to seven segment decoder / driver, Liquid crystal displays.

Ref. K: 13.16, 2.10, 2.11 & 2.12.4

T: 6.6, 6.8, 6.9

### Unit 2: Measuring Instruments

(15 Lectures)

(i) Cathode Ray Oscilloscope:

Introduction, CRO block diagram, CRT connection, Vertical amplifier, Basic function of sweep generator, Horizontal deflection system, Triggered sweep, Trigger Pulse, Delay line.

Probes: - 1:1 probe, 10:1 probe, Attenuators (Uncompensated and Compensated), Dual trace CRO

Ref. K: 7.1, 7.4, 7.12, 7.6, 7.3.1, 7.7, 7.8, 7.9, 7.10, 7.28.1, 7.28.2, 7.29, 7.29.1, 7.29.2 & 7.15

(ii) Analog Electronic Multimeters:

Transistor voltmeter, Solid state (Op Amp based) voltmeter

Ref. K: 4.7 & 4.9

(iii) Digital Instruments:

D/A Conversion, Variable (weighted) resistor and Binary Ladder (4bit) type D/A Converters.

Ref. M&L: 12.1 & 12.2

DMM, 3 ½ Digit, resolution and sensitivity, general specification

Ref. K: 6.2, 5.8, 5.9 & 5.10.

### Unit 3: Signal Generation and Signal Conditioning

(15 Lectures)

(i) Signal generators and Clippers using op-amps and 555 timer applications:  
Oscillators: Wien bridge Oscillator, Triangular Wave generation, Sawtooth wave-generation and Square-triangular wave generator using op-amp.  
Positive and Negative Clippers using Op-amp.  
555 Timer applications: Tone Burst Oscillator (Temperature to frequency conversion) Voltage controlled frequency shifter.

Ref. G: 7.13, 7.16, 7.17 & 8.12.1.  
C & D: 13.4.1 & 13.4.2

(ii) Instrumentation Amplifier & its applications:  
Basic Instrumentation Amplifier, Instrumentation system, Applications of Instrumentation Amplifier, Temperature indicator, light intensity meter, analog weight scale.

Ref. K: 14.3, 14.3.2, 14.4, 14.4.1, 14.4.2, 14.4.3

(iii) Active filters:

Introduction, Active Filters, 2<sup>nd</sup> order Low Pass Butterworth filter, 2<sup>nd</sup> order High Pass Butterworth filter, Band pass Filters, wide band pass filter, wide band rejection filter and narrow band rejection filter.

Ref. G: 7.1, 7.2, 7.4, 7.6, 7.7, 7.8, 7.8.1, 7.9.1 & 7.9.2

### UNIT 4: Power Supplies

(15 Lectures)

(i) Linear and switching regulators

Adjustable Positive Voltage Regulator (LM 317), Adjustable Negative Voltage Regulator (LM 337), Formation of adjustable bipolar voltage regulator using LM317 and LM337. Fixed output voltage regulator with current booster.

Ref. C & D: 16.11, 16.12, 16.13

Ref. M: 24.5

Constant current source (ground load) using OP-Amp and pnp transistor

Ref C & D: 5.5.2

Basic and Monolithic Switching regulators (buck, boost and buck-boost) (Only basic Configurations)

Ref M: 24.7

## References:

1. BKG: Basic Electronics and Linear Circuits by N. N. Bhargava, D. C. Kulshreshtha and S. C. Gupta. Technical Teachers training Institute, Tata McGraw Hill Publishing Company Limited.
2. H & C: Modern Electronic Instrumentation & Measurement Techniques by Albert D. Helfrick & William D. Cooper (PHI) Edition.
3. K: Electronic Instrumentation by H. S. Kalsi, 2nd Edition, Tata McGraw Hill.
4. T: Digital electronics by G. L. Tokheim (6th Edition) (Tata McGraw Hill)
5. C & D: "OPAMPs and linear integrated circuits" by Coughlin & F. F. Driscoll (6<sup>th</sup> Edition), Eastern Economy Education, PHI.
6. G: OPAMPs & linear integrated circuits by R. A. Gayakwad, (4<sup>th</sup> Edition, PHI)
7. M: "Electronic Principles" by A. P. Malvino (6<sup>th</sup> edition, PHI).
8. M & L: Digital Principle & Applications" by Malvino & Leach (6<sup>th</sup> edition, TMH)

## Additional References:

H & H: The Art of Electronics, by Paul Horowitz & Winfield Hill (2nd Edition)



## PAPER II

### Digital Electronics, Microprocessor and its applications, Programming in C++ (15 lectures)

#### Unit 1 Digital Electronics

Tri-State Devices, Buffers, Decoders, Encoders, Latch.

Ref: RG: 3.5, 3.5.1, 3.5.2, 3.5.3, 3.5.4 & 3.5.5

Multiplexers, Their use in Combinational Logic design, multiplexer tree, De-multiplexers, Their use in Combinational Logic design, De-multiplexer tree.

Ref: RPJ: 6.2.1, 6.2.2, 6.3.1 & 6.3.2

Memory Classification, Charge Coupled Device memory.

Ref: RG: 3.2.7. and RPJ: 11.9.1, 11.9.2 & 11.9.3

#### Unit 2 8085 Microprocessor and Basic Assembly Language Programming-I (15 lectures)

Introduction, Historical Perspective, Organization of a Microprocessor Based system, How does the Microprocessor works, Machine Language, Assembly Language, Writing and executing an Assembly Language Program, High Level Languages.

Ref: RG: 1.1, 1.1.2, 1.1.3, 1.2 (Omit - 1.2.4)

8085 Bus Organization, 8085 Hardware model, 8085 Programming Model, The 8085 Microprocessor, Microprocessor Communication and Bus Timings, De-multiplexing of Address and Data Bus, Generating Control Signals. A detailed look at 8085 Microprocessor.

Ref RG: 3.1.1, 2.1.1 & 2.1.2, 4.1.1, 4.1.2, 4.1.3, 4.1.4, 4.1.5

Instruction, Instruction Word Size, Opcode Format Ref: RG: 2.3.1 & 2.3.2, Addressing Modes Ref: RG: 6.1.1. The 8085 Instruction Set (Classification) Ref: RG: 2.2.1, Data transfer Operations Ref: RG: 6.1, 7.2.1, 7.2.2 & 7.3.3, Arithmetic Operations Ref: RG: 6.2, 7.2.4 & 7.3.1,

#### Unit 3 Basic Assembly Language Programming-II and 8255 PPI (15 lectures)

Logical Operations Ref RG: 6.3, 7.4 & 7.5, Branch Operations Ref: RG: 6.4, 9.2 {Omit - 9.2.1, 9.2.2} & 9.3 Stack Ref: RG: 9.1, Introduction to Advanced Instructions Ref RG: 10.7, Flowchart Ref: RG: 6.1.2  
IC 8255 (PPI): Block diagram of the 8255A, Mode 0: Simple Input or Output, BSR (Bit Set/Reset) Mode. Ref: RG: 15.1.1, 15.1.2, & 15.1.3



**Unit 4 Basic Concepts of Object Oriented Programming and C++ (15 lectures)**  
 (1) **Basics of Object-Oriented Programming & Beginning with C++:**  
 A look at Procedure-Oriented Programming, Object-Oriented Programming Paradigm, Basic concepts of Object-Oriented Programming, Benefits of OOP, Object-Oriented Languages, Applications of OOP.  
 What is C++?, Applications of C++, A simple C++ program, More C++ Statements, Example with Class, Structure of C++ Program, Creating the Source File, Compiling and Linking.  
 Ref EB: 1.3, 1.4, 1.5, 1.6, 1.7 & 1.8  
 EB: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7 & 2.8

(2) **Tokens, Expressions and Control Structures:**  
 Introduction, Tokens, Keywords, Identifiers and Constants, Basic Data Types, User-Defined Data Types, Derived Data Types, Symbolic Constants, Type Compatibility, Declaration of Variables, Dynamic Initialization of Variables, Reference Variables, Operators in C++, Scope Resolution Operator, Member Dereferencing Operators, Memory Management Operators, Manipulators, Type Cast Operator, Expressions and Their Types, Special Assignment Expressions, Implicit Conversions, Operator Overloading, Operator Precedence.  
 Ref EB: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.15, 3.16, 3.17, 3.18, 3.19, 3.20, 3.21, 3.22 & 3.23

(3) **Control Statements and Functions:**  
 Control Structures, Functions: The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Arguments, Constant Arguments, Function Overloading, Math Library Functions.  
 Ref EB: 3.24, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9 & 4.11

### Main References:

1. RPJ: Modern Digital Electronics by R. P. Jain, 3<sup>rd</sup> Edition, Tata McGraw Hill.
2. RG: Microprocessor Architecture, programming and Applications with the 8085 by Ramesh Gaonkar, 5<sup>th</sup> Edition, Prentice Hall of India.
3. EB: Object Oriented Programming with C++ by E Balagurusamy, Third /Fourth Edition, Tata McGraw-Hill Publishing Company Limited.

### Additional references:

- 1) Microprocessor and Applications by Vibhute and Borole, Technova Publications, Pune.
- 2) Microprocessor, Principles & Applications by Gilmore (2<sup>nd</sup> Ed) TMH
- 3) Programming with C++ by D. Ravichandran, Tata McGraw-Hill Publishing Company Limited.
- 4) Starting out with C++ by Tony Gaddis, Third Edition, Addison Wesley Publishing Company.

# PRACTICALS

## PAPER I

### GROUP-A

1. Thermistor Characteristics - Thermal and electrical (H & C)
2. Thermistor as sensor in temperature to voltage converter using OPAMP (C&D Ch.8)
3. Basic Instrumentation Amplifier using 3 OpAmps coupled to resistance bridge (C&D Ch.8)
4. Study of LVDT characteristics (K Ch. 13)
5. Study of Load Cell / Strain Gauge (K Ch. 13)

### GROUP-B

**Note: All the B-group experiments should be performed on breadboard**

1. Temperature to frequency Conversion using 555 timer. (C & D Ch. 13)
2. OPAMP D/A Converter weighted resistor / Ladder network (M & L Ch. 12)
3. Positive and Negative Clipper using op-amp. (G Ch. 8)
4. Second Order active Low Pass/High Pass filter (frequency response & phase relation) (K.Ch15)
5. Active Notch Filter (frequency response & phase relation) (K.Ch.15)
6. Square and Triangular wave generator using OPAMPs with concept of duty cycle. (M.Ch 23)

### GROUP-C

1. Adjustable Voltage Regulator using LM 317. (C&D Ch 14)
2. Adjustable constant Current Source using LM 317.
3. Constant Current source using OPAMP and PNP transistor (o/p current less than 50 mA) (C & D Ch 5)
4. Study of Monolithic IC regulator. (M Ch.24)
5. Study of variable dual power supply LM 317 & LM 337 ( $\pm 3v$  to  $\pm 15v$ ). (C & D Ch. 13)

**References:**

1. H & C : Modern Electronic Instrumentation & Measurement Techniques  
By Albert D. Helfrick & William D. Cooper (PHI) EEEdition
2. C & D : "OPAMPs and linear integrated circuits" by Coughlin & F. F. Driscoll (6<sup>th</sup> edition PHI)
3. G: OPAMPs and linear integrated circuits by R.A. Gayakwad (4<sup>th</sup> edition, PHI)
4. M : "Electronic Principles" by A. P. Malvino (6<sup>th</sup> edition, PHI)
5. K : Electronic Instrumentation by H. S. Kalsi (TMH) 2<sup>nd</sup> Edition
6. M & L : Digital Principle and Applications" by Malvino and Leach (5<sup>th</sup> edition, TMH)
7. RPJ : Modern Digital Electronics 3<sup>rd</sup> edition (TMH) – R .P. Jain

## PAPER - II

### GROUP A

- 1) Study of 3:8 Decoder (74LS138) and study of 8:3 Priority Encoder (74LS148) and their applications.(RPJ)
- 2) Study of Latch (74LS373) and its applications.(RPJ)
- 3) Study of 8:1 Multiplexer (74LS151) and its applications.(RPJ)
- 4) Study of 1: 4 De-multiplexer (74LS155) and its applications.(RPJ)
- 5) Study of ROM and its addressing using decoder.(RPJ & RG)

### GROUP B

#### 8085 Programming

**NOTE:** The students should be familiar with Keyboard and Display utilities such as READ KEYBOARD, TO DISPLAY ON ADDRESS FIELD, TO DISPLAY ON DATA FIELD, mentioned in their 8085  $\mu$ p kit's manual.

- 1) Writing Assembly Language Programs using Direct Register Addressing, Indirect Addressing:-
  - i) To Add 8-bit/16-bit numbers with CARRY. (Display/Store result and Carry)
  - ii) To Subtract 8-bit/16-bit numbers with BORROW. (Display/Store result and Borrow)
- 2) Writing Assembly Language Programs:-
  - i) To accept 4-bit/8-bits numbers from Keyboard, add/subtract and display/store Result, Carry/Borrow
  - ii) To Add a series of numbers. (Display Result and Carry)
  - iii) To multiply two, 8 - bit numbers (Using Direct Register Addressing, Indirect Addressing) and Display result.
- 3) Writing Assembly Language Programs:-
  - i) To transfer a series of block of data from Source to Destination.
  - ii) To find odd/even numbers from a series of block of data. (Display result)
- 4) Writing Assembly Language Programs:-
  - i) To find positive/negative nos. from a series of block of data. (Display result)
  - ii) To find maximum/minimum from a series of block of data. (Display result)
- 5) Writing Assembly Language Programs:-
  - i) To divide two, 8 - bit nos. (Display Quotient and Remainder)
  - ii) To arrange, 8 - bit nos. in ascending/descending order.

**Ref: Same books as in Theory Paper II**

**GROUP C**  
**C++ Programming**

- 1) Program based on Input, Output Statements.  
(Programs to read any two numbers through keyboard and to perform simple arithmetic operations and to display the result)
- 2) Program based on Control Statements
  - i) Program based on if-else statement
  - ii) Program based on nested if statement
- 3) Program based on for loop, while loop and do-while loop.
- 4) Program using switch statements and if-else ladder.
- 5) Program to study function declaration, function calling and function prototype.

**Ref: Same books as in Theory Paper II**





UNIVERSITY OF MUMBAI  
No. UG/176 of 2010

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the T.Y.B.A. degree course vide this Office Circular No.UG/389 of 2005, dated 20<sup>th</sup> September, 2005 and the Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Board of Studies in Sanskrit, Pali and Prakrits at its meeting held on 10<sup>th</sup> November, 2009 has been accepted by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 vide item No. 4.18 and that, in accordance therewith, the syllabus for T.Y.B.A. in the subject of Sanskrit (Paper-IV, V, VI, VII, VIII & IX) is revised as per Appendix and that the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
13<sup>th</sup> July, 2010

L.R.Mane  
Offg. Registrar

To,

The Principals of the affiliated Colleges in Arts and the Professor-cum-Director, Institute of Distance and Open Learning

A.C./4.18/3/03/2010

\*\*\*\*\*

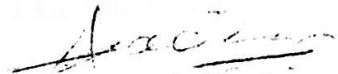
No. UG/176-A of 2010,

MUMBAI-400 032

13<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Arts,
- 2) The Chairperson, Board of Studies in Sanskrit, Pali and Prakrits,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

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The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section (5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum-Director, Institute of Distance and Open Learning, Faculty of Arts, University Computerization Centre (IDE Building), Vidyanagari, the Assistant Registrar, Academic



Enclosure to Item No. 4.18

03.03.2010

UNIVERSITY OF MUMBAI



**REVISED SYLLABUS**

**AT**

**T.Y.B.A.**

**IN THE**

**SUBJECT**

**OF**

**SANSKRIT**

**(Papers – IV, V, VI, VII, VIII & IX)**

**(With effect from the academic year 2010-2011)**

UNIVERSITY OF MUMBAI  
T.Y.B.A. (Third Year B.A.) Course – SANSKRIT

Paper IV –

**Philosophical Literature**

80/100Marks

Texts

I- ब्रह्मसूत्रशांकरभाष्यम् ( II.I.1-3; II.II.1-9)

40Marks

II- तर्कसंग्रहः (Introduction to न्याय-वैशेषिक philosophy;  
Text of तर्कसंग्रह without हेत्वाभासाः)

40 Marks

Viva based on the related topics.

20Marks

Unit I – Introduction, ब्रह्मसूत्रशांकरभाष्यम् II.I.1-3

Unit II – ब्रह्मसूत्रशांकरभाष्यम् II.II.1-9

Unit III – Introduction to तर्कसंग्रह,

Unit IV – सप्तपदार्थ and प्रमाणविचार

20 Marks

Unit V – Viva

History of Vedic and Classical Sanskrit Literature

100Marks

Unit I – Vedic literature

25 Marks

- 1) ऋग्वेद – A) Arrangement and Classification of the hymns,  
B) Deities-General nature and special features,  
C) Social life
- 2) अथर्ववेद – Names and Subject-matter
- 3) ब्राह्मण Literature – Nature and Importance
- 4) उपनिषद् Literature – Nature and Importance

Unit II – Classical Sanskrit Literature (Drama)

25 Marks

- १) भाससमस्या, भास- शोकान्तिका (उरुभङ्गम् – कर्णभारम्)
- 2) कालिदास – अभिज्ञानशाकुन्तलम् 3) शूद्रक – मृच्छकटिकम्
- 4) विशाखदत्त – मुद्राराक्षसम् 5) भवभूति – उत्तररामचरितम्

Unit III – Classical Sanskrit Literature (Poetry)

25Marks

- 1) भारवि – किरातार्जुनीयम् 2) माघ - शिशुपालवधम्
- 3) हर्ष - नैषधीयचरितम् 4) भर्तृहरि – शतकत्रयी
- 5) शंकराचार्यस्तोत्राणि 6) कल्हण - राजतरङ्गिणी

Unit IV - Classical Sanskrit Literature (Prose and चम्पू)

25 Marks

- 1) बाणभट्ट – कादंबरी 2) बाणभट्ट – हर्षचरितम्
- 3) गुणाढ्य – बृहत्कथा 4) दण्डी – दशकुमारचरितम्
- 5) वेङ्कटाध्वरि - विश्वगुणादर्शचंपू 6) विष्णुशर्मा-पञ्चतन्त्र, नारायणपंडित – हितोपदेश

### Books Recommended –

- 1) Winternitz M., History of Indian Literature, Reprint, Delhi, 1998
- 2) Dasgupta S.N., A History of Sanskrit Literature, 2<sup>nd</sup> ed. Calcutta, 1962
- 3) Max Muller F., A History of Ancient Sanskrit Literature,  
Reprint, Varanasi, 19968
- 4) Dange S.S., Bharatiya Sahityacha Itihasa, Nagpur, 1975
- 5) Upadhyay Baladev, Sanskrit Sahityaka Itihasa, Benares, 1945
- 6) Gokhale-Mahulikar-Vaidya, Abhijata Sanskrit Sahityacha Itihasa,  
Mumbai, 2004

### Paper Pattern

- |   |          |
|---|----------|
| Q.1) Full question/ paragraphs with internal option (Unit 1)  | 20 Marks |
| Q.2) Full question/ paragraphs with internal option (Unit II)   | 20 Marks |
| Q.3) Full question/ paragraphs with internal option (Unit III)  | 20 Marks |
| Q.4) Full question/ paragraphs with internal option (Unit IV)   | 20 Marks |
| Q.5) Objective questions on all four units combined<br>to be answered in <b>Sanskrit</b> any ten out of twelve. | 20 Marks |

Paper VI

**Ancient Indian State-Craft**

80/100Marks

Texts:

- A) कौटिलीय अर्थशास्त्र (Selected Portion) 40 marks
- B) Study of three inscriptions 40 Marks
- C) Project/ Assignment based on self study and library Work relating to the topics 20 Marks

Unit I – Introduction to कौटिलीय अर्थशास्त्र,  
कौटिलीय अर्थशास्त्र - I.2-8, 11-12

Unit II - कौटिलीय अर्थशास्त्र - VI.1-2  
कौटिलीय अर्थशास्त्र - VII.I. 1-19

Unit III – Introduction to Epigraphic Literature,  
Junagadh Rock Inscription of Rudradaman

Unit IV – Allahabad Stone-pillar Inscription of Samudragupta,  
Aihole Inscription of Pulakes'i II

**Books recommended –**

- 1) Kangale R.P., Kautiliya Arthas'astra (Marathi Translation), Reprint, Mumbai, 1982
- 2) Kangale R.P., Kautiliya Arthas'astra (English Translation), Vol. I-III, 2<sup>nd</sup> ed., Bombay, 1969
- 3) Hivargaonkar B.R., Kautiliya Arthas'astra, 3<sup>rd</sup> Reprint, Pune, 1993
- 4) Gokhale Shobhana, Purabhilekha Vidya, Nagpur, 1975
- 5) Jha Ramakant-Jha Harihar, Abhilekhamala, 6<sup>th</sup> ed. Varanasi, 1953

**Paper Pattern**

- Q.1 Translate adding explanatory notes any two out of four 14Marks
- Q.2 a) RTC – two out of four 10Marks  
b) Critical paragraphs – two out of four 16Marks
- Q.3 Translate adding explanatory notes any two out of four (Inscriptions) 14Marks
- Q.4 a) RTC – two out of four (Inscriptions) 10Marks  
b) Critical paragraphs – two out of four (Inscriptions) 16Marks
- Q.5 (For I.D.E.Students only)
- a) A general question/ paragraphs with internal option (Unit I and II) 10Marks
- b) A general question/ paragraphs with internal option (Unit III and IV) 10Marks



Paper VII

Vedic Literature

80/100 Marks

Texts:

I - ऋग्वेद

II - शतपथब्राह्मण, जैमिनीयब्राह्मण

III - ईशावास्योपनिषद्

IV - तैत्तिरीयोपनिषद्,

Viva based on related topics

20Marks

Unit I - Selected Hymns from the ऋग्वेद -

50 Marks

(अग्नि) I.143; (इन्द्र) II.12; (विश्वामित्र-नदी) III.33; (पर्जन्य) V.83;  
(अश्विनौ) VII.71; (उषस) VII.75; (वरुण) VII.86; (मण्डूक) VII.103;  
(अक्ष) X.34; (राजयक्ष्मघ्न) X.161

Unit II - Selected passages from ब्राह्मण-s

15 Marks

शतपथब्राह्मण (XI.5.1); जैमिनीयब्राह्मण (II.438-440)

Unit III - Selected passages from उपनिषद्-s

15 Marks

ईशावास्योपनिषद् (complete);  
तैत्तिरीयोपनिषद्, I.xi.1-4; III.i.1-6

Unit IV - Viva

20 Marks

### Books Recommended –

- 1) Velankar H.D., Ruksuktashati, Bombay, 1972
- 2) Velankar H.D., Ruksuktavaijayanti, Pune, 1965
- 3) Radhakrishnan S., Principal Upanisads, London, 1953
- 4) Swami Gambhirananda, Eight Upanisads, Calcutta, 1957
- 5) Dange S.A. Divine Hymns and Ancient Thought, Vols. I-II, New Delhi, 1995

### Paper Pattern

- Q.1 a) Translation and annotation – any two out of four 16 Marks  
b) RTC – any two out of four 12 Marks
- Q.2 a) 1) Give पदपाठ of one of the verses asked in Q.1) (a). 06 Marks  
2) Recognize forms any three out of six 06 Marks  
OR
- a) Appreciation of a hymn 12 Marks  
b) Characteristics of a Vedic deity 10 Marks
- Q.3 RTC/paragraphs any two out of four (ब्राह्मण-s) 15 Marks
- Q.4 RTC/ paragraphs on any two out of four (उपनिषद-s) 15 Marks
- Q.5 (For I.D.E. students only)  
A general question with internal option 20 Marks

Grammar and Language Skills

100 Marks

Text:

लघुसिद्धान्तकौमुदी – (Edited by M. D. Sathe) (Selected portion)

Unit I - संज्ञाप्रकरण, विभक्त्यर्थप्रकरण

25 marks

Unit II - Selected aphorisms from सन्धिप्रकरण –s (with application) –  
15,19,22,25,27,28,32,33,41,61,63,  
66,67,73,76,78,92,95,100,102.

15Marks

Unit III – Relation of संस्कृत to modern Indian languages through  
the stages of प्राकृत and अपभ्रंश

20Marks

Unit IV – Translation - संस्कृत into मराठी or English (prose and poetry)

OR

Essay in संस्कृत

20Marks

Unit V - Comprehension

OR

Story-writing in संस्कृत (with given clues)

10 Marks

Unit VI - Letter-writing/ News-writing/ dialogue-writing  
in संस्कृत (on given subject)

10 Marks

## Books Recommended For Study -

- 1) Sathe M.D., Laghusiddhantakaumudi, Pune, 1961
- 2) Mule Ravindra, Sanskrit Vyakaranashastra Pravesh, Sangamner, 2004
- 3) Pandit M.D. Prachina bharatiya Bhashashastra, Pune, 2000
- 4) Woolner A.C. Introduction To Prakrit, Reprint, Delhi, 1996
- 5) Kalelkar N.G. Bhasha Ani Sanskriti, Mumbai, 1982
- 6) Apte V.M. Sanskrit composition, 26<sup>th</sup> ed. Varanasi, 1970

## Paper Pattern

- Q.1 – Explain any four aphorisms out of six 16 Marks
- Q.2 a) short notes – any two out of four 05 Marks  
b) Explain विभक्ति - any two out of four 04Marks
- Q.3 – Dissolve सन्धि with appropriate aphorism  
(any five from the given paragraph) 15 Marks
- Q.4 – Write paragraphs on any two out of four 20 Marks
- Q.5 - Translate into मराठी or English –  
a) Prose paragraph 12 Marks  
b) Poetry (four verses) 08 Marks
- Q.6 (a) Comprehension  
OR  
Story-writing in संस्कृत (with given clues) 10 Marks  
(b) - Letter-writing/ News-writing/ dialogue-writing  
in संस्कृत (on given subject) 10 Marks

**Scientific Literature, Rapid Reading and  
Modern Sanskrit Literature**

80/100Marks

Unit I – Introduction to the following sciences –

- 1) Manuscriptology
- 2) Archaeology
- 3) Numismatics
- 4) Ayurveda

30 Marks

Selected terms related to the above sciences (list attached)

Unit II – Rapid Reading – Selected chapters from -

30Marks

A) विवेकानन्दचरितम् - by G.B.Palsule, शारदा गौरव ग्रंथमाला, पुणे-

- 1)जन्म, २) बाल्यम्, 3)अथातो देवजिज्ञासा, 4)गुरुशिष्ययोः प्रथममेलनम्,
- 5) तत्त्वज्ञशिक्षया अभ्यासः, 6)अमेरिकाप्रयाणम्, 7)सर्वधर्मपरिषद्

B)भूलोकविलोकनम् – by P.N.Kavthekar, Nag Publishers,Delhi-

- 1)सम्मानयात्रा हि विमानयात्रा, 2)विमानबाला-व्योमबाला, 3)विमानवातायनतः,
- 4) मोनालिसा, 5)वर्सेलिसवर्णनम्, 6)लन्दनं नन्दनं भुवः

Unit III – Introduction to modern Sanskrit Literature

20 Marks

Study of the following writers –

- 1) S.B. Varnekar
- 2) S. B. Velankar
- 3) G B. Palsule
- 4) Prabhakar Kavthekar

20 Marks

Unit IV – Project/ Assignment

## Books Recommended For Study –

- 1) Dev S.B., Puratattvavidya, Pune, 1976
- 2) Dhavlikar M.K., Prachina Bharatiya Nanakashastra, Pune, 1975
- 3) Ray H.P., Coins In India, Mumbai, 2006
- 4) Contemporary Indian Literature (A Symposium), Sahitya Akademi, 4<sup>th</sup> ed., Mumbai, 1981
- 5) Varnekar S.B. Arvachina Sanskrit Sahitya, Nagpur, 1963
- 6) Satyavrat Usha, Sanskrit Dramas In Twentieth Century, Delhi, 1971

## Paper Pattern

- |   |          |
|---|----------|
| Q.1 a) Write paragraphs on any two out of four  | 20 Marks |
| b) Give संस्कृत equivalents to English terms<br>(related to Unit I) any five out of ten | 10 Marks |
| Q.2 a) Summarize in संस्कृत any one chapter out of three-<br>(विवेकानन्दचरितम्)         | 15Marks  |
| b) Write paragraphs on (भूलोकविलोकनम्)-<br>any two out of four                          | 15Marks  |
| Q.3 – Write paragraphs on any two out of four   | 20 Marks |
| Q.4 (for I.D.E. students only)<br>A general question with internal option               | 20 Marks |
-



**Selected Terms Related To The selected Sciences**  
(Manuscriptology, Archeology, Numismatics, Ayurveda)

**Manuscriptology-**

1. Curator – अवेक्षकः
2. Birch Bark – भूर्जपत्रम्
3. Palm Leaf – तालपत्रम्
4. Handmade Paper – हस्तकर्गजः
5. Accession Index – अभ्युपगमसूचिः
6. Alphabetical Index – वर्णक्रमसूचिः
7. Classified Catalogue – विषयक्रमसूचिः
8. Textual Criticism – ग्रन्थचिकित्साशास्त्रम्
9. Paleography – लिपिशास्त्रम्
10. Stylus – कीलः
11. Brush – तूलिकः
12. Copyist – अनुलेखकः
13. Interpolated – प्रक्षिप्तम्
14. Corrupt copy – भ्रष्टलेखः
15. Collation – शोधनम्

**Archeology**

1. Excavation - उत्खननम्
2. Fossil - अश्मास्थि
3. Clay-tablet – मृद्वर्तिका
4. Relative Dating – सापेक्षकालमापनम्
5. Site-plan – स्थल-आलेखः
6. Stone-circle – शिलावर्तुलम्
7. Pottery – मृद्भाण्डम्
8. Layer – स्तरः
9. Copper- hoard – ताम्रनिधिः
10. Stone-age – अश्मयुगम्
11. Weathered – निसर्गहतम्
12. Water-worn – जलजीर्णम्
13. Protohistoric Period –  
प्रागैतिहासिककालः
14. Pit-dwelling – गर्तवासः
15. Lake-dwelling – सरोनिवासः

## Numismatics

1. Coinage - नाणकानि
2. Barter - वस्तुविनिमयः
3. Bent-bar - वक्रपट्टः
4. Punch-marked Coins - आहतनाणकानि
5. Souvenir Coins - स्मारकनाणकानि
6. Mint - टङ्कशाला/ मुद्राङ्कनशाला
7. Mint-master - टङ्काध्यक्षः
8. Mintage - मुद्राङ्कनम्
9. Currency - प्रचलितमुद्रा
10. Engraving - मुद्रणम्/ तक्षणम्
11. Obverse - अग्रभागः/ मुखम्
12. Reverse - पृष्ठभागः/ पृष्ठम्
13. Engraver - तष्टा
14. Portrait Coins - आलेख्यनाणकानि
15. Over-striking - पुनर्मुद्राङ्कनम्

## Ayurveda

1. Diagnosis - निदानम्
2. Surgery - शल्यक्रिया
3. Toxicology - अगदतन्त्रम्
4. Plastic-surgery - त्वग्रोपणम्
5. Probing - शालाक्यतन्त्रम्
6. Medicinal Herbs - वनौषधयः
7. Pediatrics - कौमारभृत्यम्
8. Thrombosis - रक्तवाहिनीबन्धनम्
9. Pharmacology - रसशास्त्रम्
10. Therapeutics - चिकित्साशास्त्रम्
11. Infection - जन्तुसंसर्गः
12. Bone-fracture - अस्थिभङ्गः
13. Digestion - पचनम्
14. Antiseptic - पूतिनाशकः
15. Nursing - रुग्णपरिचर्या

—XOX—

UNIVERSITY OF MUMBAI  
No. UG/ 178 of 2010

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabubs relating to the B.Sc. degree course vide Pamphlet No.151 and to this office Circular No.UG/343 of 2004, dated 16<sup>th</sup> August, 2004 and the Principals of the affiliated Colleges in Science are hereby informed that the recommendation made by the Board of Studies in Zoology at its meeting held on 11<sup>th</sup> January, 2010 has been accepted by the Academic Council at its meeting held 3<sup>rd</sup> March, 2010 vide item No.4.61 and that, in accordance therewith, the syllabus for the T.Y.B.Sc. Examination in the subject of Zoology is revised as per Appendix and that the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
13<sup>th</sup> July, 2010

J. R. Mane  
Offg. Registrar

To,  
The Principals of the affiliated Colleges in Science.

A.C./4.61/03/03/2010

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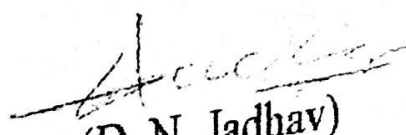
No. UG/178-A of 2010,

MUMBAI-400 032

13<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Science,
- 2) The, Chairman, Board of Studies in Zoology,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

**UNIVERSITY OF MUMBAI**



**Revised Syllabus**  
**for the**  
**T.Y.B.Sc. Examination**  
**in**  
**Zoology**

**(with effect from the academic year 2010 - 2011)**

# REVISED SYLLABUS OF T.Y. B.Sc. ZOOLOGY (w.e.f. from the academic year 2010-11)

## Preamble

Board of Studies in Zoology during its meeting held on 1<sup>st</sup> August 2008 constituted a committee of board members and senior teachers from various colleges to revise the syllabi of F.Y., S.Y. and T.Y. B. Sc. The committee revised the syllabi of F.Y. and S.Y B.Sc. and implemented the same from academic year 2008-09 and 2009-10 respectively after proper approval of concerned authorities of the university. Then committee has prepared the draft of revised syllabus for T.Y.B.Sc. The draft syllabus was circulated among the heads and senior teachers of Zoology department for approval and suggestions. A special meeting of senior teachers and head of the departments was called on 5<sup>th</sup> December 2009 to finalize the syllabus. After debate on various topics of the syllabus, necessary changes incorporated in the syllabus. The Board of studies in Zoology approved the syllabus in the meeting held on 11<sup>th</sup> January 2010 and resolved to implement the revised syllabus of T.Y. B.Sc. Zoology and made effective from the academic year 2010-11.

# Revised Syllabus of T.Y.B.Sc. Zoology

## Effective from the Academic year 2010-11

### PAPER-I:

Unit 1: Animal types: Type Study	
a) Invertebrate: Sepia	30 Lectures
b) Vertebrate: Shark	
Unit 2: Comparative Chordate Anatomy	30 Lectures
Unit 3: Developmental Biology	30 Lectures
Unit 4: Histology and Endocrinology	30 Lectures

### PAPER-II

Unit 1: Physiology	30 Lectures
Unit 2: Homeostasis and Regulation	30 Lectures
Unit 3: Haematology	30 Lectures
Unit 4: Immunology	30 Lectures

### PAPER III

Unit 1: Molecular Biology	30 Lectures
Unit 2: Biotechnology	30 Lectures
Unit 3: Genetics and Evolution	30 Lectures
Unit 4: Toxicology	30 Lectures

### PAPER IV

Unit 1: Environmental Science	30 Lectures
Unit 2: Environmental Biology	30 Lectures
Unit 3: Epidemiology	30 Lectures
Unit 4: Biostatistics	30 Lectures



Notes:

1. Theory paper I and II and Practical I and II are to be studied by the students opting for 3 units and for 6 units students all the four papers and practical are compulsory.
2. Two short and one long excursion for habitat studies/visits to institutes of educational interest are compulsory.
3. Field work of not less than eight hour duration is equivalent to one period per week for a batch of 15 students.
4. A candidate will be allowed to appear for the practical examination only if he/she submits a journal of T.Y. B.Sc. Zoology certified by the Head of the department/Institute. In case of loss of journal, a candidate must produce a certificate from the Head of the Department/Institute that the practical for the academic year were completed by the student. However, such a candidate will be allowed to appear for the practical examination but the marks for the journal will not be granted

### PAPER-I

Animal Type, Comparative chordate Anatomy, Developmental Biology, Histology and Endocrinology

#### Unit 1: Study of Animal types

##### 1.1: Invertebrates: Sepia

(30)

Systematic position, habit & habitat, external features, shell, locomotion, digestive system, ink sac, respiratory system, circulatory system, excretory system, reproductive system, nervous system and sense organs, economic importance.

##### 1.2: Vertebrates: Shark

Systematic position, habit & habitat, distribution, external characters, skin, exoskeleton, endoskeleton, digestive system, respiratory system, blood vascular system, nervous system, receptor organs, urinogenital system, copulation, fertilization and development economic importance.

#### Unit 2: Comparative Chordate Anatomy:

(30)

##### 2.1: Structure of integument and its derivatives:

Scales - epidermal & dermal, feathers, hair, beaks, claws, nails, hoofs, horns, antlers, glands.

##### 2.2: Digestive system:

Digestive tube and its evolution , primary divisions of the tube. Tooth structure & position, teeth in lower vertebrates, mammalian dentition.

##### 2.3: Respiratory system:

Skin, gills of cartilaginous & bony fish, lungs in vertebrates.

##### 2.4: Circulatory System:

Evolution of heart, aortic arches, venous, portal and lymphatic systems in vertebrates.

##### 2.5: Nervous system:

Development and differentiation of primary brain vesicles and their cavities, flexures of brain, evolution of cerebral hemispheres & cerebellum with reference to shark, frog, lizard, pigeon & rabbit.

##### 2.6: Urinogenital System:

Archinephros, pronephros, mesonephros, metanephros, structure of nephron, urinogenital ducts, urinary bladder in vertebrates.

### Unit 3: Developmental Biology:

#### 3.1: Frog embryology:

Gametogenesis, Structures of Egg and Sperm, Fertilization, Development in embryonic and post embryonic phases

#### 3.2: Chick Embryology:

Development up to 72 hours of age, extra embryonic membranes.

#### 3.3: Types of placentae:

classification of placentae on the basis of external morphology and histology.  
Extra embryonic membranes in mammal,

#### 3.4: Morphogenesis:

Fate maps, cell differentiation, embryonic stemcells, differential cell affinity, cell adhesion, morphogenetic movements

### Unit 4: Histology and Endocrinology:

#### 4.1: Histology.

Histological structures of the following mammalian organs: stomach, intestine, liver, kidney, testis and ovary.

#### 4.2: Mammalian Endocrinology:

Histology, hormones, functions of hormones and hormonal disorders of the endocrine glands: pituitary, adrenal, thyroid, parathyroid & pancreas.

## PRACTICAL-I

### 1. Sepia:

Dissections: Digestive, Nervous and Reproductive Systems

Mountings: jaws, radula, chromatophores, spermatophores, statocyst.

### 2. Shark:

Dissections: Digestive, Circulatory, Urinogenital systems and Cranial nerves

Mountings: scroll valve, muscles, nerve fiber, cartilage.  
Skeleton

3. Temporary mountings: placoid, cycloid and ctenoid scales of fish.

5. Brain: Comparative study of brains of shark, frog, lizard, bird (pigeon /fowl) & rat.

### 7. Chick Embryology:

Observations: permanent slides of whole-mounts of chick embryo at 18hrs, 22-24 hrs, 36hrs, 48hrs & 72hrs of incubation.

8. Permanent preparation of Chick Embryo - upto 48 hrs of incubation.

9. Study of placentae [observation - specimen and/or slide]

Shark yolk sac placenta, different types of mammalian placentae.

10. Observation of permanent slides:

Mammalian tissues: liver, kidney, testis, ovary, pituitary, adrenal, thyroid and pancreas

## REFERENCE: BOOKS

1. **Invertebrates / Vertebrates and Comparative anatomy**  
Vertebrate comparative anatomy, Function, Evolution: K. V. Kardong, 3rd Ed. Tata McGraw Hill publication.
2. **The life of Vertebrates:** J. Z. Young, ELBS-Oxford Univ. Press.
3. **A Text Book of Zoology:** T. J. Parker and W. A. Haswell, McMillan.
4. **Chordate Zoology:** E. L. Jordan and P. S. Verma, S. Chand & Co.
5. **Invertebrate Zoology:** E. L. Jordan and P. S. Verma, S. Chand & Co.

## Developmental Biology / Embryology

6. **Developmental Biology:** 5th Ed, Scott F. Gilbert, Sinauer Associates Inc. \*
7. **Developmental Biology:** T. Subramoniam, Narosa Publishers.
8. **Chick embryology:** Bradley M. Patten

## Histology / Endocrinology

9. **Bailey's Text Book of Histology,** 6th Ed: Scientific book Agency
10. **General Endocrinology** 3rd Ed,: Turner and Bagnara, Saunders.

## PAPER – II

### Physiology, Haematology and Immunology.

#### Unit 1: PHYSIOLOGY

##### 1.1. Enzyme and enzyme kinetics:

(30)

**Enzyme as biocatalyst,** Concept of activation energy, Chemical structure of enzymes, Nomenclature and classification with numerical code, Brief study of oxidoreductases, transferases, hydrolases, lyases, isomerases and ligases, Co-enzymes, Enzyme specificity, Mechanism of enzyme action;

**Basic principles of chemical kinetics :** (Derivation of Michaelis-Menten equation), Derivation of Lineweaver-Burk equation, plot and its significance, Significance of  $V_{max}$ , Factors affecting/regulating enzyme activity: temperature, pH, substrate concentration, Enzyme activation, Enzyme inhibition and its kinetics, Regulatory enzymes: allosteric and covalently modulated enzymes, Isozymes and their significance.

**1.2. Chemical messengers:** Introduction, concepts and classification; Neurotransmitters & Neurosecretory substance Acetylcholine, catecholamine, Gama-amino butyric acid (GABA), Aspartic acid, Purines-ATP; Mode of working of transmitters; Neurosecretory substances & a brief account of neurosecretory system

#### Unit 2: HOMEOSTASIS AND REGULATION

(30)

**2.1. Homeostasis:** External and Internal environment; Control systems in biology: Feed back mechanisms; Control of blood glucose level as an example

**2.2 Thermoregulation:** Temperature balance: Heat production : Shivering & non shivering thermogenesis, brown fat – special thermogenic tissue in mammals & heat loss; Acclimation and acclimatization; Adaptive response to temperature: Daily torpor, Hibernation, Aestivation

2.3. **Osmotic and ionic regulation:** Maintaining water and electrolyte balance: Ionic regulation in iso-osmotic environment; Living in hypo-osmotic and hyper-osmotic environment, Problems of living in terrestrial environment: water absorption, salt water ingestion and salt excretion, metabolic water and behavioral adaptations.

2.4. **Regulation of blood circulation:** Vascular pumps: Suction pump in open circulation and pressure pump in closed circulation, Heart size (heart mass -  $H_m$ ) in vertebrates, Heart rate frequency ( $H_f$ ) in invertebrates, Cardiac output, Pace maker, Neurogenic and Myogenic hearts; Electrical activity in heart muscles: Electrocardiogram; Chemical and nervous regulation of heart.

2.5 **Regulation of breeding cycle:** Endocrine regulation of male reproductive system, Endocrine regulation of female reproductive system, Types of female reproductive cycles (estrous and menstrual), Endocrine regulation of pregnancy, parturition, and lactation in mammals

### Unit 3: HAEMATOLOGY:

3.1. **Composition of blood:** Plasma proteins, Inorganic constituents, respiratory gases, Organic constituents other than proteins (include Internal secretions, antibodies and enzymes). (25)

#### 3.2. Volume of blood:

Total quantity and regulation, Haemorrhage, Blood transfusion with whole blood and other materials (saline, gum acacia and isinglass).

3.3 **Erythrocytes:** Total count, variation in number and ESR, Abnormalities in form and structure of Erythrocytes, Haemoglobin-structure, function, formation and degradation; Haemolysis (Fragility test), Erythropoiesis, Anaemia.

3.4 **Leucocytes:** Total count, differential count & variation in number, Types of leucocytes and functions, Differential count, Leucopoiesis, Leukemia.

#### 3.5 Blood coagulation and lymph:

Formation of blood platelets (Thrombopoiesis), Clotting mechanism, Bleeding and clotting time, Anticoagulants, Failure of clotting Mechanism.

### Unit 4: IMMUNOLOGY

4.1 **Innate (Nonspecific) Immunity:** Definition and characteristics, Innate immunity at species, race, family and individual levels; Factors influencing the level of innate immunity in an individual: age, hormone and nutrition; Mechanism: First line of defense, Second line of defense, Third line of defense. (45)

4.2 **Acquired (Specific) Immunity:** Definition and characteristics, Important features: Immune memory, Immune specificity & Recognition of non-self; Passive acquired Immunity: Natural & Artificial, Active acquired immunity: Natural & Artificial, Immune system cells: Lymphoid cells: B lymphocytes, T lymphocytes, Null cells & Activities of mononuclear cells: Phagocytosis, Antimicrobial and cytotoxic activities, secretion of factors, Mast cells, Dendritic cells;

4.3 **Organs of the immune system:** Primary lymphoid organs: Thymus, bone marrow, Lymphatic system; Secondary lymphoid organs: Lymph nodes, Spleen, Gut associated lymphoid tissue (GALT) & Cutaneous associated lymphoid tissue

**4.4 Antigens:** Complete antigens and haptens, Determinants of antigenicity: foreignness, molecular size, chemical composition and heterogeneity, susceptibility to tissue enzymes, antigen specificity, species specificity, isospecificity, organ specificity, auto specificity, heterogenic specificity.

**4.5 Immunoglobulin (antibodies):** Basic structure of immunoglobulin Immunoglobulin classes: IgG, IgM, IgA, IgD and IgE, structure and properties.

**4.6 Antigen antibody interactions:** General features of antigen antibody Interactions; Precipitation reactions: Definition, characteristics and mechanisms, in fluids (tube test) and in gels (slide test)-Radial immunodiffusion (Mancini method), Double immunodiffusion (Ouchterlony method), Immunoelectrophoresis Agglutination reactions: Definition, characteristics and mechanisms, Haemagglutination (slide and micro-tray agglutination), Bacterial agglutination (tube agglutination), passive agglutination, Coomb's test and Agglutination inhibition; Complement fixation.

## PRACTICAL-II

### Hematology:

1. Colorimetric estimation of total plasma proteins
2. Separation of plasma proteins by electrophoresis on agarose/PAGE.
3. Estimation of blood glucose by O-Toluidine method
4. Estimation of serum/plasma total cholesterol by  $\text{FeCl}_3$  method.
5. Estimation of serum/plasma total triglycerides by Phosphovanillin method.
6. Enumeration of erythrocytes-total count
7. Enumeration of leucocytes-total and differential count.
8. Estimation of haemoglobin by Sahlis acid haematin method.
9. Study of Lymphoid organs: Lymph node, Thymus and Spleen.
10. Study of Leukemic cells from permanent slide
11. Observation of bone marrow cells.  
(Students are expected to know the preparation of blood report)

### Physiology:

1. Study of Acid phosphatase activity:
  - a) Effect of substrate concentration
  - b) Effect of pH variation
  - c) Effect of enzyme concentration
  - d) Effect of inhibitor
2. To determine specific activity of Acid phosphatase
3. Separation of LDH isozyme by electrophoresis on agarose / PAGE
4. Study of vaginal smear to identify stages of oestrous cycle.
5. Study of human ECG: Normal, Sinus tachycardia, Sinus bradycardia, Ventricular fibrillation.
6. Mounting of nerve cells and neurosecretory cells from cockroach

### Immunology:

1. Latex agglutination test [any available / Rheumatoid Arthritis]
2. Determination of blood group and Rh factor - RA test serum



## REFERENCE:BOOKS

1. Comparative Animal Physiology: P. C. Withers. Thomson Publishing Co.
2. Comparative Animal Physiology: Prosser and Brown
3. Comparative Animal Physiology: Knut Schmidt-Nielson, Cambridge
4. General and Comparative animal Physiology: William Hoar, Prentice Hall.
5. Biochemistry: S. C. Rastogi, Tata McGraw Hill
6. Biochemistry: Lehninger, Nelson and Cox, Worth Publication.
7. Human Physiology, Vol I: Chhatterjee, Central Book Agency.
8. Immunology, 4<sup>th</sup> Ed. Janis Kuby, W. H. Freeman & Co.
9. Immunology, 6<sup>th</sup> Ed. Ivan M. Roitt
10. Immunology, Tizzard, Thomson Publishing Co.
11. Text Book of Microbiology, R. Ananthanarayan, Orient Longman.

## PAPER – III

### Molecular Biology, Biotechnology, Genetics, Evolution and Toxicology.

#### Unit 1. MOLECULAR BIOLOGY

(30)

- 1.1. **The Nature and Properties of the Genetic Material:**
- 1.2. **DNA as genetic material:** Griffith's transformation experiment, Avery, Macleod and McCarty experiment, Hershey-Chase experiment.
- 1.3. **RNA as genetic material:** Singer and Conrat experiment on TMV.
- 1.4. **DNA replication:** Semi conservative nature of DNA replication Meselson and Stahl experiment. Prokaryotic & eukaryotic DNA replication: Semi discontinuous replication Priming, Bi-directional and unidirectional replication, Theta mode of replication in bacteriophages, Enzymes involved in DNA replication.
- 1.5. **Gene Regulation:** a) Control of gene expression in prokaryotes : Lac operon and Trp operon, b) Control of gene expression in Eukaryotes : Heterochromatin & euchromatin, Transcriptional level control [Transcription factors other than those involved in formation of initial complex ; DNA binding domains, Helix turn helix, Zinc fingers, Leucine zipper, HLH (helix – loop-helix) motif] The role of DNA methylation.
- 1.6. **Mutations and mutagenic agents:** Point mutations due to Deletion, Insertion & substitution [Missense, nonsense, frameshift and silent mutations], Tautomerism of bases, Transition and Transversion, Mutagenesis: Effect of ionizing radiations, UV radiation [formation of pyrimidine dimmers], Chemical mutagens Base analogue, alkylating agents, deaminating agents, intercalating agents.
- 1.7. **DNA damage repair mechanisms:** Photoreactivation, Excision repair, Recombination repair & SOS repair.



## Unit 2. BIOTECHNOLOGY:

(30)

- 2.1. **Animal Cell and tissue culture:** Primary and established mammalian cell lines and their characteristics, mass culture & clonal cell culture, density dependent regulation of growth, growth factors; Media for cultivation of mammalian cells: [media containing naturally occurring ingredients : blood plasma, blood serum, tissue extract, complex media] Methodology: Preparation of cells / organs for culture, coverslip culture, Flask & tube culture ; Applications of animal cell culture.
- 2.2. **Hybridoma technology:** Somatic cell fusion, somatic cell genetics, production and applications of monoclonal antibodies.
- 2.3. **DNA finger printing:** PCR, Southern blotting, RFLP; Applications in forensic science, parenthood testing etc.
- 2.4. **Gene manipulation:** Restriction enzymes: Types, characteristics and nomenclature ; Overview of various cloning strategies and characteristics of cloning vehicles ; Insertional inactivation in pBR 322, and pUC series plasmids; Bacteriophage  $\lambda$  as a vector : Insertional and replacement vectors; Reverse transcription, preparation of desired gene [cDNA] using reverse transcriptase.
- 2.5. **Bioinformatics:** DNA databases and protein databases, Primary and Secondary databases ; Broad idea of the services available on the 'NET' namely - Sequence search tools FASTA & BLAST (Basic Local Alignment Search Tool), Data retrieval system Entrez, SRS (Sequence Retrieval System), Literature database: PubMed (Public MEDLINE), Human genetics: OMIM [Online Mendelian Inheritance in Man].

(30)

## Unit 3: GENETICS AND EVOLUTION

(20)

- 3.1. **Genetics:**
  - i] Normal human karyotype: Karyotype preparation and chromosome banding techniques, band numbering scheme; Human genome sequencing and human genome project.
  - ii] Chromosome non-disjunction: Process of non-disjunction and its genetic implications; Non disjunction of autosomes: Trisomy 21, Trisomy 18 & Trisomy 13 syndromes; Non disjunction of sex chromosomes: Turner's and Klinefelter's syndromes, XYY males; Other chromosomal anomalies: Deletions and Duplications with examples; Micro deletions and micro duplications with examples; Translocation Down's syndrome and other translocations; other abnormalities: Inversions, ring chromosomes, polyploidy.
  - iii] Inborn errors of metabolism: The concept of inherited metabolic disease, Genetics of human metabolic diseases: Phenylketonuria, alkaptonuria and albinism, Maternal PKU, G6PD deficiency & variants of G6PD; Complex trait in families: Diabetes mellitus.

### 3.2. EVOLUTION:

Molecular evolution: Amino acid sequence divergence in proteins, Nucleotide sequence divergence in DNA, Molecular evolutionary clock, Large scale DNA sequence comparisons, Molecular marker analysis, DNA hybridization, Gene organization, Maintenance of gene diversity, Phylogenetic analysis, Construction of a phylogenetic tree, Comparison of data from different sources in phylogenetic analysis.

(10)

### Unit 4: TOXICOLOGY

(30)

- 4.1 Introduction to toxicology: definition, scope; Relationship to other sciences; History of toxicology.
- 4.2 Sources of toxic compounds: Food additives, Chemicals in work place (lead and mercury). Drugs of abuse Therapeutic drugs, Pesticides, Solvents, Polycyclic aromatic hydrocarbons and cosmetics.
- 4.3 Naturally occurring toxins: Mycotoxins, microbial toxins, plant toxins, (caffeine and Nicotine), Animals toxins (Honey bee sting, venoms of coelenterates, scorpion, snake and fish).
- 4.4 Dose response relationship: Measurement of dose response relationship, dose response curves,  $LC_{50}$  and  $LD_{50}$ , Acute and chronic toxicity; Margin and safety and therapeutic index; Threshold dose and no observed effect level (NOEL); TDH, TDL.
- 4.5 Mechanism of absorption through membranes: Rates of penetration, Routes of absorption in mammals [dermal, gastrointestinal and respiratory]; Distribution and accumulation.
- 4.6. Metabolism of Toxicants: Phase I reactions, Phase II reactions, Metabolism of carbon tetrachloride ( $CCl_4$ ) and Paracetamol.
- 4.7. Target organ toxicity - Hepatotoxicity: susceptibility of the liver, types of liver injury, examples of hepatotoxicants; Nephrotoxicity: Susceptibility of kidney, examples of nephrotoxicants; Neurotoxicity: Vulnerability of nervous system, Examples of neurotoxicants.

### PRACTICAL - III

#### Molecular Biology

1. Estimation of RNA Orcinol method.
2. Estimation of DNA Diphenylamine method.
3. Isolation of *E. coli* genomic DNA and checking its purity by horizontal gel electrophoresis.

#### Biotechnology:

1. Use of autoclave for sterilization of equipment for tissue culture.
2. To prepare cells for culture from mammalian kidney. spleen / chick embryo using trypsin.
3. Problems in Biotechnology and Bioinformatics.

## Genetics:

1. Karyotype analysis for the following syndromes with comments on numerical and structural variations in chromosomes. : Turner's, Klinefelter's, Down's, Cri-du-chat, D-G translocation, Edwards', and Patau's syndrome.

## Toxicology

1. Determination of  $LC_{50}$  for a suitable pollutant (any one salt of heavy metal dissolved in water) on Daphnia, Probit analysis.
2. Effect of salt of heavy metal on the heart beat of Daphnia.
3. Effect of carbon tetrachloride on the level of enzyme activity in liver or serum acid and alkaline phosphatases, aspartate and alanine amino transferases.

## Bioinformatics:

Visit to at least one of the related sites on World Wide Web and its report\*

\* Students will enter a record of their visit to the related web site/s in his / her own handwriting, not exceeding two pages. The College is expected to provide internet facility for these practicals.

## REFERENCE:BOOKS

1. Cell and Molecular Biology- Concept and Experiments: Gerald Karp, John Wiley and Sons & Inc.
2. Molecular Biology of the Cell: Bruce Alberts and others: Garland Publishing.
3. Molecular Biology: Peter Pioletta, Tata McGraw Hill.
4. Molecular Biology: David Freifelder, Narosa Publishing House.
5. The Science of Genetics: A.G. Atherly, J.R.Girton, J.F.McDonald, Harcourt College Publishers.
6. Genetics: D.J.Fairbanks, W.R.Anderson, Thomson Publishing Co.
7. Basic Human Genetics: E.J.Mange and A.P.Mange, Rastogi Publications.
8. Advance Genetics: G.S.Miglani, Narosa Publishing House.
9. Principles of Gene Manipulation: Old and Primrose, Blackwell Scientific Publication.
10. Molecular Biotechnology: B.R.Glick and J.J.Pasternak. ASM Press.
11. Biotechnology: Rutledge, Cambridge Publication.
12. Introduction to Bioinformatics: T.K.Atwood and D.J.Parrysmith. Pearson Education
13. Instant Notes-Bioinformatics. D.R.Westhead, J.H.Parish & R.M.Twyman. Viva Books Pvt. Ltd.
14. Introduction to Computational Molecular Biology: J.Setubal & J.Meidanis. International Student Ed. Thomson Books/Cole
15. Sequence Analysis in a nut shell. A guide to common tools and Data Base. S.Markel & D.Leon. O'Reilly, Shroff Publishers & Distributers

**Environmental Science; Environmental Biology; Epidemiology and Biostatistics.**

Unit 1 : Environmental Science-Natural Resources and their management ..... 30

- 1.1 : Types of Resources – Conventional and non-conventional; exhaustible and inexhaustible; renewable and non-renewable.
- 1.2 : Resource Utilization and Impact of Technology – After Industrial Revolution and World Sustainable Development
- 1.3 : Energy – Firewood, Fossil fuels, Solar, Thermal, Hydel, Wind, Tidal, Geo-thermal, Biofuels.
- 1.4 : Air – Components of air and their significance; Common Air Pollutants, their sources, effects and management; Greenhouse gases and Global Climate change; Carbon Audit ( Carbon credits and foot-print)
- 1.5 : Water - Distribution of water; Potable water resources – reasons for shift from rivers to impoundment and ground water resources; recharging ground water; Common Water Pollutants, their sources, effects and management.
- 1.6 : Land – Land Use Pattern and optimization; Metal and non-metal resources, Mining and its effects; Geological hazards (earthquake, volcano, flood and erosion); Soil as a resource; agricultural practices and their polluting effects; types of solid wastes, strategies of waste management.
- 1.7 : Environment Management- EIA studies; Role of Pollution Control Boards- Central and Maharashtra State.

Unit 2 : Environmental Biology

30

- 2.1 : Zoogeography: Continuous and Discontinuous Distribution; Dispersal – Means and Barriers; Zoogeographic Realms – Geographical limits, Climate, Topography, Vegetation and Fauna of Palaearctic, Nearctic, Neotropical, Ethiopian, Oriental, Australasian and Antarctic realms.
- 2.2 : Biodiversity and Conservation: Forest Resources; National Forest Policy, Forestry and Wildlife Research, Education and Training in India; India's Biodiversity; Rare and Endangered animals of India; Wildlife conservation projects; Important National Parks, Sanctuaries and Tiger Projects in India ( Sariska, Gandhi, Tadoba, Gir, Ranthambhore, Dachigam, Jim Corbett, Bharatpur, Kaziranga, Sunderbans, Kanha, Bandipur-Mudumalai, Silent Valley; Ecotourism.
- 2.3 : Animal Behaviour: Habitat selection; food selection; dispersal, homing, territoriality, aggression.
- 2.4 : Social Behaviour: Schooling in fish, herding in mammals; Group selection, Kin selection, Altruism, Reciprocal Altruism, Inclusive Fitness; Social organization in Insects and Primates.

Unit 3: Epidemiology

30

- 3.1 Scope of Epidemiology: Perspectives of epidemiology; Descriptive and Analytical Epidemiology; Epidemiological triad; stages of disease; Screening for diseases.
- 3.2 Epidemiology of communicable diseases- definition of common terms.
- 3.3 Dynamics of disease transmission- reservoir, routes of transmission, incubation.
- 3.4 Prevention and control of communicable diseases- notification, isolation, quarantine, disinfection, concurrent, terminal, precurrent/ prophylactic, methods of disinfection: natural, physical, chemical immunization; general measures; Health education in India.
- 3.5 Epidemiology of communicable diseases: Diagnosis, transmission, prevention, control measures and treatment of-
- a) diseases of viral origin - Rabies, Dengue, Swine flu
  - b) diseases of bacterial origin - TB, National TB control Programme, Leprosy, Leptospirosis.
  - c) diseases of protozoan origin- Malaria, National Malaria Control Programme
  - d) diseases of helminth origin- Ascariasis, Dracunculosis, filariasis



- Unit 4 : Biostatistics**
1. Scope of Biostatistics- Definitions; applications and limitations.
2. Sampling Techniques: Simple random sampling- lottery method, with and without replacement, use of random numbers; stratified random sampling
3. Classification of Data- Primary, secondary, qualitative (concept of attributes), quantitative (concept of discrete and continuous).
4. Presentation of data: Tabulation- simple tables (one way and two way), complex tables, frequency distribution tables. Diagrammatic presentation- frequency polygon, frequency curves, bar diagrams (simple, multiple, segmented), pie diagrams.
5. Probability- Addition and multiplication rules and their applications
6. Measures of central tendency and dispersion: mode, median, mean, variance, standard deviation.
7. Normal distribution: properties of normal distribution, Z-transformation, p-value
8. Parametric tests of significance- two tailed Z-test and t-test.
9. Chi-square test and its applications.
10. Correlation: Correlation coefficient and testing significance of correlation coefficient

### PRACTICAL-IV

- Natural Resources and Their Management**
1. Rapid field tests for sulfate and nitrate contents as well as base deficiency of soil samples.
  2. Determination of carbonates in soil by rapid titration.
  3. Analysis of a community by working out ecological indices (frequency/ importance probability-, rarity-, fidelity-, constancy-, species diversity- and Shannon-Weiner Indices):
    - a) using transect method
    - b) using quadrat method
  4. Physical Properties of water:
    - a) Turbidity
    - b) Conductivity
  5. Chemical Properties of water:
    - a) Total Acidity
    - b) Total Alkalinity
    - c) COD
    - d) Heavy metal- Copper
    - e) Nitrate and nitrite nitrogen

### Environmental Biology

- Study of interaction between organisms: Social organization in Honey bee, termite, hanuman languor, and Asian elephant.

2. Study of present status, distribution, habitats and reasons for decline in India of the following animals: Gaur, hangul, rhino, musk deer, wild ass, brow-antlered deer, blackbuck, elephant, tiger, lion, snow leopard, red panda, reticulated python, pink headed duck, white-winged wood duck, mountain quail and great Indian bustard.

#### Zoogeography

1. Study of fauna of different zoogeographic regions (with the help of photographs, models or sketches):
- Palaeartic- Giant Panda, Japanese snow monkey
  - Nearctic- Virginia opossum, sea otter, raccoon
  - Neotropical- South American lung fish, low land tapir/ Brazilian Tapir, llama,
  - Oriental – flying frog, gharial, flying lizard, Asian elephant, Indian porcupine, and Great Indian one horned rhino
  - Ethiopian- African lung fish, ostrich, African elephant
  - Australasian – duck billed platypus, spiny ant-eater, Australian lung fish, red kangaroo
  - Antarctic – penguins.

#### Epidemiology

- Temporary preparation of head and mouthparts of mosquito.
- Identification: Permanent slides/ specimens of – *Plasmodium*, *Ascaris*, *Wuchereria*

#### Biostatistics

- From the given data make frequency distribution table.
- From the given data plot frequency polygon/ histogram.
- From the given data derive mean and standard deviation.
- From the given data plot bar diagram/ pie diagram.
- Application of Z test
- Application of t-test
- Application of chi-square test of significance
  - to test goodness of fit of observed and expected proportion
  - to test association between two events.
- Use of spreadsheet programme in biostatistics.



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4. Ecology: N.S.Subramanyam.& AVSS.Sambamurthy, Narosa.
5. Animal Behaviour: David McFarland, Pitman Publishers.
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7. Public Health & Sanitation Part I &II: The All India Institute of Local Self Government. Sthanikraj Bhavan, C.D.Barfiwala Marg, Andheri (W), 400058,
8. Park's Textbook of Preventive & Social Medicine, 7th E.d: K.Park, M/S Banarsidas Bhanot Publishers, 1167, Premnagar, Jabalpur, 482001.
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VICE-CHANCELLOR :-

Reference is invited to the Ordinances, Regulations and syllabi relating to the T.Y.B.Sc. degree course vide Pamphlet No.151 and to this office Circular No.334 of 2004 dated 11<sup>th</sup> August, 2004, and the Principals of the affiliated Colleges in Science are hereby informed that the recommendation made by the Board of Studies in Chemistry at its meeting held on 9<sup>th</sup> February, 2010 has been approved by the Academic Council at its meeting held on 3<sup>rd</sup> March, 2010 under item No.4.39 and that, in accordance therewith, the syllabus and Paper Pattern of the T.Y.B.Sc. Examination in the subject of Chemistry is revised as per Annexure and that the same has been brought into force with effect from the academic year 2010-2011.

MUMBAI-400 032  
July, 2010

L.R.Mane  
Offg. Registrar


The Principals of the affiliated Colleges in Science.

4.39/03/03/2010

UG-179-A of 2010, MUMBAI-400 032 13<sup>th</sup> July, 2010

Copy forwarded with compliments for information to:-

- 1) The Dean, Faculty of Science,
- 2) The Chairman, Board of Studies in Chemistry,
- 3) The Controller of Examinations,
- 4) The Co-Ordinator, University Computerization Centre,

  
(D. N. Jadhav)  
Ag. Deputy Registrar  
(UG/PG Section)

The Director, Board of College and University Development, the Deputy Registrar (Eligibility and Migration), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information.

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section, Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section, the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section), Vidyanaagari, the Deputy Registrar, Affiliation Section (2 copies), the Professor-cum- Director, Institute of Distance Education (10 copies), the Director University Computer Center (IDE Building), Vidyanaagari, (2 copies) the Deputy Registrar, Executive Authorities Unit (2 copies) and the Deputy Registrar, (P.R.O) the Assistant Registrar, Academic Authorities Unit (2 copies) and the Deputy Registrar, Executive Authorities Unit (2 copies). They are requested to treat this as action taken report on the resolution adopted by the Academic Council referred to in the above circular and that on separate Action taken report to be submitted to the Vice-Chancellor, the Deputy Registrar, Executive Authorities Unit (2 copies), BUCT

Enclosure to Item No. 4.39

03.03.2010

**UNIVERSITY OF MUMBAI**



**Revised Syllabus  
and  
Paper Pattern**

**at the  
T. Y. B. Sc. Examination  
in  
Chemistry**

**(with effect from the academic year 2010 - 2011)**

**TYBSc CHEMISTRY**  
**EXAMINATION PATTERN – 06 UNITS**  
**THEORY**

Each paper will be of 03 hours duration and of 100 marks.

**PRACTICALS:**

There will be one practical examination for 200 marks (Core compound) to be held for 14 hours, per batch of 40 candidates, spread over 02 days and four groups will move in rotation. Sessions of 3½ hrs duration.

**FIRST DAY – GROUP A**  
**SESSION – I (MORNING)**  
**PHYSICAL CHEMISTRY PRACTICAL**

Candidate has to perform any ONE experiment from the list of instrumental and non-instrumental exercises.

Total marks for experiments.

Journal	40 Marks
Viva Vice	05 Marks
Total Marks	05 Marks
	50 Marks

**FIRST DAY – GROUP A**  
**SESSION – II (AFTERNOON)**  
**ANALYTICAL CHEMISTRY PRACTICAL**

Candidate has to perform any ONE experiment from the list of instrumental and non-instrumental exercises.

Total marks for experiments.

Journal	40 Marks
Viva Vice	05 Marks
Total Marks	05 Marks
	50 Marks

Note: Out of the two experiments, a candidate is supposed to perform from physical and analytical exercise, ONE should be instrumental exercise and other should be non-instrumental.

**SECOND DAY – GROUP A**  
**SESSION – I (MORNING)**  
**ORGANIC CHEMISTRY PRACTICAL**

TYPE – A: Separation of a solid mixture

OR

TYPE – B:

(a) Separation of a solid mixture containing

VL + S components

OR

VL + L components

(b) Preparations:

Journal

Viva Vice

40 Marks

20 Marks

20 Marks

05 Marks

05 Marks

Total Marks

SECOND DAY - GROUP A  
 SESSION - I (AFTERNOON)  
 INORGANIC CHEMISTRY PRACTICAL  
 Experiment (A) Inorganic Preparation  
 Experiment (B) Titrimetric Analysis  
 Journal  
 Viva Vice  
 Total Marks

20 Marks

20 Marks

05 Marks

05 Marks

50 Marks

**TYBSc CHEMISTRY**  
**EXAMINATION PATTERN - 06 UNITS**

Schedule for rotation of groups:

<u>DAY - 1</u>	GROUP - A	GROUP - B	GROUP - C	GROUP - D
Session - I Morning	PHYSICAL	ANALYTICAL	ORGANIC	INORGANIC
Session - II Afternoon	ANALYTICAL	PHYSICAL	INORGANIC	ORGANIC
<u>DAY - 2</u>				
Session - I Morning	ORGANIC	INORGANIC	PHYSICAL	ANALYTICAL
Session - II Afternoon	INORGANIC	ORGANIC	ANALYTICAL	PHYSICAL

Note:

For physical and analytical practical experiments should be equally distributed among the group. Candidate should be given the experiments in physical / analytical by lot system.

For inorganic and organic practical examination experiments should be equally distinguished among the group.

**TYBSc CHEMISTRY**  
**EXAMINATION PATTERN – 03 UNITS**

There will be one practical examination of 100 marks (Core component) to be held for 07 hrs in two sessions, each of 3½ hrs duration.  
Batch of 20 to 30 candidates should be spread over 01 day. Group will move in rotations.

**FIRST DAY – GROUP A**  
**SESSION – I (MORNING)**

**Physical / Analytical Practical Examination:**

(Any one experiment from Physical / Analytical exercises)	40 Marks
Journal	05 Marks
Viva Vice	05 Marks
<b>Total Marks</b>	<b>50 Marks</b>

**FIRST DAY – GROUP A**  
**SESSION – II (MORNING)**

**Organic / Inorganic Practical Examination:**

Organic: Separation / Preparation 40 Marks

Type (A)

i) Type ii) Separation of comp. iii) Measuring waste crude iv) Determination of M.P.  
20 marks

**OR**

Type (B) Preparation of organic compound  
20 marks

**Inorganic Preparation / Titrimetric Analysis**  
**20 marks**

Journal

05 Marks

Viva Vice

05 Marks

**Total Marks**

**50 Marks**

**Note:**

For physical and analytical practical experiments should be equally distributed among the group. Candidate should be given the experiments in physical / analytical by lot system.

For inorganic and organic practical examination experiments should be equally distinguished among the group.



**TYBSc CHEMISTRY**  
**EXAMINATION PATTERN – 03 UNITS**

**Schedule for rotation of groups:**

	<b>GROUP A</b>		<b>GROUP B</b>	
<b>Session – I</b>	<b>PHYSICAL</b>	<b>/</b>	<b>ORGANIC</b>	<b>AND</b>
<b>Morning</b>	<b>ANALYTICAL</b>		<b>INORGANIC</b>	
<b>Session – II</b>	<b>ORGANIC</b>	<b>AND</b>	<b>PHYSICAL</b>	<b>/</b>
<b>Afternoon</b>	<b>INORGANIC</b>		<b>ANALYTICAL</b>	

UNIVERSITY OF MUMBAI  
DRAFT SYLLABUS  
T.Y.B. Sc.  
PAPER I- PHYSICAL CHEMISTRY-

(WITH EFFECT FROM THE ACADEMIC YEAR 2010-11)

UNITS- I to IV FOR 06 UNIT COURSE Total Lectures 120

UNITS - I to II FOR 03 UNIT COURSE Total Lectures 60

(Each unit is assigned 30 lectures)

Note: (1) Numerical and theoretical problems are expected from each unit except chapter 4, 8 and 14.

(2) Use of Microsoft Excel in theory problems and practical work should be encouraged

UNIT-I

- 1.1 Colligative Properties of Dilute Solutions 08L
- 1.1.1 Dilute solution, colligative properties, Raoult's law, relative lowering of vapour pressure.
- 1.1.2 Elevation in boiling point of a solution, thermodynamic derivation relating elevation in the boiling point of a solution and the molar mass of a non-volatile solute.
- 1.1.3 Depression in freezing point of a solution, thermodynamic derivation relating the depression in the freezing point of a solution and the molar mass of a non-volatile solute.
- 1.1.4 Osmotic pressure, van't Hoff's equation for osmotic pressure, (derivation is expected) and determination of molar mass of the solute. Abnormal molar masses of solutes and van't Hoff factor (calculation of Degree of Association and Degree of Dissociation.) 07L
- 1.2 Phase Rule
- 1.2.1 Gibb's phase rule and terms involved in the equation.
- 1.2.2 Application of phase rule to ONE component systems (i) water system, (ii) sulphur system
- 1.2.3 Application of phase rule to TWO component systems, condensed systems, condensed phase rule, eutectic systems (Lead-Silver system), desilverisation of lead.
- 1.2.4 Introduction to THREE component systems, explanation of the phase diagram for three liquids forming one immiscible pair. 09L
- 1.3. Surface Chemistry and Catalysis
- 1.3.1 Adsorption Physical and Chemical Adsorption, types of adsorption isotherms,

Langmuir's adsorption isotherm, (Postulates and derivation expected). B.E.T. equation for multilayer adsorption, derivation not expected, significance of the terms involved in the equation is expected.), determination of surface area of an adsorbent using B.E.T. equation.

- 1.3.2 **Catalysis** Homogeneous and heterogeneous catalysis, catalytic activity and selectivity, promoters, inhibitors, catalyst poisoning and deactivation,
- 1.3.3 Acid-Base catalysis, mechanism and kinetics of acid-base catalyzed reactions, effect of pH on acid-base catalyzed reactions. Mechanism and kinetics of enzyme catalyzed reaction (Michaelis-Menten equation).
- 1.3.4 Kinetics of surface reactions, heterogeneous catalysis) 1 unimolecular surface reactions, 2 bimolecular surface reaction (relevant rate expressions expected.)

06L

#### 1. 4. Colloids

- 1.4.1 Introduction to colloidal state of matter.
- 1.4.2 Origin of charge on colloidal particles. Concept of electrical double layer, zeta potential, Helmholtz and Stern mode, electrokinetic phenomena,  
1. Electrophoresis  
2. Electro-osmosis 3. Streaming potential 4. Sedimentation potential
- 1.4.3 Colloidal electrolytes,
- 1.4.4 Donnan Membrane Equilibrium.
- 1.4.5 Surfactants, micelle formation, applications of surfactants in detergents, food industry, in pesticide formulations.

### UNIT – II

#### 2.1 Molecular Spectroscopy:

15L

- 2.1.1 **Dipole moment:** Dipole moment, polarization of a bond, bond moment, dipole moment and molecular structure.
- 2.1.2 **Rotational Spectrum:** Rotational spectrum of a diatomic molecule, rigid rotor, moment of inertia, energy levels, conditions for obtaining pure rotational spectrum, selection rule, nature of spectrum, determination of inter nuclear distance and isotopic shift.
- 2.1.3 **Vibration ( IR ) spectrum:** Vibrational motion, degrees of freedom, modes of vibration, vibrational spectrum of a diatomic molecule, simple harmonic oscillator, energy levels, zero point energy, conditions for obtaining vibrational spectrum, selection rule, nature of spectrum.
- 2.1.4 **Vibration-Rotation spectrum of diatomic molecule** v.ibrating rotor, energy levels, selection rule, nature of spectrum, R and P branches, anharmonic oscillator : energy levels, selection rule, fundamental band, overtones, applications of vibration-rotation spectrum.1. Force constant, determination and significance 2.Determination of inter nuclear distance, isotopic shift. Introduction to infrared spectra of simple molecules like H<sub>2</sub>O and CO<sub>2</sub>.
- 2.1.5 **Raman Spectroscopy:** scattering of electromagnetic radiation, Rayleigh scattering, Raman scattering, nature of Raman spectrum , Stoke's lines, anti-Stoke's lines, Raman shift, quantum theory of Raman spectrum, comparative study of IR and Raman spectra, rule of mutual exclusion (example of CO<sub>2</sub> molecule).

## 2.2 Electrochemistry: Electrochemical cells

- 2.2.1 Lewis concept of Activity and Activity coefficient, Mean ionic activity and activity coefficient  $\gamma_{\pm}$  of an electrolyte, Variation of mean ionic activity coefficient with concentration, expression for activities of electrolytes of different valence type, ionic strength of a solution, Debye-Huckel limiting law derivation not expected) **15L**
- 2.2.2 Classification of cells: 1. chemical cells without transference 2. Concentration cells with and without transference (derivations of expression for concentration cell EMF are expected) Origin of liquid-liquid junction potential and its elimination using a salt bridge.
- 2.2.3 Applications of EMF measurements in the determination of: 1 Mean ionic activity coefficient of an electrolyte 2 pH of a solution using quinhydrone and glass electrode. 3 solubility and solubility product of sparingly soluble salts using chemical cell and concentration cell method 4 determination of liquid-liquid junction potential

## UNIT-III

### 3.1 Nuclear Chemistry

- 3.1.1 Types of nuclear radiations and their characteristics, behaviour of ion-pairs in electric field, detection and measurement of nuclear radiations using G.M. counter and scintillation counter. **15L**
- 3.1.2 Kinetics of radioactive decay, units of radioactivity (Curie, Becquerel, Rutherford),
- 3.1.3 Radioactive equilibrium (secular and transient) Determination of radioactive constants for radio-elements having 1 moderate half life 2 long half life 3 extremely long or short half life.
- 3.1.4 Use of radioisotopes as tracers in, 1 chemical investigations-reaction mechanism 2 age determination – dating by tritium content and by carbon-14
- 3.1.5 Nuclear Reactions – nuclear transmutation, artificial radioactivity (suitable examples using different projectiles are expected.), Q-value of nuclear reaction threshold energy.
- 3.1.6 Fissile and fertile material, nuclear fission, chain reaction, factors controlling fission process (multiplication factor and critical size or mass of fissionable material), nuclear power reactor and breeder reactor.
- 3.1.7 Nuclear fusion, characteristics of nuclear fusion, thermonuclear reactions occurring in stellar bodies.

### 3.2 Chemical Kinetics

- 3.2.1 Collision theory of reaction rates .application of collision theory to, bimolecular reaction and 2. Unimolecular reaction (Lindemann theory, derivation expected). Merits and drawbacks of collision theory. Activated complex theory of bimolecular reactions, expression for rate constant of bimolecular reaction (derivation is not expected), comparison of collision theory and activated complex theory. **05L**
- 3.2.2 Classification of reactions as Slow, Fast and Ultra-fast. study of kinetics of fast reactions by Stop flow method.

**3.3 Basics of Quantum Chemistry**

- 3.3.1 Classical mechanics, limitations of classical mechanics, Black body radiation, photoelectric effect, Compton Effect.
- 3.3.2 Introduction to quantum mechanics, Planck's theory of quantization, wave particle duality, de-Broglie equation, Heisenberg's uncertainty principle.
- 3.3.3 Progressive and standing waves, boundary conditions, Schrödinger's time independent wave equation, interpretation and properties of wave function.
- 3.3.4 Postulates of quantum mechanics (following are to be considered) state function and its significance. 2. Concept of operators: definition, addition, subtraction and multiplication of operators, commutative and non-commutative operators, linear operator, Hamiltonian operator. 3. Eigen function and eigen value, eigen value equation.

**UNIT- IV****4.1 Introduction to Polymers**

05L

- 4.1.1 Basic terms: macromolecule, monomer, repeat unit, degree of polymerization
- 4.1.2 Classification of polymers based on (i) source, (ii) structure, (iii) thermal response and (iv) physical properties
- 4.1.3 Molar masses of polymers 1. Number average molar mass 2. Weight average molar mass 3. Viscosity average molar mass monodispersity, polydispersity
- 4.1.4 Methods of determining molar masses of polymers 1. Ultracentrifuge method (Limiting or sedimentation velocity method only) 2. Viscosity method (Mark-Houwink equation).
- 4.1.5 Introduction to light emitting polymers (characteristics, method of preparation and its applications are expected)

**4.2 Crystalline State**

07L

- 4.2.1 Laws of crystallography,
- 4.2.2 Bravais lattices and crystal systems with examples,
- 4.2.3 Characteristics of simple cubic, face centered and body centered cubic system, inter planer distance in cubic lattices (only expressions for ratios of inter planar distances are expected).
- 4.2.4 Use of X-rays in the study of crystal structure, Bragg's equation (derivation expected), X-ray diffraction method of studying crystal lattices, structure of NaCl and KCl, determination of Avogadro's number.
- 4.2.5 Elementary idea of defects in crystals - Frenkel defect and Schottky defect.

**4.3 Nuclear Magnetic Resonance Spectroscopy**

06L

- 4.3.1 Nuclear spin, magnetic moment, nuclear 'g' factor, energy levels, Larmor precession. Relaxation processes in n.m.r. (spin-spin relaxation and Spin lattice relaxation),
- 4.3.2 NMR spectrometer, chemical shift, shielding and de-shielding of protons, low resolution n.m.r spectrum of methanol and ethanol, fine structure of n.m.r -- nuclear spin-spin interaction with reference to methanol and ethanol



## 4.4 Applied Electrochemistry

05L

- 4.4.1 Polarization, concentration polarization and its elimination,
- 4.4.2 Decomposition potential, experimental determination of decomposition potential, factors affecting decomposition potential (nature of electrolyte, nature of electrodes and temperature, overvoltage, Tafel's theory and Tafel's equation for hydrogen overvoltage, simultaneous deposition of metals,
- 4.4.3 Electroplating ---objectives and process

## 4.5 Renewable Energy Sources

07 L

- 4.5.1 Batteries – Secondary cells Lithium ion Cell.
- 4.5.2 Fuel Cells--Choice of fuel and oxidant, thermodynamic and kinetic aspect of electrochemical energy transformation, efficiency of fuel cells, Bacon's H<sub>2</sub> and O<sub>2</sub> fuel cell.
- 4.5.3 Solar cells solar energy, photovoltaic effect, semiconductors as solar energy converters , Silicon solar cell.
- 4.5.4 Biomass energy from biomass and its sources, conversion of biomass into energy by alcohol fermentation and anaerobic digestion method.
- 4.5.5 Hydrogen: fuel of the future Production of hydrogen by direct electrolysis of water and. biomass gasification ,advantages of hydrogen as a universal energy medium.



## Physical Chemistry Practicals

### 6- Unit Course- Non Instrumental Experiments (Total of 04 experiments should be performed)

#### Chemical Kinetics:

1. To determine the energy of activation of acid catalyzed hydrolysis of methyl acetate.
2. To determine the order of reaction between  $K_2S_2O_8$  and KI by fractional change method.

#### Partition Coefficient:

3. To determine the equilibrium constant for the reaction  $KI + I_2 = KI_3$  by partition method. (Partition coefficient of  $I_2$  between  $CCl_4$  and  $H_2O$  is to be given)

#### Viscosity:

4. To determine the molecular weight of high polymer (PVA) by viscosity measurement.  
OR
4. To determine the radius of a glycerol molecule by viscosity measurement.

### Instrumental Experiments

(Total of 07 experiments are to be performed by the student. The distribution is as follows: Potentiometric 04, Colorimetric 01, Conductometric 01 and pH- metric 01.)

#### Potentiometry :

5. To determine the amount of Fe (II) in the given solution by titration with a standard  $K_2Cr_2O_7$  solution and hence to find the formal redox potential of  $Fe^{3+}/Fe^{2+}$
6. To determine the strength of a given strong acid (HCl) by potentiometric titration using quinhydrone electrode.( calculation of pH from  $E_{cell}$  and the plot of (1)  $\Delta E/\Delta V$  vs V and (2) pH vs V are expected)

OR

6. To determine the pKa value of a given weak monobasic acid ( $CH_3COOH$ ) by e.m.f. measurements.
7. To determine solubility product and solubility of silver chloride potentiometrically using chemical cell.

OR

7. To determine solubility product and solubility of silver chloride potentiometrically using concentration cell.
8. To determine  $E_{cal}$  at room temperature and using this value determine standard reduction potential of  $Ag/Ag^+$  electrode at room temperature.

**Note:** (For experiment number 07 and 08, 50 cm<sup>3</sup> volumetric flasks and beakers should be preferably used.)

#### Colorimetry :

9. To determine the amount of Fe(III) present in the given solution by using salicylic acid by colorimetric titration (static method). ( $\lambda = 525$  nm).

#### Conductometry :

10. To determine the amount of dibasic acid (oxalic acid) by conductometric titration against strong base.

**OR**

10. To determine the relative strength of monochloroacetic acid and acetic acid conductometrically.

11. To determine acidic and basic dissociation constants of Amino acid and hence to calculate iso-electric point.

**For III-Unit Course**

(From the above list of experiments the students should perform the experiments as indicated below)

**Non-Instrumental Experiments: 1 and 3**

**Instrumental Experiments: 6, 7 and 9**

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31. **A Basic Course in Crystallography**: J.A.K. Tareen and  
T.R.N. Kuty. Unversity Press, (2001)
32. **New Directions in Solid State Chemistry**: C.N.R. Rao  
and J. Gopalakrishnan,  
2<sup>nd</sup> ed., Cambridge University Pres (1997).
33. **Molecular Spectroscopy**: P.S. Sindhu , Tata McGrow Hill Co. Ltd.,  
New Delhi (1985).
34. **Instrumental Methods of Chemical Analysis**: Chatwal and Anand,  
5<sup>th</sup> ed., Himalaya Publication.
35. **2000 Solved Problems in Physical Chemistry** : S.R.Metz,  
Tata McGrow Hill Publishers, New Delhi.
36. **Fuel cells; their electrochemistry**: O'M Bockris & S.N. Srinivasan,  
McGraw Hill, New York (1969) 'Chemical & Electrochemical energy  
systems' University, Press (India) Ltd.1998.
37. **'Renewable Energy'**: Godfrey Boyle, Publisher: OUP Oxford;  
2<sup>nd</sup> edition( March 2004)
38. **Handbook of alternative fuel technologies**, S.N. Lee & James G.  
Spergit, CRC Press.
39. **Textbbk of Biotechnolog**: .C.Dubey, S. Chand, New Delhi.
40. **Biomass for Renewable Energy, fuels & Chemicals** : Donald L.  
Klass, Academic Press, London, UK.
41. **A Textbook of Physical Chemistry**, K.L. Kapoor,  
MacMillan India Ltd.  
Volume-1 State of Matter and Ions in Solution.  
Volume-2 Thermodynamics and Chemical Equilibrium.  
Volume-3 Applications of Thermodynamics.  
Volume-4 Quantum Chemistry and Molecular Spectroscopy.  
Volume-5 Dynamics of Chemical Reactions, Statistical  
Thermodynamics and Macromolecules.
42. **Physical Chemistry**: N.B.Singh, Shiva Saran Das, Rmji Singh,  
New Age International Pvt. Ltd., Publishers, New Delhi. (2003).

## **LIST OF REFERENCE BOOKS FOR PRACTICALS**

- 1. A Laboratory Manual of Experiments in Physical Chemistry: C.D.Brennan & C.F.H.Tipper, McGraw Hill (1967).**
- 2. Experimental Physical Chemistry: V.D.Athawale & R. Mathur, New Age International Publishers, New Delhi (2001).**
- 3. Systematic Experimental Physical Chemistry: S.W.Rajbhoj & T.K.Chondekar, Anjali Publication, Aurangabad (2000).**



UNIVERSITY OF MUMBAI

DRAFT SYLLABUS

T.Y.B. Sc.

PAPER II-INORGANIC CHEMISTRY-

(WITH EFFECT FROM THE ACADEMIC YEAR 2010-11)

UNITS- I to IV FOR 06 UNIT COURSE Total Lectures 120

UNITS - I to II FOR 03 UNIT COURSE Total lectures 60

(Each unit is assigned 30 lectures)

- Unit I Chemical Bonding and Solid State Chemistry (30L)
- 1.1 Molecular symmetry (07L)
- 1.1.1 Introduction and Importance.
- 1.1.2 Symmetry elements and symmetry operations.
- 1.1.3 Concept of a Point Group with illustrations using the following point groups: (i)  $C_{\infty v}$  (HCl), (ii)  $D_{\infty h}$  (H<sub>2</sub>), (iii)  $C_{2v}$  (H<sub>2</sub>O), (iv)  $C_{3v}$  (NH<sub>3</sub>), (v)  $C_{2h}$  (trans-dichloroethylene), and (vi)  $D_{3h}$  (BCl<sub>3</sub>). (05L)
- 1.2 Molecular Orbital Theory for polyatomic species (05L)
- 1.2.1 Simple triatomic species: H<sub>3</sub><sup>+</sup> and H<sub>3</sub> (correlation between bond angle and molecular orbitals).
- 1.2.2 Other molecules (considering only  $\sigma$ -bonding): (i) BeH<sub>2</sub>, (ii) H<sub>2</sub>O, (iii) NH<sub>3</sub>, and (iv) CH<sub>4</sub>. (03L)
- 1.3 Metallic Bond (10L)
- 1.3.1 Band theory.
- 1.3.2 Explanation of electrical properties of conductors, insulators and semiconductors (n- and p-types) on the basis of Band theory.
- 1.4 Structures of solids (10L)
- 1.4.1 Importance of solid state chemistry.
- 1.4.2 Classification of solids on the basis of bonding.
- 1.4.3 Explanation of terms viz., crystal lattice, lattice points, unit cells, and lattice constants.
- 1.4.4 Closest packing of rigid spheres (hcp, ccp), packing density in simple cubic, bcc, fcc and hcp lattices (numerical problems expected).
- 1.4.5 Structures of metallic solids.
- 1.4.6 Tetrahedral and octahedral interstitial voids in ccp lattice, tetrahedral holes, limiting radius ratios for different coordination numbers and their significance, calculation of limiting radius ratio for co-ordination number 4.
- 1.4.7 Structures of sodium chloride and cesium chloride.
- 1.4.8 Structure of zinc blende and failure of radius ratio rule (directional bonding), structure of wurtzite.



## 1.5 Superconductivity

- 1.5.1 Superconductivity, Meissner effect.
- 1.5.2 Different superconducting materials viz., conventional superconductors, organic superconductors, alkali metal fullerenes ( $A_3C_{60}$ ) and high temperature superconductors.
- 1.5.3 Applications of superconducting materials.

(05L)

## Unit II Inner Transition Elements and Solution Chemistry

(30L)  
(02L)

### 2.1 4f and 5f block elements

- 2.1.1 Introduction.
- 2.1.2 The shapes of f-orbitals.
- 2.1.3 The position of f-block elements in the periodic table.
- 2.1.4 Electronic configurations of 4f and 5f block elements.

### 2.2 Lanthanide series

- 2.2.1 Chemistry of lanthanides with reference to (i) lanthanide contraction, (ii) oxidation states, (iii) magnetic properties, (iv) colour and spectra (f-f transition spectra), and (v) complex formation (types and stereochemistry of the complexes).
- 2.2.2 Occurrence, extraction and separation of lanthanides by (i) ion-exchange, and (ii) solvent extraction methods.
- 2.2.3 Applications of lanthanides.

(10L)

### 2.3 Actinide series

- 2.3.1 Chemistry of Uranium and Plutonium with reference to occurrence, extraction (solvent extraction method), properties and applications.
- 2.3.2 Comparative chemistry of lanthanides and actinides.

(03L)

### 2.4 Acid-base chemistry in aqueous medium

- 2.4.1 Acidity of mono- and polyatomic cations.
- 2.4.2 Basicity of mono- and polyatomic anions (discussion for 2.4.1 as well as 2.4.2 to include Latimer equation and predominance diagrams).
- 2.4.3 Measure of acidity and basicity: concepts based on electronegativity and thermodynamic aspects (Drago-Wayland equation).

(08L)

### 2.5 Chemistry in non-aqueous solvents

- 2.5.1 Classification of solvents and importance of non-aqueous solvents.
- 2.5.2 Characteristics and study of liquid ammonia, dinitrogen tetroxide and acetic acid as non-aqueous solvents with respect to (i) acid-base reactions, and (ii) redox reactions.

(07L)

**Unit III**  
**Coordination Chemistry**

**Crystal field theory (CFT)**

(30L)

(07L)

- 3.1.1 Basic tenets of Crystal field theory and effect of crystal field on central metal valence orbitals.
- 3.1.2 Splitting of d orbitals in octahedral, tetrahedral and square planar complexes.
- 3.1.3 Crystal field splitting energy ( $10Dq / \Delta_o$ ) for octahedral complexes and factors affecting the magnitude of  $\Delta_o$ .
- 3.1.4 Crystal field stabilization energy (CFSE), calculation of CFSE for octahedral and tetrahedral complexes with  $d^1$  to  $d^{10}$  metal ion configurations, high-spin and low-spin complexes.
- 3.1.5 Effect of crystal field splitting on (i) Ionic radius, and (ii) Lattice energy.
- 3.1.6 Theoretical failure of the CFT model.
- 3.1.7 Experimental evidence for co-valence in co-ordination compounds:  
(i) ESR spectrum of  $[\text{IrCl}_6]^{2-}$ , (ii) NMR spectrum of tris(acetyl acetonato)vanadium(III) complex, (iii) Intensities of d-d transitions, and (iv) Nephelauxetic effect.

**Molecular orbital theory (MOT) of coordination complexes**

(04L)

- 3.2.1 Application to octahedral complexes in case of- (i)  $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ , (ii) Fluoro complexes of Fe (II) and Fe (III), and (iii) Cyano complexes of Fe (II) and Fe (III).
- 3.2.2 Effect of pi-bonding on ligand field splitting parameter in  $M \rightarrow L \pi$ - and  $L \rightarrow M \pi$ -interactions.

**Electronic states and terms for polyelectronic atoms**

(04L)

- 3.3.1 Introduction: electronic configuration and electronic states, Term symbols, coupling of spin momenta ( $M_s$ ), orbital momenta ( $M_L$ ) and spin-orbit coupling or Russell-Saunders coupling.
- 3.3.2 Determination of Terms for  $p^2$  electronic configuration (as in a carbon atom).
- 3.3.3 Terms and micro-states for transition metal atoms/ions.

**Electronic Spectra**

(05L)

- 3.4.1 Types of electronic transitions like intra-ligand transitions, charge transfer transitions and intra-metal transitions (d-d or ligand field transitions for transition metals).
- 3.4.2 Rules for electronic transitions: Spin and Orbital or Laporte selection rules.
- 3.4.3 Splitting of Terms in weak crystal field, the Hole Formalism.
- 3.4.4 Orgel Diagrams for D Terms (i.e.  $d^1$ ,  $d^4$  and  $d^6$ ,  $d^9$  electronic configurations) and its use in interpretation of visible electronic absorption spectra of these configurations.
- 3.4.5 Applications of electronic spectra, in brief, with special reference to  
(i) Cis -trans isomerism in complexes, and (ii) Geometry of complexes.

- 3.5 Stability of octahedral complexes** (05L)
- 3.5.1 Thermodynamic stability and kinetic stability of complexes with examples.
  - 3.5.2 Stability constants: stepwise and overall constants and their inter-relationship.
  - 3.5.3 Factors affecting thermodynamic stability.
  - 3.5.4 Potentiometric method of determination of stability constants with the example of silver- ammonia complex.

- 3.6 Substitution reactions in octahedral complexes** (05L)
- 3.6.1 Introduction, types of reactions in complexes.
  - 3.6.2 Ligand substitution reactions: basic mechanisms.
  - 3.6.3 Inert and labile complexes and electronic configurations and lability of complexes.
  - 3.6.4 Acid hydrolysis, base hydrolysis and anation reactions.

## Unit IV

### Some selected Topics

- 4.1 Organometallic compounds of main group elements** (30L)
- 4.1.1 **Introduction; General synthetic methods:** (i) Oxidative addition, (ii) Metal-Metal exchange (Transmetallation), (iii) Carbanion- Halide exchange, (iv) Metal-Hydrogen exchange and (vi) Methylene-insertion reactions. (04L)
  - 4.1.2 **Chemical reactions:** (i) Reactions with oxygen and halogens, (ii) Alkylation and arylation reactions, (iii) Reactions with protic reagents, (iv) Redistribution reactions, and (v) Complex formation reactions.
- 4.2 Metallocenes** (05L)
- 4.2.1 Introduction.
  - 4.2.2 Synthesis, structure, reactions and applications of ferrocene.
  - 4.2.3 Bonding in ferrocene on the basis of VBT.
  - 4.2.4 Bonding in Re and Mo halide complexes.
- 4.4 Catalysis by transition metal complexes** (03L)
- 4.4.1 Introduction.
  - 4.4.2 Catalysis with reference to (i) hydrogenation of alkenes (Wilkinson catalyst), (ii) hydroformylation reaction (Roelen catalyst) and (iii) polymerization reaction (Ziegler-Natta catalysts).
- 4.5 Inorganic Polymers** (03L)
- 4.5.1 Introduction.
  - 4.5.2 Various methods of classification with examples.
  - 4.5.3 Chemistry of borazine with reference to preparation, properties, structures, bonding and applications.

- 4.6 **Characteristics and treatment of liquid effluent** (08L)
- 4.6.1 Characterization of waste: biochemical oxygen demand (BOD), chemical oxygen demand (COD), total organic carbon (TOC), aerobic and anaerobic processes.
- 4.6.2 Removing of solid contaminants, physical and chemical principles such as coagulation, flocculation and sedimentation.
- 4.6.3 Primary, secondary and tertiary treatment of liquid effluents.
- 4.7 **Nanomaterials** (04L)
- 4.7.1 Introduction and Importance of nanomaterials.
- 4.7.2 Properties (Comparison between bulk and nanomaterials): (i) Optical properties, (ii) Electrical conductivity, (iii) Melting points, and (iv) Mechanical properties.
- 4.7.3 Forms of nanomaterials: nanofilms, nanolayers, nanotubes, nanowires, and nanoparticles.
- 4.7.4 Chemical methods of preparation : (i) Colloidal route, and (ii) Sol-gel method.
- 4.8 **Inorganic Pharmaceuticals** (03L)
- 4.8.1 Gastrointestinal agents viz., (i) antacids (aluminium hydroxide, milk of magnesia, sodium bicarbonate and (ii) cathartics (magnesium sulphate and sodium phosphate).
- 4.8.2 Topical agents viz., (i) protectives and adsorbents (talc, calamine), (ii) antimicrobial agents (potassium permanganate, tincture iodine, boric acid) and astringents (alum).

## Practicals for the students offering six units of Chemistry

### 1. Inorganic preparations

(20 marks)

1. Tris-(ethylenediamine)nickel(II)thiosulphate.
2. Bis-(acetylacetonato) copper (II).
3. Tetraamminecopper (II) sulphate.
4.  $\text{CuCl}_2 \cdot 2\text{DMSO}$ .
5. Tri(thiourea)-cuprous chloride.
6. 8-(Hydroxyquinolinato) magnesium (II).
7. Tris-(acetylacetonato) iron (III)\*.
8. Bis-(Dimethylglyoximato) nickel (II)\*.

\* These should be prepared using Green Chemistry principles.

**Note:** Students are expected to weigh the chemicals, prepare solutions, carry out the reaction, isolate and report the yield of the crude product.

### Titrimetric analysis marks)

(20

1. Estimation of Cu by EDTA method using Fast Sulphone Black F.
2. Determination of Al (back titration) complexometrically.
3. Determination of Ni Complexometrically using Murexide indicator.
4. Analysis of talcum powder for magnesium content.
5. Analysis of calcium tablet.
6. Determination of acidity of a water sample\*.
7. Determination of Fe(II) using  $\text{KMnO}_4$ \*.
8. Determination of Cu by iodometric method\*.

\* Standardization of the supplied NaOH,  $\text{KMnO}_4$  and sodium thiosulphate solutions must be carried out.

**Note:** One experiment each from Inorganic preparations and Titrimetric analysis should be set during examination.

Viva-voce : (05 marks)

Journal : (05 marks)

## Practicals for the students offering three units of Chemistry

### 1. Inorganic preparations

1. Tris-(ethylenediamine)nickel(II)thiosulphate.
2. 8-(Hydroxyquinolinato) magnesium (II).
3. Tris-(acetylacetonato) iron (III)
4. Tri(thiourea)-cuprous chloride.

### 2. Titrimetric analysis

1. Estimation of Cu by EDTA method using Fast Sulphone Black F.
2. Analysis of talcum powder for magnesium content.
3. Analysis of calcium tablet.
4. Determination of Fe (II) using  $\text{KMnO}_4$ \*

\* Standardization of the supplied  $\text{KMnO}_4$  solution must be carried out.

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## Reference Books

### Unit I

1. H. Jaffe and M. Orchin, Symmetry in Chemistry, 1966.
2. F. A. Cotton, Chemical Applications of Group Theory, 2<sup>nd</sup> edition, Wiley Eastern Ltd., New Delhi, 1976.
3. C. J. Ballhausen and H. B. Gray, Molecular Orbital Theory, McGraw-Hill, New York, 1965.
4. R. L. Dekock and H. B. Gray, Chemical Structure and Bonding, The Benjamin/Cummings Publishing Company, 1980.
5. A.R. West, Solid State Chemistry and Its Applications, John Wiley & Sons, 1987.
6. Lesley Smart and Elaine Moore, Solid state Chemistry – An Introduction, 2<sup>nd</sup> edition, Nelson Thornes Ltd., U.K., 1996.
7. R. N. Kutty and J. A. K. Tareen, Fundamentals of Crystal Chemistry, Universities Press (India) Ltd., 2001.

### Unit II

1. F. A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, 3<sup>rd</sup> edition, 1977.
2. James E. Huheey, Inorganic Chemistry, 3<sup>rd</sup> edition, Harper & Row Publishers, Asia, Pte Ltd., 1983.
3. D. F. Shriver, P. W. Atkins and C. H. Langford, Inorganic Chemistry, 3<sup>rd</sup> edition, Oxford University Press, 1999.
4. N. N. Greenwood and A. Earnshaw, Chemistry of Elements, Pergamon, 1984.
5. H. Sisler, Chemistry in Non-aqueous Solvents, Reinhold Publ., New York, 1965.
6. J. J. Lagowski, The Chemistry of Non-aqueous Solvents. Academic press, New York and London.
7. C. M. Day & J. Selbin, Theoretical Inorganic Chemistry, Affiliated East West Press Pvt. Ltd., 1985.

### Unit III

1. L. E. Orgel, An Introduction to Ligand Field Theory, Methuen & Co. Ltd., London, 1960.
2. F. A. Cotton and G. Wilkinson, Advanced Inorganic Chemistry, 3<sup>rd</sup> edition, 1977.
3. F. Basolo and R. G. Pearson, Mechanisms of Inorganic Reactions, Wiley, New York, 1967.
4. J.D. Lee, Concise Inorganic Chemistry, 5<sup>th</sup> edition, Blackwell Science Ltd., 2005.

### Unit IV

1. G. W. Parshall and S. D. Ittel, Homogeneous Catalysis, 2<sup>nd</sup> edition, John Wiley & sons, Inc., New York, 1992.
2. Gary O. Spessard and Gary L. Miessler, Organometallic Chemistry, Prentice-Hall. (1997).
3. R. C. Mehrotra and A. Singh, Organometallic Chemistry-A Unified Approach, 2<sup>nd</sup> ed., New Age International Pvt.Ltd., 2000.
4. B. Douglas, D. H. McDaniel and J. J. Alexander, Concepts and Models of Inorganic Chemistry, 2<sup>nd</sup> edition, John Wiley & Sons, 1983.

5. Sulabha K. Kulkarni, Nanotechnology-Principles and Practices, Capital Publishing Co., 2007.
6. K. R. Mahadik and B. S. Kuchekar, Concise Inorganic Pharmaceutical Chemistry, Nirali Prakashan, Pune, 19
7. John H. Block, E. B. Roche, T. P. Soine and Charles O. Wilson, Inorganic Medicinal and Pharmaceutical Chemistry, Lea and Febiger, 1974.
8. B. Pani, Textbook of environmental chemistry, I. K. International Publishing House Pvt. Ltd., New Delhi, (2007).
9. A.K.De and A.K. De Environmental Chemistry, 7<sup>th</sup> ed., New Age International (P), Publishers, New Delhi (2010).

### General Reference Books

1. James E. Huheey, Inorganic Chemistry-Principles of structure and reactivity, Harper & Row Publishers, 1972.
2. D. F. Shriver and P. W. Atkins, Inorganic Chemistry, 3<sup>rd</sup> ed., Oxford University Press, 1999.
3. F. A. Cotton, G. Wilkinson, C. Murillo and M. Bochmann, Advanced Inorganic Chemistry, 6<sup>th</sup> ed., John Wiley, New York, 1999.
4. Gary Wulfsberg, Inorganic Chemistry; Viva Books PA Ltd., New Delhi; 2002.
5. Gary L. Miessler and Donald A. Tarr, Inorganic Chemistry, 3<sup>rd</sup> edition, Pearson Education, Inc., 2004.

**UNIVERSITY OF MUMBAI**  
**DRAFT SYLLABUS**  
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**PAPER III- ORGANIC CHEMISTRY-**  
**(WITH EFFECT FROM THE ACADEMIC YEAR**

**UNITS- I to IV FOR 06 UNIT COURSE    Total**  
**Lectures 120**

**UNITS - I to II FOR 03 UNIT COURSE    Total lectures**  
**60**

(Each unit is assigned 30 lectures)

## **UNIT I**

**5L**

**1.1 IUPAC Nomenclature** IUPAC systematic and accepted trivial nomenclature of the following classes of compounds, including substituted ones (up to 2 substituents/functional groups):

**1.1.1 (a)** Bicyclic compounds – spiro-, fused, and bridged (upto 11 carbon atoms) - saturated and unsaturated compounds

**1.1.2 (b)** Biphenyls

**1.1.3 (c)** Cummulenes up to 3 double bonds    (d) Monocyclic (5 and 6 membered) aromatic and non-aromatic heterocyclic compounds containing a maximum of two hetero atoms among N, O, S.

### **1.2. Catalysts and Reagents**

**5L**

Study of the following catalysts and reagents with respect to functional group transformations and selectivity (no mechanism).

**1.2.1. Catalysts:** Catalysts for hydrogenation: Raney Ni, Pt and PtO<sub>2</sub>: C=C, CN, NO<sub>2</sub>, aromatic ring; Pd/C: C=C, COCl → CHO (Rosenmund); Lindlar catalyst: alkynes; Wilkinson's catalyst for stereoselective reduction of olefins.

**1.2.2 Reagents :** (1) LiAlH<sub>4</sub> and Red-Al: reduction of C=O, COOR, CN, NO<sub>2</sub>. (2) NaBH<sub>4</sub>: reduction of C=O. (3) Diborane: olefins to alcohols through hydroboration, reduction of COOH. (4) SeO<sub>2</sub>: hydroxylation of allylic and benzylic positions, oxidation of CH<sub>2</sub> (alpha to C=O) to C=O. (5) *m*CPBA and R-OOH/H<sub>2</sub>O<sub>2</sub> for epoxidation of C=C. (6) NBS: allylic and benzylic bromination, bromination of position alpha to C=O. (7) Ceric ammonium nitrate (CAN): for oxidation of primary alcohol to aldehyde

### **1.3. Organometallic Chemistry**

**5L**

**1.3.1. Introduction:** Carbon-metal bond - Nature, types, reactivity.

**1.3.2. Organ magnesium compounds:** Grignard reagent (aliphatic and aromatic):

Preparation, structure, and stability. Reactions with - compounds containing acidic hydrogen, carbonyl compounds, cyanides and CO<sub>2</sub>.

**1.3.3 Organolithium compounds:** Preparation using alkyl/aryl halides. Reactions with -compounds containing acidic hydrogen, carbonyl compounds, cyanides and CO<sub>2</sub>. **Lithium dialkyl cuprates:** Preparation and reactions with aliphatic/ aromatic/ vinylic halides.

**1.3.4 Organizing compounds:** Preparation of dialkylzincs. Reaction with water - acid chlorides and alkyl halides. Reformatsky reaction (with mechanism), Simmons-Smith reaction.

## 1.4 Mechanism of Organic Reactions

**1.4.1 Investigation of reaction mechanisms:** Product analysis including crossover products, trapping of intermediates, isotopic labeling; kinetic and stereochemical evidence. **15L**

**1.4.2 Thermodynamic and kinetic control of organic reactions:** Concept with mechanisms of the following reactions: Addition of HX to butadiene; sulfonation of naphthalene. Nucleophilicity/electrophilicity vs Basicity/acidity.

**1.4.3 Mechanism of elimination reactions, with stereochemistry:** E<sub>1</sub> and E<sub>2</sub> reactions: regioselectivity (Saytzeff and Hofmann rules).

**1.4.4 Mechanism of reactions of carbonyl compounds with nucleophiles:**

**1.4.4.1** Formation of acetals / ketals from aldehydes and ketones.

**1.4.4.2** Reaction of aldehydes and ketones with primary and secondary amines.

**1.4.4.3** Acyl nucleophilic substitution (tetrahedral mechanism): Acid catalysed esterification of carboxylic acids and base promoted hydrolysis of esters.

**1.4.5 Mechanism of rearrangements with examples and stereochemistry** wherever applicable:

**1.4.5.1** Migration to electron deficient carbon: Pinacol, Benzilic acid.

**1.4.5.2** Migration to electron deficient nitrogen: Beckmann, Hofmann.

**1.4.6 Mechanism of the following reactions with synthetic applications:** Claisen condensation, Michael addition.

## UNIT II

**15L**

### 2.1. Stereochemistry

**2.1.1 Assigning configurational descriptors:** R/S to compounds with two stereogenic centres and represented in Fisher projection and wedge-dash formula. **E/Z to geometrical isomers.**

**2.1.2 Molecular chirality and elements of symmetry:** Mirror plane symmetry, centre of symmetry (inversion centre), rotation-reflection (alternating) axis. Chirality of compounds without stereogenic centre: cummulenes, spirans and biphenyls.

**2.1.3 Stability of cycloalkanes:** Strains in cycloalkanes - angle, eclipsing, transannular (3 to 8 membered). Conformations of cyclohexane, mono- and di-alkyl cyclohexanes and their relative stabilities.

**2.1.4 Stereoselectivity and stereospecificity:** Idea of enantioselectivity (*ee*) and diastereoselectivity (*de*). Topicity - enantiotopic and diastereotopic atoms,

groups and faces.

### **Stereochemistry of-**

- 1) Substitution reactions –  $S_N1$ ,  $S_N2$ ,  $S_Ni$  (reaction of alcohol with thionyl chloride)
- 2)  $E_2$  – anti – elimination – Base induced dehydrohalogenation of 1-bromo-1,2-diphenylpropane
- 3) Addition reactions to olefins- i) catalytic hydrogenation ii) bromination (electrophilic anti addition) iii) syn-hydroxylation (molecular addition) with  $OsO_4$  and  $KMnO_4$ .

## **2.2 Heterocyclic Chemistry**

8L

**2.2.1 Introduction:** Electronic structure and aromaticity of furan, pyrrole, thiophene and pyridine.

**2.2.2 Synthesis:** Synthesis of furans, pyrroles, and thiophenes by Paal-Knorr synthesis. Pyridines by Hantzsch synthesis and from 1,5-diketones. .

**2.2.3 Reactivity:** Reactivity towards electrophilic substitution reactions - of furan, pyrrole, thiophene on the basis of stability of intermediate; and of pyridine on the basis of electron distribution. Nucleophilic substitution reaction of pyridine on the basis of electron distribution.

**2.2.4 Reactions of heterocycles:** The following reactions of furan, pyrrole and thiophene: Halogenation, Nitration, Sulphonation, Vilsmeier formylation reaction, Friedel-Crafts reaction.

**Furan:** Diels-Alder reaction. Ring opening of furan.  
**Pyrrole:** Acidity and basicity of pyrrole - Comparison of basicity of pyrrole and pyrrolidine. Acid catalyzed polymerization of pyrrole.  
**Pyridine:** Basicity. Comparison of basicity of pyridine, pyrrole and piperidine. Sulphonation of pyridine, with and without catalyst. Reduction. Oxidation of alkyl pyridines and action of sodamide (Chichibabin reaction).  
N-methylation of pyridine. Quaternization of piperidine, pyrrolidine and Hofmann elimination of the quaternary salts.

7L

## **2.3 Organic Synthesis**

**2.3.1 Introduction:** Criteria for ideal organic synthesis. Yield and selectivity. Green parameters. Types of organic synthesis: Linear and convergent synthesis, multi-component synthesis - with examples, Mannich reaction, Hantzsch synthesis of pyridines (without mechanism)

**2.3.2 Illustrative synthesis of industrially important compounds:** Ibuprofen (chiral synthesis), paracetamol (green synthesis), L-ascorbic acid (from D-glucose), norfloxacin, nalidixic acid, thyroxine, vanillin, methyl dihydrojasmonate (Hedione), Bifenox-I, pigment red 242, indigo, 2-hydroxy-3-amino-5-nitrobenzene sulphonic acid.

**2.3.3 Newer methods of organic synthesis:** Introduction to the use of the following in organic synthesis: Ultrasound, microwaves, PTC.

## UNIT III

### 3.1 Spectroscopy

15L

**3.1.1 Introduction:** Electromagnetic spectrum, units of wavelength and frequency.

**3.1.2 UV-Visible Spectroscopy:** Basic theory, solvents, nature of UV-VIS spectrum. concept of – chromophore, auxochrome, bathochromic shift, hypsochromic shift, hyperchromic effect and hypochromic effect. Chromophore-chromophore and chromophore-auxochrome interactions.

**3.1.3 IR Spectroscopy:** Basic theory, nature of IR spectrum, selection rule, fingerprint region

**3.1.4 PMR Spectroscopy:** Basic theory of NMR, nature of PMR spectrum, chemical shift ( $\delta$  unit), standard for PMR, solvents used. Factors affecting chemical shift: 1) inductive effect 2) anisotropic effect (with reference to C=C, C $\equiv$ C, C=O and benzene ring). Spin-spin coupling and coupling constant. Proton exchange – Application of deuterium exchange. Application of PMR in structure determination.

**3.1.5 Spectral characteristics of following classes of organic compounds, including benzene and monosubstituted benzenes, with respect to UV-VIS, IR, PMR:**

1) alkanes 2) alkenes and polyenes 3) alkynes 4) haloalkanes 5) alcohols 6) carbonyl compounds 7) ethers 8) carboxylic acids 9) esters 10) amines 11) amides (broad regions characteristic of different groups are expected)

**3.1.6 Mass Spectrometry:** Basic theory. Nature of mass spectrum. General rules of fragmentation. Importance of - molecular ion peak, isotopic peaks, base peak. Nitrogen rule. Illustrative fragmentation of - alkanes and aliphatic carbonyl compounds (No McLafferty rearrangement).

**3.1.7 Problems of structure elucidation of simple organic compounds using individual or combined use of the above spectroscopic techniques are expected. (index of hydrogen deficiency should be the first step in solving the problems)**

11L

### 3.2 Polymers

**3.2.1 Introduction:** General idea of monomers, polymers, and polymerization. natural and synthetic polymers. Homopolymers and copolymers. Classification of polymers – Plastics, fibres, resins, elastomers. Thermoplastics and thermosets. Copolymers – alternating, block, random, graft.

**3.2.2 Mechanism of free radical addition polymerisation.**

**3.2.3 Elastomers:** Natural and synthetic rubbers. Diene polymerization: 1,2- and 1,4-addition (*cis* and *trans*) polymerization of isoprene. 1,3-Butadiene- styrene copolymer.

**3.2.4 Stereochemistry of polymers:** Tacticity. Role of Ziegler-Natta catalyst (coordination polymerization) in directing the tacticity in polypropylene (no mechanism).

**3.2.5 Preparation and uses of polymers:**

(1) Addition polymers: (a) polyethylene (b) polypropylene (c) PVC (d) polystyrene (e) polyacrylonitrile (f) polyvinylalcohol (g) teflon.



(2) Condensation polymers: (a) polyesters (b) polyamides (c) polyurethans  
(d) phenol-formaldehyde resin (e) epoxy resin (f) polycarbonates.

3.2.6 Recyclable polymers. Biodegradable polymers and their uses. Biomedical uses of polymers.

3.2.7 Additives to polymers: - Plasticizers, stabilizers and fillers  
(The students are expected to identify monomers in a given polymer and draw the structure of a polymer from a given set of monomers).

### 3.3 Photochemistry

4L

3.3.1 **Introduction:** Difference between thermal and photochemical reactions. Jablonski diagram, singlet and triplet states, allowed and forbidden transitions, fate of excited molecules, photosensitization.

3.3.2 Photochemical reactions of olefins: Photoisomerisation, photochemical rearrangement of 1, 4-dienes (di  $\pi$  methane).

3.3.3 Photochemistry of carbonyl compounds: Norrish I, Norrish II cleavages, photoreduction (e.g. benzophenone to benzpinacol)

## UNIT IV

### 4.1. Carbohydrates

10L

4.1.1 **Introduction:** Classification, Sources. Reducing & non-reducing sugars. DL notation.

4.1.2 **Structures of monosaccharides:** Fischer projection (4-6 carbon monosaccharides) and Haworth formula - Furanose and pyranose forms of pentoses and hexoses. Interconversion: Open and Haworth forms of monosaccharides with 5 and 6 carbons. Chair conformation with stereochemistry of D-glucose and D-fructose. Stability of chair forms of D-glucose.

4.1.3 **Determination of open chain configuration** - of D-glucose assuming the configuration of D-arabinose; and of D-fructose assuming the configuration of D-glucose.

4.1.4 **Anomers and epimers** of monosaccharides. Enantiomers and diastereomers of glucose. Mutarotation (with mechanism) in D-glucose.

4.1.5 **Chain lengthening and shortening reactions:** Modified Kiliani-Fischer synthesis. Wohl method.

4.1.6 **Reactions of D-glucose and D-fructose:** (a) osazone formation (b) reduction -  $H_2/Ni$ ,  $NaBH_4$  (c) oxidation - bromine water,  $HNO_3$ ,  $HIO_4$ . (d) interconversion of D-glucose and D-fructose (e) acetylation (f) methylation [e and f with cyclic pyranose form]

4.1.7 **Glycosides:** General structure (examples: indican)

4.1.8 **Disaccharides:** Structures of sucrose and maltose. [Structure determination not expected].

4.1.9 **Commercial importance** of carbohydrates in pharmaceutical, paper, food and textile industries.

## 4.2 Natural Products

10L

**4.2.1 Introduction:** Primary and secondary metabolites. Introduction to the following natural products with respect to sources and classes. (Structures of the compounds specified below are expected.)

- (a) Terpenes: Isoprene and special isoprene rule.  $\alpha$ -terpeniol, citral, camphor,  $\alpha$ -pinene.
- (b) Alkaloids: nicotine, atropine.
- (c) Vitamins: vitamins A and C.
- (d) Hormones: adrenaline, thyroxine
- (e) Steroids: cholesterol, progesterone
- (f) Plant pigments – carotenoids –  $\beta$ -carotene, flavones - quercetin,

### 4.2.2. Structure determination of natural products:

**4.2.2.1 Ozonolysis in terpenoids** – Examples of open chain and monocyclic monoterpenes.

**4.2.2.2 Hofmann exhaustive methylation and degradation in alkaloids** – Simple open chain and monocyclic amines.

**4.2.2.3 Structure determination of citral and nicotine through degradation studies.** Total synthesis of (i) Citral from 3-methylbutan-1-ol (ii) Nicotine from nicotinic acid.

**4.2.3 Biosynthesis:** Primary and secondary metabolism and broad classification of natural products based on biosynthesis. Biosynthesis of  $\alpha$ -terpeniol.

**4.3.4 Commercial importance of terpenoids and alkaloids:** Synthesis of camphor from  $\alpha$ -pinene,  $\alpha$  and  $\beta$  ionones, geraniol and nerol from citral,

## 4.3 Chemistry of some Important Biomolecules:

10L

**4.3.1  $\alpha$ -Amino acids:** Structure, configuration. Essential amino acids and their abbreviations, classification. Properties: pH dependency of ionic structure and isoelectric point. Methods of preparations: Strecker synthesis, amidomalonnate synthesis, Erlenmeyer azlactone synthesis.

**4.3.2 Polypeptides and proteins:**  
**Polypeptides:** Peptide bond. Nomenclature and representation of polypeptides. Merrifield's solid phase peptide synthesis (examples of di- and tri-peptides for nomenclature and synthesis). **Proteins:** Sources, types, functions, colloidal nature, separation based on isoelectric point, denaturation, and functions. Partial and total hydrolysis. General idea of primary, secondary, tertiary and quaternary structures.

**4.3.3 Nucleic acids:** Selective hydrolysis of nucleic acids. Sugars and bases in nucleic acids. Structures of nucleosides and nucleotides in DNA and RNA. Function of nucleotides: AMP-hormone, ATP – energy source. Structure of nucleic acids (DNA and RNA): Base pairing in nucleic acids. Importance of nucleic acids - self duplication, protein synthesis.

**4.3.4 Lipids:** Oils, fats, waxes. Saturated and unsaturated fatty acids in triglycerides. Saponification value, acid and iodine values, transesterification of

triglycerides - biodiesel

**Books for Reference:**

- (1) Organic Chemistry, Francis A Carey, Pearson Education, 6<sup>th</sup> Edition, Special Indian Edition, 2008.
- (2) Organic Chemistry, R.T. Morrison and R.N. Boyd, 6<sup>th</sup> Edition, Pearson Education.
- (3) Organic Chemistry, T.W.G. Solomon and C.B. Fryhle, 8<sup>th</sup> Edition, John Wiley & Sons, 2004.
- (4) Fundamentals of Organic Chemistry, G. Marc Loudon, 4<sup>th</sup> Edition, Oxford University Press, 2006.
- (5) Organic Chemistry, L.G. Wade Jr. and M.S. Singh, 6<sup>th</sup> Edition, Pearson Education, New Delhi, 2008.
- (6) Organic Chemistry, Paula Y. Bruice, Pearson Education, 2008.
- (7) Organic Chemistry, J.G. Smith, 2<sup>nd</sup> Edition, Special Indian Edition, Tata McGraw Hill, New Delhi, 2008.
- (8) Organic Chemistry, S.H. Pine, McGraw Hill Kogakusha Ltd.
- (9) Organic Chemistry, J. McMurry, 5<sup>th</sup> Edition, Asian Books Pvt. Ltd., New Delhi, 2000.
- (10) Organic Chemistry, S. Ege, A.I. T.B.S., 3<sup>rd</sup> Edition, Publishers, New Delhi, 1999.
- (11) A guide to mechanism in Organic Chemistry, 6<sup>th</sup> Edition, Peter Sykes, Pearson Education, New Delhi.
- (12) Organic Reaction Mechanism, third ed., V.K. Ahluwalia and R.K. Parashara, Narosa Publications.
- (13) Systematic Nomenclature of Organic Chemistry: A Directory to Comprehension and Application on Its Basic Principles, D. Hellwinkel, Springer Verlag, 2001.
- (14) Nomenclature of Organic compounds, S. C Pal, Revised ed. Narosa Publications.
- (15) Stereochemistry, P.S. Kalsi, New Age International Ltd., 4<sup>th</sup> Edition, 2006.
- (16) Stereochemistry of Carbon compounds, E. L. Eliel, Tata McGrawHill, New Delhi.
- (17) Organic Stereochemistry, M.J.T. Robinson, Oxford University Press, New Delhi, Indian Edition, 2005.
- (18) Spectroscopy, D.L. Pavia, G.M. Lampman, G.S. Kriz, J.R. Vyvyan, Brooks/Cole, Indian Edition, 2007.
- (19) Organic Spectroscopy- Principles and Applications- Jagmohan, 2<sup>nd</sup> ed., Narosa Publication.
- (20) Organic Spectroscopy, W. Kemp, 3<sup>rd</sup> Edition, Palgrave, Indian Edition, 2005.
- (21) Carbohydrate Chemistry, B.G. Devis and A.J. Fairbanks, Oxford University Press, New Delhi, Indian Edition, 2005.
- (22) Polymers, D. Walton and P. Lorimer, Oxford University Press, New Delhi, Indian Edition, 2005.
- (23) Photochemistry, C.E. Wayne and R.P. Wayne, Oxford University Press, New

- Delhi, Indian Edition, 2005.
- (24) Heterocyclic Chemistry, J.A. Joule and K. Mills, 4<sup>th</sup> Edition, Wiley India Pvt. Ltd., New Delhi, 2008.
- (25) Terpenoids, V.K. Ahluwalia, Ane Books Pvt. Ltd., New Delhi, 2009.
- (26) Polymer Science, V.K. Ahluwalia and A. Mishra, Ane Books Pvt. Ltd., New Delhi, 2009.
- (27) An introduction to Green Chemistry, V.K. Ahluwalia, Vishal Publishing Co.
- (28) Organic Chemistry, K.S. Tewari, N.K. Vishnoi, Vikas Publications.
- (29) Advanced Practical Organic Chemistry, N.K. Vishoi, 2<sup>nd</sup> Edition, Vikas Publications..

## Organic Chemistry Practicals

### Practical for the students offering six Units of chemistry

#### [A] Organic Separation:

**Separation of a binary mixture:** Type of mixture, Separation of both components, drying components, measurement of masses (crude), purification and identification of one of the components through systematic scheme of identification (microscale).

Mass of solid: ~ 3-4g, Liquid: Volatile ~ 6-8mL, Nonvolatile ~ 4-6 mL

Types: Solid+ Solid, Volatile Liquid + Solid, Volatile Liquid + Nonvolatile Liquid

(No carbohydrates to be given in water soluble, with water soluble the water insoluble should be completely water insoluble)

Note: Minimum 10 mixtures should be done, covering all the possible types.

#### [B] Preparation of Organic compound (One step):

Preparation of Organic compound as per the procedure given. Purification of product by crystallization, measurement of mass, and recording of the m.p. Minimum of 8 preparations from the list given below are expected, covering all the types. Quantity of reactant to be given 1g.

- (1) Aniline/p-toluidine → N-Acetyl/propionyl derivative
- (2) Salicylic acid/nitrobenzene → Nitro derivative
- (3) Beta naphthol → Methyl ether (dimethyl sulphate)
- (4) Acetanilide → p-bromoacetanilide
- (5) Aniline/p-toluidine → Schiff base with benzaldehyde (solventless)
- (6) Hydroquinone/beta naphthol → Acetate
- (7) Methyl salicylate/ethyl benzoate → Acid (hydrolysis)

(8) Benzaldehyde/p-nitrobenzaldehyde → Acid (oxidation)

**Practical for the students offering three units of Chemistry**

**[A] Organic Separation:**

Separation of a solid binary mixture: Separation of both components, drying of crude compounds, measuring of masses, and determine the m.p.s (microscale).

Note: Mass of solid: ~ 3-4g; No carbohydrates to be given as water soluble compound; with water soluble compound, the water insoluble compound should be completely water insoluble.

Note: Minimum 5 mixtures are expected, covering all the possible types

**[B] Preparation of Organic compound (One step):**

Preparation of an organic compound as per the procedure given, measuring the mass (crude) and recording the m.p. The following preparation should be done. Quantity of reactant to be given 1g.

- (1) Aniline → Acetanilide
- (2) Aniline → Schiff base with benzaldehyde (solventless)
- (3) Nitrobenzene to m-Dinitrobenzene
- (4) Beta naphthol → Methyl ether (dimethyl sulphate)

**Guidelines for the Practical Examination**

**For the examination of the candidates offering six units of chemistry**

**Type A: Separation of a solid mixture.** (i) Type (ii) Separation (iii) Purification of one component. (iv) Masses of both components (pure and crude) (iv) Identification of the other (crude) compound. **40M**

**OR**

**Type B: (a) Separation of a mixture containing VL+S or VL+L components.** (i) Type (ii) Separation (iii) Measuring the mass/volume and recording the physical constants of both compounds (without purification). **20 M**

**AND**

(b) **Preparation** – Preparation of an organic compound, crystallization of the product, measurement of mass, and recording the m.p. **20M**

For the examination of the candidates offering three units of chemistry

**Separation of a solid binary mixture.** (i) Type of mixture (ii) Separation of components (iii) Drying (iv) Measurement of masses of crude compounds (v) Determination of melting points. **20M**

OR

**Preparation of organic compound:** Preparation of an Organic compound, measuring the mass (crude) and determining m.p. **20M**



University of Mumbai  
T.Y.B.Sc.  
(With effect from the year 2010-11)  
Draft Syllabus  
Paper IV  
Analytical Chemistry  
Unit -I and II are for three unit students and  
Unit -I to Unit IV are for six unit students.  
Total Lectures 120

**Unit 1**

**Unit I-A Treatment of analytical data and Sampling**

[30L]

[7L]

**1.1 Treatment of analytical data:** Types of errors, determinate and indeterminate errors, minimization of errors, constant and proportionate errors, accuracy and precision, measures of dispersion and central tendency: mean, median, average deviation, relative average deviation, standard deviation, variance, coefficient of variation.

{Numerical problems expected}

**1.2 Sampling:** terms involved, importance of sampling, sampling techniques, sampling of gases, ambient and stack sampling, equipments used, sampling of homogeneous and heterogeneous liquids, sampling of static and flowing liquids, methods and equipments used, sampling of solids, importance of particle size and sample size, samplers used, need for the reduction in the sample size, methods of reduction in sample size, collection, preservation and dissolution of the sample.

[8L]

**Unit I-B Titrimetric Analysis**

**1.3 Acid -base titrations:** construction of titration curves and choice of indicator/s in the titration of [1] strong acid and strong base, [2] strong acid and weak base, [3] weak acid and strong base [4] weak acid and weak base, [5] dibasic acid and strong base [no derivation expected]

[5L]

**1.4 Precipitation titrations:** Argentometric titrations, construction of the titration curves, Volhard's method, Mohr's method, adsorption indicators, theory and applications.

[3L]

**1.5 Complexometric titrations:** general introduction, EDTA titrations, advantages and limitations of EDTA as the titrant, absolute and conditional formation constants of metal EDTA complexes, construction of titration curves, types of EDTA titrations, methods of increasing the selectivity of EDTA as a titrant, metallochromic indicators, theory and applications.

[4L]

**1.6 Redox titrations:** general introduction, theory of redox indicators, criterion for choosing an indicator for a redox titration, construction of the titration curves in the case of (1) Fe (II) Vs. Ce(IV) (2) Fe(II) Vs. dichromate, use of diphenyl amine and ferroin as redox indicators.

[3L]

**Unit II**

**II-A Methods of Separation-I**

[30L]

**2.1 Solvent extraction:** partition coefficient and distribution ratio, extraction efficiency, separation factor, role of complexing agents in solvent extraction, chelation, ion pair formation, solvation, types of solvent extraction: batch, continuous. [6L]  
{Numerical problems expected]

**2.2 Chromatography:** introduction to chromatographic techniques, classification of chromatographic techniques. [1L]

**2.3 Planar chromatography:** principle, techniques and applications of [1L]  
{1] Paper chromatography [2] Thin layer chromatography and. [4L]

**2.4 Electro- chromatography:** electrophoresis, slab electrophoresis, [2L]

**2.5 Size exclusion chromatography:** Principle and applications. [2L]

### Unit II-B Optical methods –I

**2.6 U.V. Visible spectroscopy:** photometers and spectrophotometers, instrumentation in the case of single and double beam spectrophotometers, Qualitative and quantitative analysis, calibration curve method. : [3L]

**2.7 Atomic spectroscopy:** Absorption and emission spectra, energy level diagrams, processes involved in atomization, flame photometry, flame atomizer, types of burners, monochromators and detectors, atomic absorption spectroscopy: flame and electrothermal atomizer, sources, instrumentation, quantitative applications of atomic absorption and flame photometry, calibration curve method, standard addition method and internal standard method [6L]

**2.8 Molecular fluorescence and phosphorescence spectroscopy:** theory, instrumentation and applications. [3L]

**2.9 Infrared spectroscopy:** sources, sample handling, detectors. [3L]

### Unit III [30L]

#### Unit III-A Electroanalytical Methods

**3.1 Ion selective electrodes:** classification of ion selective electrodes, glass electrode, fluoride electrode. [3L]

**3.2 D.C. Polarography:** polarizable and nonpolarizable electrodes, basic principles, residual current, diffusion current, limiting current, dropping mercury electrode, supporting electrolyte, half wave potential, derivation of the polarographic wave equation for a reversible reaction, Ilkovic equation, oxygen interference and its removal, maxima and maxima suppressors, polarographic cell, qualitative and quantitative analysis, calibration curve and standard addition method, applications. [9L]  
{Numerical problems expected]

**3.3 Amperometric Titrations:** basic principles, rotating platinum electrode and nature of the titration curves, applications, advantages and limitations. [3L]

### Unit III-B Methods of Separation-II and Nonaqueous titrations

**3.4 Gas chromatography:** gas liquid chromatography, basic principles, retention time, retention volume, resolution, peak width, theoretical plates, HETP, instrumentation, columns, detectors, applications. [5L]

**3.5 High performance liquid chromatography:** instrumentation, types of elution, U.V. and R.I. detector and applications. [3L]

**3.6 Ion exchange chromatography:** types of ion exchangers, mechanism of ion exchange, selectivity coefficients and separation factors, capacity and its determination, factors affecting the separation of ions, applications. [4L]

**3.7 Non aqueous titrations:** need for nonaqueous titrations, types of solvents, factors deciding the choice of solvent, solvents used, applications. [3L]

### Unit IV

#### Unit IV-A Treatment of analytical data-II and Concepts in Quality [30L]

**4.1 Treatment of analytical data:** distribution of random errors, Gaussian curve, student's t, confidence limits and confidence interval, criteria for rejection of result: 2.5 d rule 4.0 d rule and Q test, F test, testing for significance, null hypothesis, method of averages, least squares method. [6L]

**4.2 Introduction to the concept of uncertainty in a measurement:** difference between uncertainty and error, evaluation of the uncertainty of a measurement. [2L]

**4.3 Total quality management, concept of quality, quality control, quality assurance,** total quality management, ISO series, Good Laboratory practices. [4L]

**4.4 Analytical method validation:** need, what is validation of an analytical method, parameters of method validation [3L]

#### Unit IV-B Miscellaneous Methods

**4.5 Signal and noise:** sources of noise in instrumental analysis, need for maximization of the signal to noise ratio, signal to noise enhancement, types of methods used introduction only. [3L]

**4.6 Turbidimetry and Nephelometry:** scattering of light, effect of concentration, particle size and wavelength on light scattering, instrumentation and applications. [3L]

**4.7 Mass spectrometry:** basic principles, introduction of components only. [2L]

**4.8 Introduction to radio analytical techniques:** classification of the techniques, introduction to neutron activation analysis and its applications [3L]

**4.9 Thermal methods,** classification of thermal methods, thermo gravimetric analysis, basic principles, instrumentation factors affecting the TG curve, applications. [4L]

### Practical Exercises for Paper IV

#### A Instrumental exercises [For 6 unit students only.]

1] Determination of amount of Fe (III) present in the given solution by EDTA titration colorimetrically.

- 2] Determination of Cr (VI) in the given solution as dichromate by the method of least squares, spectrophotometrically.
- 3] Determination of the amount of fluoride in the given solution colorimetrically.
- 4] Determination of potassium content of a commercial salt sample by flame photometry.
- 5] Determination of acetic acid content of a vinegar sample by potentiometric titration with sodium hydroxide using quinhydrone
- 6] Determination of Vitamin C content of a given tablet by titration with sodium hydroxide pH metrically.

### B Non-instrumental exercises [[For 6 unit students only.]

- 1] Estimation of persulphate in the given sample by the method of back titration.
- 2] Determination of the calcium and the magnesium content of a dolomite sample.
- 3] Determination of glucose content of a honey sample by Wilstater's method.
- 4] Determination of vitamin-C content of a tablet by titration with Ce (IV).
- 5] Determination of chemical oxygen demand of a water sample.
- 6] Determination of percentage purity of a sample of common salt using a cation exchanger.

### Practical Exercises for three unit students.

#### Instrumental Exercises

- 1] Determination of amount of Fe (III) present in the given solution by EDTA titration colorimetrically.
- 2] Determination of acetic acid content of a vinegar sample by potentiometric titration with sodium hydroxide using quinhydrone
- 3] Determination of Vitamin C content of a given tablet by titration with sodium hydroxide pH metrically.

#### Non-instrumental Exercises

- 1] Estimation of persulphate in the given sample by the method of back titration.
- 2] Determination of chemical oxygen demand of a water sample.
- 3] Determination of percentage purity of a sample of common salt using a cation exchanger.

#### Reference Books:

- 1 D. A. Skoog, D.M. West, F.J.Holler Fundamantal Analytical Chemistry, , 7<sup>th</sup> ed. Philadelphia, Saunders college Publishing, 1996
- 2 D. A. Skoog, D.M. West, F.J.Holler, T.A.Nieman, Principles of Instrumental Analysis, 5<sup>th</sup> ed. Philadelphia, Saunders college Publishing, 1996
- 3 G.D.Christian, Analytical Chemistry, 6<sup>th</sup> ed. John Wiley & Sons, new York, 2003.
- 4 J.G.Dick, Analytical Chemistry, International Student's Edition, McGraw Hill,

- Kogakusha Limited, New Delhi, 1973.
- 5 R.A.Dey & D.L.Underwood, Quantitative Analysis, 6<sup>th</sup> ed. Prentice Hall Of India Pvt. Ltd. New Delhi, 1993.
  - 6 M.Valcarcel, Principles Of Analytical Chemistry, Springer International Edition,
  - 7 E..Prichard, & V. Barwick, Quality assurance in Analytical Chemistry, Wiley.



Marks: 60 A. C. PAPER-I: DRUGS

Lectures: 60

Unit I

**1. General Introduction to drugs.**

- 1.1. Definition of a drug, requirements of an ideal drug, classification of drugs (based on therapeutic action) (6L)
- 1.2. Nomenclature of drugs : Generic name, Brand name, Systematic name.
- 1.3. Definition of the following medicinal terms: Pharmacoon, Pharmacophore. Prodrug. Half - life efficiency, LD<sub>50</sub>, ED<sub>50</sub>, Therapeutic index.
- 1.4. Brief idea of the following terms: Receptors, Drug - receptor interaction, Drug potency, Bioavailability, Drug toxicity, Drug addiction, Spurious drugs, Misbranded drugs, Adulterated drugs, Pharmacopoeia.

**2. Routes of drug administration and dosage forms:**

(2L)

- 2.1. Oral and parenteral routes with advantages and disadvantages.
- 2.2. Formulations, different dosage forms (emphasis on sustained release formulations).

**3. Pharmacodynamic agents:**

A brief introduction of the following pharmacodynamic agents and the study with respect to their chemical structure, chemical class, therapeutic uses, and side effects.

**3.1. CNS drugs:**

(5L)

- Classification based on pharmacological actions.  
Concept of sedation and hypnosis, anaesthesia  
Phenobarbitone (barbiturates)  
Phenytoin (hydantoin)  
Trimethadione (oxazolidinediones)  
Piracetam (pyranones)  
Midazolam, Alprazolam (benzodiazepines)  
Methylphenidate (piperidines)  
Chlorpromazine (phenothiazines)  
Fluoxetine (phenyl propyl amines).  
Syntheses of Trimethadione, Methylphenidate, Phenytoin.

(2L)

**3.2. Analgesics (Narcotics & Non-narcotics) and Antipyretics:**

- Classification of analgesics: Narcotics & non-narcotics.  
Morphine (phenanthrene alkaloids)  
Tramadol (cyclohexanols)  
Aspirin (salicylates)  
Paracetamol (*p*-aminophenols).  
Syntheses of Tramadol, Paracetamol.



## Unit II

(2L)

### 3.3. Anti-inflammatory drugs:

Mechanism of inflammation and various inflammatory conditions.  
Prednisolone; Betamethasone (steroids)  
Aceclofenac (aryl acetic acids)  
Mefenamic acid (N-aryl anthranilic acids).

**Synthesis of Aceclofenac.**

(2L)

### 3.4. Antihistaminic drugs:

Mechanism of histamine release and its action.  
Diphenhydramine (ethanolamines)  
Cetirizine (piperazinyls)  
Chlorpheniramine maleate (ethyl amines)  
Omeprazole, Pantoprazole (benzimidazoles).

**Synthesis of Cetirizine.**

### 3.5. Cardiovascular drugs:

(3L)

Classification based on pharmacological action.  
Enalapril ( $\alpha$ -amino acids)  
Isosorbide dinitrate (nitrates)  
Atenolol (aryloxy propanol amines)  
Nifedipine (pyridines)  
Chlorthiazide (thiazides)  
Frusemide/Furosemide (sulfamyl benzoic acid)  
Spironolactone (steroidal-17- $\gamma$ -lactones).

**Syntheses of Frusemide,**

Atenolol from 4-hydroxy phenyl acetamide.

### 3.6. Antidiabetic agents:

(2L)

General idea and types of diabetes, insulin therapy.  
Glibenclamide (sulphonyl ureas)  
Metformin (biguanides).

### 3.7 Antiparkinsonism drugs:

(2L)

Idea of Parkinson's disease.  
Procyclidine hydrochloride (pyrrolidines)  
Ethopropazine hydrochloride (phenothiazines)  
Levodopa ( $\alpha$ -amino acids).

**Synthesis of Levodopa from Vanillin.**

### 3.8 Drugs for respiratory system:

(2L)

General idea of Expectorants, Mucolytes, Bronchodilators.  
Decongestants and Antitussives.  
Bromhexine (phenyl methyl amines)  
Salbutamol, Pseudo-ephedrine (phenyl ethyl amines)

Oxymetazoline (imidazolines)  
Codeine Phosphate (opiates).

**Synthesis of Salbutamol.**

**3.9. Mode of action of the following drugs:**

Barbiturates (as sedatives and hypnotics)

Atenolol (as  $\beta$ -1 blocker)

Diphenhydramine (as antihistaminic agent)

Glibenclamide (as oral hypoglycemic agent).

(2L)

### UNIT III

**4.0. Drug discovery design and development:**

Discovery of a drug (Librium)

(5L)

Discovery of lead compound: Screening, drug metabolism studies and clinical observations.

Drug development from natural sources:

Anti infective agents,

Anti cancer agents,

CNS agents,

Development of drug: The pharmacophore identification, modification of structure or functional group, structure activity relationship (benzodiazepines, sulphonamides).

Structure modification to increase potency:

Homologation, chain branching, ring-chain transformation, extension of the structure.

Computer assisted drug design.

**5.0. Drug metabolism:**

(3L)

Introduction,

absorption, distribution, bio-transformation, excretion.

Different types of chemical transformation of drugs with specific examples.

**6.0. Chemotherapeutic agent:**

Study of the following chemotherapeutic agents with respect to their chemical structure, chemical class, therapeutic uses, and side effects.

(3L)

**6.1. Antibiotics:**

Definition, characteristics and properties

Amoxicillin; Cloxicillin ( $\beta$ -lactum antibiotics)

Cephalexin (cephalosporins)

Doxycycline (tetracyclines)

Gentamycin (aminoglycosides)

Ciprofloxacin (quinolones).

**Synthesis of Ciprofloxacin.**

(2L)

**6.2. Antimalarials:**

Types of malaria, symptoms, pathological detection during window period.

(Life cycle of the parasites not to be discussed)

Chloroquine (4-amino quinolines)  
Paludrine (biguanides)  
Pyrimethamine (diamino pyrimidines)  
Artemether ( benzodioxepins)

Following combination to be discussed

- i) Sulfadoxine+Pyrimethamine
- ii) Artemether+Lumefantrine (no structure)

**Syntheses of Pyrimethamine, Paludrine.**

### 6.3. Anthelmintics:

(2L)

Drugs effective in the treatment of nematodes and cestodes infestations.

Diethyl carbamazine (piperazines)

Mebendazole, Albendazole (benzimidazoles)

Niclosamide (amides).

**Synthesis of Albendazole.**

## Unit IV

### 6.4. Antiamoebic drugs:

(1L)

Types of amoebiasis,

Metronidazole, Ornidazole (nitroimidazoles)

Diloxanide furoate (furans)

Following combination therapy to be discussed:

Ciprofloxacin+Tinidazole.

**Synthesis of Metronidazole.**

### 6.5. Antitubercular and Antileprotic drugs:

(4L)

Types of tuberculosis, symptoms and diagnosis of tuberculosis.

Types of leprosy.

General idea of antibiotics used in their treatment.

PAS (aminosalicylates)

Isoniazide (hydrazides)

Pyrazinamide (pyrazines)

(+) Ethambutol (aliphatic diamines)

Ethionamide (thioamides)

Dapsone (sulfonamides)

Clofazimine (phenazines).

Following combination therapy to be discussed:

i) Rifampin + Ethambutol + Pyrazinamide.

ii) Rifampin + Isoniazide + Pyrazinamide.

iii) Rifampin + Clofazimine + Ethionamide.

**Syntheses : (+) Ethambutol,**

**Ethionamide, Dapsone.**

**Anti neoplastic drugs:**

Idea of malignancy, causes of cancer, brief idea of immunostimulants, immunodepressants. (2L)

Lomoustine (nitrosoureas)  
Fluorouracil (pyrimidines)

Estrogen (steroidal hormones)  
Mitomycin C (antibiotics)

Vincristine, Vinblastine, Vindesine (vinca alkaloids structures not expected).

**Synthesis :** 5-Fluorouracil from urea.

**Anti HIV drugs:**

Idea of HIV pathogenecity, symptoms of AIDS. (1L)

AZT, Lamivudine, Stavudine (pyrimidines), DDI (purines).

**Drug Intermediates: Syntheses and uses:**

i) 2-Amino-5-chlorobenzophenone from p-chloronitrobenzene. (3L)

ii) 2,4,6-Triamino-6-hydroxypyrimidine from guanidine.

iii) 4-Chloro-5-sulphonyl amino anthranilic acid from 4-chloro-2-toludine.

iv) p-[2'-(5-Chloro-2-methoxy benzamido) ethyl]-benzenesulphonamide from methyl-5-chloro-2-methoxybenzoate.

v) 4-(p-Chlorophenyl)-4-hydroxypiperidine from 4-chloroacetophenone .

vi) p-Acetyl amino benzenesulphonyl chloride from aniline.

vii) Epichlorohydrine from propene. (4L)

**Nanoparticles in medicinal chemistry:**

Introduction, carbon nanoparticles (structures).

Carbon nano tubes:

- Functionalisation for pharmaceutical applications,
- Targeted drug delivery,
- In vaccine (foot and mouth disease),
- Use in bio-physical treatment.

Gold nanoparticles in treatment of cancer, Parkinsonism, Alzheimer.

Silver nanoparticles: Antimicrobial activity.

Marks -60

## UNIT I

5L

## 1. Introduction to dyestuff chemistry:

- 1.1 Important landmarks in the history of dyes
- 1.1.1 Natural colouring matters and their limitations: eg: Henna, Turmeric, Kesar, Chlorophyll, Indigo, Alizarin from roots of madder plants, Logwood, Tyrian purple, Cochineal.
- 1.1.2 Important milestones in the development of the synthetic dyes: Mauve, Diazotization, Bismark Brown, Aniline Yellow, Congo Red, Indigo, Indanthrene, Disperse dyes, Fluorescent brighteners, Procion reactive dyes, Remazol dyes (emphasis on name of the scientist and the year of the discovery of dye. Structure is not expected).
- 1.2 Definition of dyes, properties i.e. colour, chromophore, auxochrome, solubility, linearity, coplanarity, fastness properties, substantivity, economic viability.
- 1.3 Explanation of nomenclature of commercial dyes with atleast one example.  
Suffixes-G, O, R, B, 6B, GK, 4GK, 6GK, L, S  
Explanation: Naming of dyes by colour index (two examples).
- 1.4 Brief idea of the important dye industry.

## 2. Classification of dyes based on constitution:

4L

(Examples as mentioned below with structures)

I. Nitro dyes-Naphthol Yellow S

II. Nitroso dyes- Gambine Y

III. Azo dyes-

a. Monoazo dyes - Metanil Yellow

b. Disazo dyes - Naphthol Blue Black

c. Trisazo dyes - Chloramine Green B

IV. Diphenylmethane dyes- Auramine G

V. Triphenylmethane dyes-

a. Malachite Green series- Naphthalene Green V

b. Magenta series-Acid Magenta.

c. Rosolic acid series -Chrome Violet

VI. Heterocyclic dyes-

a. Xanthenes-Rhodamine 6G

c. Azines-Safranin B

e. Thiazines- Methylene Green

g. Thiazoles - Primuline

b. Acridines- Acriflavine

d. Oxazines-Capri Blue

f. Quinolines- Quinoline Yellow

VII. Benzoquinones and Naphthaquinones-Naphthazarin

VIII. Anthraquinone dyes-Flavanthrene, Indanthrene, Turquoise Blue 3GK

IX. Indigoids- Indigo Carmine.

X. Phthalocyanines- Sirius Light Green FFGL



**Classification based on applications:**

6L

- a. Definition, fastness properties & applicability on substrates, examples with structures.
- b. Acid dyes- Orange II, Alizarin Sky Blue B.
- c. Basic dyes- Methyl Violet, Victoria Blue B.
- d. Direct Cotton dyes- Chrysophenine G, Benzo Fast Yellow 5GL.
- e. Azoic dyes-Diazo components: Fast Yellow G, Fast Orange R;
- f. Coupling components: Naphthol AS, Naphtol ASG.
- g. Mordant dyes- Eriochrome Black A , Alizarin.
- h. Vat dyes- Indanthrene Brown RRD, Indanthrene Red 5GK, Caledon Jade Green.
- i. Sulphur dyes- Sulphur Black T. (No structure)
- j. Disperse dyes- Celliton Fast Brown 3R, Perlon Fast Blue FFR.
- k. Reactive dyes- Cibacron Brilliant Red B, Procion Brilliant Orange MG, Procion Brilliant Blue HB.

**Unit II**

**4. Colour and chemical constitution of dyes:**

5L

- 4.1 Absorption of visible light, colour of wavelength absorbed, complementary colour.
- 4.2 Relation between colour & chemical constitution.
  - i. Witt's Theory: Chromophore, auxochrome, bathochromic and hypsochromic shift, hypochromic and hyperchromic effect.
  - ii. Armstrong theory (quinonoid theory) and its limitations.
  - iii. Valence bond theory: Comparative study and relation of colour in the following classes of compounds / dyes: benzene, nitrobenzene, nitroanilines; nitrophenols; benzoquinones; azo; triphenylmethane; anthraquinone.
  - iv. Molecular orbital theory.

**5. Non-textile uses of dyes:**

6L

Structural features of the substrate, fastness and other property requirements and main classes of dyes used to be mentioned as applicable.  
(Two examples with structures for each of the following)

1. Leather dyes
2. Paper dyes
3. Foodstuff dyes
4. Cosmetics dyes
5. Medicinal dyes
6. Biological staining agents
7. Indicators & analytical reagents
8. Coloured smokes & camouflage colours
9. Laser dyes
10. Solvent dyes

**6. Optical brighteners:**

2L

General idea and important characteristics of optical brighteners, one example each with structure of the following classes: Stilbene, coumarin, heterocyclic vinylene derivatives, diaryl pyrazolines, naphthalimide derivatives.



**7. Organic pigments:**

General idea, distinguish between dyes and pigments. Important characteristics of organic pigments, toners & lakes. Classification of organic pigments with suitable examples, i.e. Ionic pigments-lakes of acid and basic dyes, Nonionic pigments- azo, indigoid, anthraquinone, quinacridone, phthalocyanine (Copper phthalocyanine).  
Uses of pigments.

**UNIT III**

11 L

**8. Intermediates:**

8.1 A brief idea of unit processes

8.1.1 Introduction of primary intermediates, unit processes

8.1.2 a. Nitration

b. Sulphonation

c. Halogenation

d. Diazotization: 3 different methods

e. Ammonolysis

f. N- and O- alkylation

g. Oxidation

N.B: Definition, reagents, examples with reaction conditions (mechanism is not expected)

8.2 Preparation of the following intermediates.

8.2.1 Benzene derivatives: Benzenesulphonic acid, 1,3 - benzenedisulphonic acid,

Phenol, resorcinol, sulphanilic acid, o-,m-,p-chloronitrobenzenes,

o-,m-,p- nitroanilines, o-,m-,p- phenylenediamines, picric acid, Naphthol ASG.

8.2.2 Naphthalene derivatives:  $\alpha,\beta$ - Naphthols,  $\alpha,\beta$ - naphthylamines, Schaeffer acid, Tobias acid, naphthionic acid, N.W. acid, Clev-6-acid, H acid, Naphthol AS.

8.2.3 Anthracene derivatives: 1-Nitroanthraquinone, 1-aminoanthraquinone, 2-aminoanthraquinone, 2-methylanthraquinone, anthraquinone-1-sulphonic acid, anthraquinone-2-sulphonic acid, 1- chloroanthraquinone, 2-chloroanthraquinone; benzanthrone.

**9. Dyeing methods and forces of binding dyes to the fibres**

4L

9.1 Dyeing methods of cotton fibres.

i. Direct dyeing

ii. Vat dyeing

iii. Mordant dyeing

iv Disperse dyeing

9.2 Forces binding dyes to the fibres: Ionic forces, hydrogen bonds, Vander Waal's forces, covalent linkages.

**Unit IV****10. Synthesis of specific dyes and their uses:**

12L

i. Orange IV from sulphanilic acid

ii. Tartrazine by using ethyl acetate and diethyl oxalate

iii. Eriochrome Black T from  $\beta$ - naphtholiv. Eriochrome Black A from  $\beta$ - naphthol and  $\alpha$ - naphthol

v. Eriochrome Red B by using ethyl acetoacetate and 1- amino 2- naphthol-4-sulphonic acid

vi. Direct Deep Black EW by using benzidine, H acid, aniline, and m-phenylene diamine.

vii. Congo Red from nitrobenzene

- viii. Diamond Black F by using 5-amino salicylic acid, N.W.acid and  $\alpha$ -naphthylamine
- ix. Malachite Green by using benzaldehyde and N,N dimethylaniline.
- x. Auramine O from N,N dimethylaniline.
- xi. Methylene Blue by using 4-amino- N,N dimethylaniline and N,N dimethylaniline
- xii. Afranine T by using o-toluidine and aniline
- xiii. Pararosaniline by using p- toluidine and aniline
- xiv. Alizarine Cyanine Green G by using phthalic anhydride and p-chlorophenol
- xv. Indanthrene from anthraquinone
- xvi. Disperse Yellow 6G from benzanthrone
- xvii. Indigo from aniline
- xviii. Thioindigo from anthranilic acid
- xix. Eosine by using phthalic anhydride and resorcinol
- xx. Bismark Brown from m-phenylenediamine

**11. Types of fibres and classes of dyes applicable to it.**

1L

11.1 Introduction to the following types of fibres with structures and classes of dyes applicable to it. Cotton, wool, silk, polyester.

**12. Ecology and toxicity of dyes:**

2L

With reference to the textile dyes, food colours, benzidine.

(Total marks: 80)

**Drugs and Dyes Practicals**

**30 marks**

**I. Preparation:**

1. Aspirin
2. p-nitroacetanilide
3. p-nitroaniline
4. Orange II
5. m-dinitrobenzene
6. m-nitroaniline
7. Methyl salicylate

**20 marks**

**II. Estimation:**

1. Ibuprofen
2. Tincture iodine
3. Aromatic primary amino group (aniline or p-toluidine by diazotisation)
4. Methyl Orange/Eriochrome Black T/ Eosin/Congo Red by colorimetry
5. Vitamin C from fruit pulp ( lemon/orange/amala/sweet lemon)
6. Acid neutralizing capacity (gelucil/Digene)

**III. Viva Voce (Pertaining to the experiments prescribed in the syllabus): 10 marks**

**IV. Project work (To be recorded in journal):**

**10 marks**

1. Preparation of monogram of any one drug from the syllabus by I. P. method.
2. Dyeing of fabric (cotton) by Direct dyeing or Vat dyeing.

**V. Journal:**

**10 marks**

Practical examination will be for one day with 7.0 hours duration.

## Reference Books:

### Drugs:

1. Foye's principles of medicinal chemistry. 6th Edition, Edited by Davis William & Thomas Lemke, Indian edition by B I Publication Pvt Ltd, Lippincott Williams & Wilkins.
2. Text book of organic medicinal & pharmaceutical chemistry. Wilson & Gisovolds, 11th Edition by John H Block, John M Beale Jr.
3. Strategies of organic drug synthesis and design. By Daniel Lednicer A Wiley Interscience Publications, John Wiley and Sons.
4. Text book of drug design and discovery. Povl-Krog-Sgaard-Larsen, Tommy Liljefors and ULF Madsen, 3rd Edition Taylor & Francis.
5. Principle of medicinal chemistry. Vol 1 & 2 S. S. Kadam, K. R. Mahadik, K. G. Bothara
6. Medicinal chemistry. V. K. Ahluwalia, Madhu Chopra
7. Synthesis of essential drugs. Ruben Vardanyan, Victor Hruby
8. Contemporary drug synthesis. Jie Jack Li, Douglas Johnson, Drago Sliskovic, Bruce Roth
9. Bioapplications of nanoparticles. Edited by Warren C.W. Chan, Springer Publication
10. Nanoparticle and technology for drug delivery (Drugs and pharmaceutical sciences). Ram B. Gupta & Uday B. Kompella Pub. Informa Healthcare.
11. Nano forms of carbon and its applications. Edited by Maheshwar Sharon and Madhuri Sharon. Monad Nanotech Pvt. Ltd.
12. Profiles in drug synthesis. Vol. I & II. Gokul Publisher, Edited by Dr. V. N. Gogte.
13. The organic chemistry of drug design & drug action. 2nd ed. By Richard B. Silvermann. Academic Press.
14. Medicinal chemistry. Ashutosh Kar, Anshan Publisher.
15. Medicinal chemistry. V.K. Ahluwalia and Madhu Chopra, CRC Press.

### Dyes:

1. The chemistry of synthetic dyes. Vol. I to VI
2. The chemistry of synthetic dyes and pigments.
3. Colour chemistry
4. Colour chemistry
5. Unit process
6. Synthetic dyes
7. The Physical chemistry of dyeing
8. Chemistry of dyes and principles of dyeing
9. Practical organic chemistry

K. Venkataraman  
H. A. Lubs  
H. Zollinger  
R. L. M. Allen  
Groggins  
M. S. Yadav  
Thomas Vickerstaff  
V. A. Shenai  
A.I. Vogel

UNIVERSITY OF MUMBAI  
FINAL DRAFT OF HEAVY AND FINE CHEMICALS SYLLABUS  
T.Y.B.Sc. (CHEMISTRY)

DRAFT SYLLABUS FOR THE SUBJECT OF HEAVY (BULK) AND FINE  
(SPECIALITY) CHEMICALS PRESCRIBED UNDER THE APPLD COMPONENT  
GROUP FOR THE T.Y.B.Sc. (CHEMISTRY) UNDER THE REVISED PATTERN—  
2009—2010

PAPER - I

Marks: 60

Lectures: 60

UNIT-I

**Topic 1. Introduction to Chemical Industry.**

Explanation of the terms Heavy (Bulk) and Fine (speciality) Chemicals. 2L

**Topic 2. Different Sources of Energy —**

Generation, Treatment of boiler feed water, Properties of steam, steam table. 3L

**Topic 3. Refrigeration:**

System, media used for cold transfer (i.e. brine and other) 3L.

**Topic 4. Silicates:**

a) Introduction to silicates: Properties, structure and types of silicates.  
Preparation of sodium silicate.

b) Glass — Composition, types and applications. 4L

3L

Total lectures for unit-I

15

UNIT-II

**Topic 1: Pumps for chemical work**

11L

a) Pumping equipment for liquids — piston pump, diaphragm pump, gear pump, centrifugal pumps, and submersible pumps.

b) Vacuum systems oil sealed pumps, ejectors.

**Topic 2: Design of vessel :**

Classification of chemical reactors, pressure vessels for internal or external pressure, maintenance, storage vessels for liquids and gases 4L

Total lectures for unit-II

15

UNIT—III

**Topic 1. Manufacture and applications of the following: -**

1 a) Hydrogen fluoride b) Nitric acid

2. Phosphorous oxychloride.

3 a) Sodium dichromate

4) Sodium hydroxide

b) Chromium trioxide

4L

3L

5L

3L

Total lectures for unit-III

15

**UNIT-IV**

**Topic 1: Manufacture and uses of Industrial gases:** Hydrogen and acetylene 2L

**Topic 2: Industrial preparation of Inorganic Fine chemicals:**  $KMnO_4$ ,  $FeSO_4$  2L

**Topic 3: Fertilizers: Preparation, properties and uses of**

- a) Normal superphosphate
- b) Triple Superphosphate
- c) Ammonium nitrate
- d) Ammonium Sulphate 4L

**Topic 4: Zeolites, Clay and Ion-exchange resin** 3L

**Topic 5: Composite material:** 4L

Introduction, Constitution of composition, Classification of composites, Particle Reinforced composites, Fibre reinforced composites, Structural composites or Layered composites, Application of composite material.

**Total lectures for unit-IV** 15

-----X-----



UNIT-V

- Topic 1: Brief idea about economic aspects of chemical manufacturing processes** 4L  
 Location, Raw material, Energy, Capital, Manpower, Ecological aspects, Tax benefits.
- Topic 2: Phase transfer catalysts:** 3L  
 Introduction, mechanism of action, advantages and two Examples
- Topic 3: Brief account of perfumes, flavours and sweetners:**
- a) **Perfumes**— Introduction, classification (ethers, esters and essential oils) Composition, formation, blending and applications. Synthesis of  $\alpha$  and  $\beta$  -ionones from citral. 3L
- b) **Flavours** — Introduction Classification (natural and synthetic), applications Vanillin, coumarin (structures). Synthesis of vanillin. 2L
- c) **Sweeteners**— Introduction, classification with examples and structures of 3L
- i) **Natural sweetners** :Carbohydrates(Glucose,Fructose)
- ii) **Synthetic sweetners:** i) Sucralose  
 ii) Sulphonamide: eg Saccharin  
 iii) Peptides: Synthesis of aspartame

Total lectures for unit-V

15

UNIT-VI

- Topic 1: Agrochemicals** 8L  
 Classification with examples, Insect attractants and repellents, plant growth regulators.
- Topic 2: Manufacture of soaps:** Raw material, Preparation, properties and types of soaps 2L
- Topic 3: Small scale industry and R and D technology:** 5L  
 Need and scope of small scale industry, SSI rules and regulations, R and D, technology transfer, Role of R and D, Functional structure of R and D unit, Research strategies and manufacturing interface, University —industry interface, Patents.

Total lectures for unit-VI

15

UNIT—VII

- Topic 1: Manufacture of:** - Acetic acid, ethyl acetate, isopropyl alcohol 4L
- Topic 2: Unit operations** : Crystallisation, Filtration, Distillation, Drying. 8L
- Topic 3: Fluoroaromatics:** 3L  
 Introduction, important reagents used for fluorination. Preparation of ortho-fluorotoluene and 3-chloro, 4-fluoro anilines. Application of Teflon

Total lectures for unit-VII

15

**Topic 1: Industrial solvents:-**

Brief idea of green solvents. Uses of the following as solvents in industrial processes — **3L**

- a) Acetone b) Ethyl acetate c) Isopropanol d) Toluene e) Dimethyl formamide

**Topic 2: Introduction to drugs:**

Terminology, Classification with one example each **6L**

Synthesis and uses of

- 1) Ethambutol                      2) Mebendazole  
4) Ibuprofen                        5) Miconidazole                      3) Benadryl

**Topic 3: Introduction to dyes:**

Dye, Chromophore (with example), Auxochrome (with example) **6L**  
Synthesis and uses of the following dyes:

- 1) Indigo                              2) Alizarin                      3) Eriochrome black-T  
4) Auramine-O                      5) Procion-red

**Total lectures for unit-VIII**

**15**

-----X-----

## PRACTICAL SYLLABUS

### PAPER-I

- 1) Preparation of: i) Ferrous sulphate ii) Copper sulphate.
- 2) Estimation of  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  in washing soda.
- 3) Determination of thiosulphate content of a commercial hypo solution.
- 4) Estimation of available chlorine in the sample of bleaching powder.
- 5) Determination of the amount of magnesium hydroxide in a commercial milk of magnesia.
- 6) Determination of the amount of phosphoric acid in a given sample. (Students to prepare succinic acid solution for standardization).

### PAPER -II

- 1) Preparation of: i) Aspirin ii) Cinnamic acid.iii) Nerolin
- 2) Estimation of ibuprofen in the given sample.
- 3) Estimation of ascorbic acid in cola.
- 4) Estimation of aspirin by iodometry.
- 5) Estimation of acetic acid in a sample of vinegar.

**Demonstration Experiments:1) Steam distillation**

**2) Fractional distillation**

**3) Preparation of cold creams, vanishing cream and local analgesic**

UNIVERSITY OF MUMBAI  
DRAFT SYLLABUS  
FOR THE SUBJECT OF  
NONCONVENTIONAL SOURCES OF ENERGY AND WASTE RECYCLING  
PRESCRIBED UNDER THE APPLIED COMPONENT GROUP

At T.Y. B. Sc.

EFFECTIVE FROM 2010-2011

PAPER -I: NON-CONVENTIONAL SOURCES OF ENERGY. (60 LECTURES)

**UNIT-I:**

**1.1 Perspectives on Energy Sources and Utilization:**

15L

1.1.1 Definitions, units and concept.

1.1.2 Energy needs for the domestic, industrial and agricultural and transport sector, energy utilization and sustainable development, patterns of energy use in different parts of the world, depletion of energy sources.

1.1.3 Various types of energy sources, conventional/ non conventional, renewable / non renewable, fossil fuels: coal, oil, natural gas; thermal, hydroelectric and nuclear.

1.1.4 Environmental implications of energy use, energy storage and conservation, Role of Government and non government organization, socio-economic aspects, Government policies.

1.1.5 Process optimization from energy point of view; entrepreneurship opportunities and process economics.

**Unit -II:**

**Study of the following non conventional energy sources with respect to scope, present scenario, applications, limitations and future prospects:** 15L

**2.1 Solar Energy**

7L

2.1.1 Solar spectrum and its relevance as the energy source, solar radiation, conversion of solar energy into heat energy in solar collectors, Fresnel lenses, parabolic reflectors.

2.1.2 Photovoltaic effect, semi-conductors as solar energy converters, different materials used, effect of different parameters on the photovoltaic efficiency, effect of temperature, solar cells.

2.1.3 Photo-electrochemical process for the conversion of solar energy; applications of solar energy for different purposes.

3L

**2.2 Wind Energy**

2.2.1 Wind velocity and generation of wind energy

2.2.2 Description of wind mills and its working, rotor with blades, gear generator, vertical and horizontal axis of rotation.

2L

**2.3 Tidal Energy:**

2.3.1 Tide height and its potential for power generation.

2.3.2 Construction of dam across sea basin, installation of the turbine, specification of the basin.

3L

**2.4 Geothermal Energy:**

2.4.1 Origin of geothermal heat, temperature gradient, geothermal steam and hot spring, Geysers

2.4.2 Power production from geysers, mantle as source.

### Unit III:

**3.1 Study of the following non conventional energy sources with respect to scope, present scenario, applications, limitations and future prospects:**

**3.1.1 Ocean Thermal Energy Conversion:**

**3L**

**3.1.1.1** Surface and deep water temperature of oceans, temperature difference as a driving source for power generation.

**3.1.1.2** Requirements for a practical OTEC plant, different working fluids.

**3.2 Study of the following energy sources**

**9L**

**3.2.1 Fuel Cells:**

**3.2.1.1** Electrochemical energy conversion, basic principle of fuel cells, distinction between fuel cell and battery.

**3.2.1.2** Thermodynamic and kinetic effects of the fuel cell.

**3.2.1.3** Hydrogen – oxygen fuel cell, organic oxygen fuel cell

**3.2.1.4** Applications of fuel cells.

**3.3 Hydrogen as a potential fuel:**

**3.3.1** Advantages

**3.3.2** Economically viable production of hydrogen, photolysis of water

### Unit IV

**4.1 Biomass:**

**15L**

**4.1.1** Solar energy flow and its contribution to biomass production, energy from plants.

**4.1.2** Feasible biomass conversion technologies, thermo chemical combustion, pyrolysis, gasification.

**4.1.3.** Alcohol from fermentation of sugars, enzyme reactor for continuous production of alcohol. Biodiesel.

**4.1.4** Fuels from farm and animal waste: fermentation and production of methane in the biogas plant, domestic and industrial use of bio gas.

**4.1.5** Municipal and industrial solid waste, as heat source.

Unit I:

**1.1 Introduction to waste management**

12L

- 1.1.1 Definition of waste, concept of waste management, end of the pipe treatment, in plant treatment, introduction to green chemistry.
- 1.1.2 Recovery, reuse, recycle and disposal of waste, economic viability of each of the above, waste audit.
- 1.1.3 Types of waste, domestic, industrial, agricultural and commercial waste; gaseous, solid and liquid waste.

**1.2 Particulate matter and its management:**

3L

- 1.2.1 Particulate matter, sources, characterization, effects.
- 1.2.2 Disposal methods, cyclone separator, wet scrubber, electrostatic precipitator, fabric filter.

Unit II:

**2.1 Solid Waste Management:**

15L

- 2.1.1 Sources and generation of solid waste, their characterization, chemical composition and classification.
- 2.1.2 Recycling of metal, paper, plastic rubber and glass.
- 2.1.3 Methods of disposal of solid waste, dumping of garbage, sanitary landfills, composting, soil conditioning, incineration; vermin- composting
- 2.1.4 Hazardous waste, definition, classification, methods of minimization; toxic waste, disaster management and risk analysis, restriction of hazardous substances.
- 2.1.5 Radioactive waste, sources, effects on plants, animal and man, level of activity and management, minimization and treatment.
- 2.1.6 E-waste , types, hospital waste, disposal and preventive measures WEEE.

Unit III:

**Introduction to liquid waste and managements of gaseous waste**

15L

**3.1 Introduction to liquid waste**

9L

- 3.1.1 Sources and generation of liquid waste, their characterization.
- 3.1.2 Physical parameters; colour, odour, turbidity, TSS, TDS, TS
- 3.1.3 Chemical parameters: pH, acidity, alkalinity, hardness, DO, COD, TOC, THOD and BOD. Chemical composition, classification.

**3.2 Management of gaseous waste:**

6L

- 3.2.1 Sources, types and effects; vehicular and chimney exhaust
- 3.2.2 Treatment methods, adsorption, absorption, catalytic
- 3.2.3 Minimization methods, economic viability of reuse.

Unit IV:

15L

**Liquid Waste Management**

- 4.1 Use of COD, BOD and TOC for deciding the process with respect to treatment.
- 4.2 Pre-primary treatment: neutralization, equalization screening, sedimentation, coagulation, and filtration
- 4.3 Primary treatment: screening, sedimentation, coagulation, filtration
- 4.4 Secondary treatment: principles of the biological treatment of liquid waste,



- 4.5 Various processes used for, aerobic and anaerobic process.- mechanism and different methods.
- 4.6 Aerobic process, oxidation ponds, oxidation ditch, lagoons, activated sludge process and trickling filter process.
- 4.7 Anaerobic processes, anaerobic contact process
- 4.8 Tertiary treatment, reverse osmosis, ultra filtration electrodilysis, ion exchange, ozone treatment, Fenton's reagent
- 4.9 Characterization of effluent from i) pharmaceutical ii) food and beverage iii) Fertilizer and iv) petrochemical industry

**LIST OF PRACTICALS & GROUP ASSESSMENT:**

**(a) The practicals to be carried out by each student**

**30 Marks**

1. Determination of COD of the waste water sample.
2. Construction of the breakthrough curve and hence determination of breakthrough capacity of the given ion exchanges resin.
3. Removal of hardness of the water sample by chemical addition- optimization study.
4. Removal of colouring matter from the waste water sample by adsorption - optimization study.
5. Determination of BOD of the waste water sample.
6. Determination of nitrite colorimetrically from the waste water sample.
7. Determination of Sulphate in the given water sample by benzidine sulphate method.
8. Determination of Cr (VI) spectrophotometrically in the given water sample.

**(b) Experiments to be conducted by a group of students (Project Work): 20 Marks**

1. Visit to any one of the sites or units where non-conventional sources of energy are being harnessed. Write a detailed report of the visit and the any studies undertaken.
2. Given characteristics of waste water released from an industry, prescribe suitable methods for its treatment. Describe various steps required to optimize the process. Submit as the project report.
3. The candidate shall submit the project work report to the laboratory supervisor, on the day of inspection, who in turn will make it available to the examiners.

**(c) Journal**

**(d) Viva-voce examination**

**(e) Presentation**

**: 5 Marks**

**: 5 Marks**

**: 20 Marks**

# REFERENCE BOOK

- 1 Solar energy: principles of thermal collection and storage - S.P. Sukhatme, Tata Mcgraw Hill, New Delhi 1990
- 2 Fuel Cell Will Mitchell, Academic Press 1963
- 3 Photo electrochemical Cells: Studies in Physical and theoretical Chemistry, Vol.50 K.V.S.Santham & M.Sharma, Elsevier Publishing Company, Amsterdam, 1988
- 4 Wastewater Treatment and pollution control : S.A.Arsewala, Tata Mcgraw Hill, New Delhi 1990
- 5 Pollution Control in Process Industries: S.P.Mahajan, Tata Mcgraw Hill, New Delhi 1990
- 6 Waste Water Treatment: M.N. Rao and A.K. Datta, Oxford and IBH Publishing 1978
- 7 Nonconventional energy sources: G.D. Rai: 4<sup>th</sup> edition, Khanna Publishers, New Delhi 1996
- 8 Waste Recycling and Pollution control Handbook, A.V. Bridge Water & Mumford
- 9 Basic Photovoltaic Principles & Methods, Solar Energy Research Institute.
- 10 Industrial Water Pollution control, Eckenfelder, 2<sup>nd</sup> edition Mcgraw Hill Book Company, 1989
- 11 Nonconventional Energy Systems, Principles, Progress and Processes, K.M. Mittal, 1<sup>st</sup> edition, Wheeler Publishers, New Delhi.
- 12 Solar Energy Utilization, G. D. Rai, 5<sup>th</sup> edition, Khanna Publishers, New Delhi 1989.

**UNIVERSITY OF MUMBAI**  
**DRAFT SYLLABUS FOR THE SUBJECT OF PETROCHEMICALS**  
Prescribed under the APPLIED COMPONENT group for the T.Y.B.Sc. (Chemistry)  
Under the revised pattern 2010-2011

Paper – I

Marks -60

Lecture- 60

**Unit I:**

**1.1 PETROLIUM EXPLORATION & PRODUCTION:**

- 1.1.1 Introduction
- 1.1.2 Formation of Oil and Gas
- 1.1.3 Characteristics of crude oils
- 1.1.4 Oils & Gas Exploration
- 1.1.5 Drilling for Oil and Gas
- 1.1.6 Production of Crude oil and Natural gas

(8L)

**1.2 INORGANIC CHEMICALS FROM PETROLEUM:**

- 1.2.1 Sulphur byproducts
- 1.2.2 Hydrogen
- 1.2.3 Petroleum coke
- 1.2.4 Nitrogen compound

(7L)

**Unit II:**

**2.1 REFINERY PROCESSES AND PRODUCTS:**

- 2.1 Chemical Composition
- 2.2 Meaning of terms such as flash, ignition point, octane number, doctor Solution smoke print, calorific value.
- 2.3 Distillation – separation based on relative volatilities – fractions obtained with flow sheet diagrams.
- 2.4 Petroleum Product – Manufacture, Composition and uses of LPG, Naphthol, Gasoline, Kerosene.
- 2.5 Conditions of conversion processes, (catalyst, temperature, pressure etc) Mentioned below – Pyrolysis, Catalytic cracking and hydro cracking, Isomerisation, Alkylation Reforming

(15L)

**Unit III:**

**3.1 SOURCES OF THE FOLLOWING SECONDARY MATERIALS FROM PETROCHEMICALS**

- Methane, ethylene, acetylene, propylene, C<sub>4</sub> hydrocarbons, Higher olefins and aromatic hydrocarbons with flow sheet diagrams.

(10L)

**3.2 GENERAL STUDY OF THE FOLLOWING REACTIONS USED IN PETROCHEMICAL INDUSTRY**

- 3.2.1 Oxidation
- 3.2.2 Ammoxidation
- 3.2.3 Hydroformylation (oxoreaction)

(05L)

**Unit IV**

**4.1 GENERAL STUDY OF THE FOLLOWING REACTIONS USED IN  
PETROCHEMICAL INDUSTRY**

4.1.1 Hydration of olefins

(05L)

4.1.2 Chlorination

4.1.3 Polymerisation ( free radical and ionic)

**4.2 UNIT OPERATIONS**

(10L)

4.2.1 Extraction

4.2.2 Filtration

4.2.3 Crystallization

4.2.4 Drying

4.2.5 Evaporation

4.2.6 Cooling

UNIT –I**1.1 PREPARATION OF IMPORTANT CHEMICALS****1.1 From ethylene and propylene**

Ethyl chloride, ethylene oxide, ethylene glycol, ethanalamine and acetaldehyde, ethanol, acetic acid, styrene, vinyl acetate, isopropanol, cumene, glycerine, and acrylonitrile (12L)

**1.2 From C<sub>4</sub> – hydrocarbons, Butadiene, isobutene and butane**

(3L)

UNIT-II

2.1 From methane and carbon monoxide, Methanol, chlorinated methanes, carbon disulphide, hydrogen cyanide and carbon black (6L)

2.2 From acetylene Vinyl chloride, Chloroprene, acrylonitrile and acetaldehyde (4L)

2.3 From aromatic hydrocarbon Aniline, chlorobenzene, D.D.T, Xylene, Phthalic anhydride, Terephthalic acid Phenol and maleic anhydride : (5L)

UNIT –III**3.1 INDUSTRIAL CHEMICALS**

3.1.1 Plastic- polyethylene, polyvinyl chloride, polystyrene. (10L)

3.1.2 Synthetic elastomers- styrene, Butadiene rubber, polychloropropene, nitrile rubber.

3.1.3 Synthetic fibres- polyester, polyamide, acrylics.

**3.2 SYNTHETIC DETERGENTS**

3.2.1 Introduction of Soap and Detergents (5L)

3.2.2 Classification of detergents

3.2.3 Surface active agents

UNIT-IV**4.1 SYNTHETIC DETERGENTS**

4.1.1 Wetting agents

4.1.2 Emulsifying agents

4.1.3 Preparation of Dodecyl Benzene sulphate .

4.1.4 Finishing of Detergents

(5L)

**4.2 ENVIRONMENTAL POLLUTION CONTROL IN PETROLEUM REFINERIES**

4.2.1 Air pollution: a) Introduction b) Air Pollutants from refining operation (10L)  
c) Air Pollution control technique

4.2.2 Water Pollution: a) Introduction of water pollution b) Types of water pollution  
c) Control of water pollution in petroleum refining. d) Study of various parameters of polluted water.

**SYLLABUS FOR PRACTICALS IN THE SUBJECT OF PETROCHEMICALS**  
**(Applied component) Paper I and II**

Marks : 80

**I- Preparations:**

1. Hydroquinone to Benzoquinone
2. Phthalic anhydride to phthalamide
3. Salicylic to Aspirin
4. Aniline to p- aminodiazobenzene
5. Benzoylation of  $\beta$ -naphthol
6. Nerolin from  $\beta$ -naphthol

**II - Estimation of:**

1. Saponification of Oil
2. Ethyl methyl ketone
3. Estimation of Formaldehyde
4. Determination of COD value of water

**III- Applied Experiments**

- i) Determination of Specific gravity and viscosity of Oil
- ii) Determination of acid number of oil.
- iii) Determination of acidity and alkalinity of given hydrocarbon

**IV- Demonstration experiments:-**

- i) Cloud point,
- ii) Pour point,
- iii) Aniline point,
- iv) Flash /fire point and
- v) Calorific value of a fuel

**BOOKS RECOMMENDED FOR APPLIED COMPONENT (PETROCHEMICALS)**

Note: Latest Edition should be used when available.

1. G.D.Hobson and W.Pohl "Modern Petroleum Technology" (1978)
2. E.R.Reigel "Industrial chemistry" (1960)
3. P.H. Groggins 'Unit Processes in Organic synthesis' (1952)
4. G.B.Crump "Petroanalysis II" (1982)
5. R.N.Shreve "Chemical Process Industries" (1977)
6. P.H.Spitz "Chemical Process Industries" (1977)
7. B.P Tissot and D.H. Welte "Petroleum formation and Occurrence" (1984)
8. P.W.Sherwood "Petrochemical Profit For tomorrow" (1966)
9. R.D. Patel "Petroleum and Petrochemicals" (1971)
10. Institute of petroleum "Modern Petroleum Technology"
11. W.L.Faith, D.B. Keyes and R.L.Clark "Industrial chemicals" (1965)
12. M.J.Antle "The Chemistry of Petrochemicals" (1956)
13. L.Hatch and S.Maker "From Hydrocarbon to Petrochemicals"
14. T.Dumas and W.Bulani "Oxidation of Petrochemicals" (1979)
15. Dr.Ramprasad, "Petroleum Refining Technology", Khanna Publication (2000)
16. Advance Inorganic Chemistry -II (Including Environmental Chemistry by Gurdeep Raj, Goyal publication)
17. Fundamental concepts of Environmental Chemical by G.S. Sothi, Narora Publication House.
18. B.K.Bhaskar Rao, "Modern Petroleum refining Processes", Oxford and IBH Publishing Company Pvt., Calcutta.

