UNIVERSITY OF MUMBAI
No.UG./ 388 of 2007

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and Syllabi relating to the Bachelor of Science (B.Sc.) degree course under revised pattern *vide* this office Circular No. UG/80 of 2003 dated 27th February, 2003 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 23rd July, 2007 has been accepted by the Academic Council at its meeting held on 10th August, 2007 *vide* item No 4.19 and that, in accordance therewith, the syllabus in the subject of Physics (Theory and Practicals) at the F.Y.B.Sc. examination is revised as per *appendix* and that the same will be brought into force with effect from the academic year 2008-2009.

MUMBAI-400 032
28th September, 2007

for I/c REGISTRAR

To,

The Principals of the affiliated colleges in Science.

AC/4.19/10.08.2007

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No.UG/ 388 -A of 2007, 29th September, 2007

Copy forwarded with compliments for information to :-

1) The Dean, Faculty of Science.
2) The Chairman, Board of Studies in Physics
3) The Officer on Special Duty and Controller of Examinations.

for I/c REGISTRAR

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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 Personal Assistant to the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information .

The Officer on Special Duty and 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 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 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 no separate Action Taken Report will be sent in this connection. the Assistant Registrar Constituent Colleges Unit (2 copies), BUCT(1 copy), the Deputy Account, Unit V(1 copy), the In-charge Director, Centralize Computing Facility (1 copy), the Receptionist (1 copy), the Telephone Operator (1 copy), the Secretary MUASA (1 copy), the Superintendent, Post-Graduate Section (2 copies) the Superintendent Thesis Section (2 copies) .

Nmm/circ-vm/29102007

Enclosure to item No. 4.19
Appendix 10/8/07

UNIVERSITY OF MUMBAI

Revised Syllabus at the F.Y.B.Sc. Examination (Theory & Practical) in Physics

(With effect from the academic year 2008-2009)

Revised Syllabus in Physics (Theory & Practical)

As per Revised Examination Scheme

First Year B. Sc. 2008 - 2009.

The revised syllabus in Physics for the First Year B. Sc. course will be implemented from the academic year 2008 – 2009.

The scheme of examination for the revised course in Physics at the First Year B. Sc. Examination will be as follows.

Scheme of Examination

Theory	Title	Examination	Maximum Marks	Maximum Marks after conversion
Paper - I	Mechanics, Properties of Matter, Heat, Sound & Optics	First Term Second Term	50 50	30 30
Paper - II	Electricity, Magnetism, Electronics, Atomic, Nuclear and Modern Physics	First Term Second Term	50 50	30 30
Practical Paper - I	Experiments from Group A		30	30
Practical Paper - II	Experiments from Group – B		30	30
Certified Journal *	Regular + Skill + Demonstration Experiments.		10** (5+3+2)	10
Practical		Viva - Voce	10	10
Total Marks	Theory: Practical			120 080
				200

Each paper is divided into six equal units. Units 1, 2, 3 of each paper are to be taught during first term and Unit – 4, 5, 6 to be taught during second term. The duration of each paper will be 2 hours for first as well second term examination.

Examination paper will consist of four questions, out of which first three questions will be one each on each unit with internal option, fourth question is to be set on all the three units with internal option and should be of objective nature.

Question one and two will be of 13 marks each and questions three and four will be of 12 marks each. All four questions in a paper are compulsory.

For Practical examination, the candidates will be examined in two experiments (one from each group). Each experiment will be of three hours duration. In all, minimum 7 experiments from each group, minimum 4 from demonstration and all skill experiments are required to be completed compulsorily. Students are required to report all experiment in journal.

*A candidate will be allowed to appear for the examination only if the candidate submits a certified journal of F. Y. B. Sc. Physics or a certificate from the Head of the Department / Institute to the effect that the candidate has completed the practical course of F. Y. B. Sc. Physics as per the minimum requirement.

** Of the total marks for the journal, 5 marks are to be allotted for the report of the regular experiments, 3 marks for the skill and remaining 2 marks are to be allotted for the report of demonstration experiments.

F. Y. B. Sc. PHYSICS
PAPER – I
(Mechanics, Properties of Matter, Heat Sound, Light)

Unit : I **(15 lect.)**

i) Newton's Laws :

Newton's first, second and third laws of motion.
Interpretation and applications, pseudo forces.
Worked out examples (without friction): 1, 2, 3, 5 Chapter 5 - HCV
Worked out examples (with friction): 1, 2, 3, 4 Chapter 6 – HCV

Ref.: HCV : 5.1 to 5.5 and 5.7
Add. Ref. : TM, HRW.

ii) Elasticity : *(Elastic constants Y, K, η, σ : review)*

Equivalence of shear strain to compression and extension strains
Relation between elastic constants, Couple for twist in cylinder.

Ref.: HP : 15.2. A to 15.5.A and 15.7.A
Add Ref.: DSM

iii) Fluid Dynamics :

Equation of continuity, Bernoulli's equation, streamline and turbulent flow, lines of flow in airfoil, Poiseuille's equation.

Ref.: HP 15.2B to 15.6B
Add. Ref.: HCV, DSM

Unit : II **(15 – lect.)**

Concept of Heat, The first law, Non adiabatic process and Heat is a path function, Internal energy, Applications of first law to simple processes, Heat Capacity and Specific heat, General relations from the First Law : The Enthalpy, The case of an Ideal gas, Dependence of Temperature of the Atmosphere on Height above sea level,
Worked examples, problems.

Ref. EG : Chapter 3, Page No. 44 to 64.

Unit – III: **(15 – lect.)**

i)Wave motion in one dimension. :

General solution of wave equation, Classification of waves, Examples of one dimensional waves: Transverse wave on string, Longitudinal Waves on Rod, Pressure waves in a gas.

Ref. SPP : 6.1, 6.2, 6.5, 6.5.1, 6.5.2, 6.5.3.

ii) Ultrasonics

Piezoelectric effect,

Production of Ultrasonic waves: Piezoelectric Crystal Method
: Magnetostriction Method.

Detection, Properties and applications of Ultrasonic Waves

iii) Acoustics of Buildings

Reverberation, Sabine's formula (without derivation)
Absorption coefficient, Acoustics of Buildings, factors affecting Acoustics of Buildings, Sound distribution in an auditorium.

Ref : MS : 5.1 to 5.6, 5.8, 5.9, 5.10, 5.12, 5.13, 5.14, 5.15.

Unit – IV

(15 – lect.)

i)Composition of two SHM,s :

(Definition of SHM and composition of two parallel SHM's of same period : review)

Composition of two perpendicular S H M's having same period and period in the ratio 1:2. Lissajous figures.

Ref.: SPP 2.4.1, 2.4.3, 2.4.4.

ii)Mechanics of a system of particles:

Centre of mass of a system of particles, Linear momentum of a system of particles and its conservation. Angular momentum of a system of particles and its conservation.
Rocket motion (neglecting gravity)

Ref.: TM: 9.2, 9.3, 9.4, 9.11

Unit – V

(15 – lect.)

i)Geometrical Optics:

Refraction through lenses, Thin lens, Thick lens, Lens combination.

ii)Aberrations:

Spherical Aberration, Reduction of Spherical Aberration
Chromatic Aberration, Condition for Achromatism

iii)Simple Table Spectrometer:

Adjustments, measurement of angle of minimum deviation

iv)Interference of light:

Interference in thin films, Fringes in Wedge shaped films, Newton's Rings.

Ref.: S. B 2.1 to 2.11, 2.14, 2.15, 3.5 to 3.11, 3.25 to 3.28, 4.36, 4.37, 8.15 to 8.25.

Unit – VI

(15 – lect.)

Laser :

Introduction, transition between Atomic energy states (without derivation), Principle of Laser, Properties of Laser, Helium–Neon Laser, Application of Laser to Holography and other applications.

Ref.: S P: 9.1, to 9.6, 9.10, 9.11.

Fibre Opties :

Light propagation through Fibres, Fibre Geometry, Internal reflection, Numerical Aperture, Step-Index and Graded-Index Fibres, Applications of Fibres.

Ref.: S P : 13.3, 13.5, 13.9.

Note:

A good number of numerical examples are expected to be covered during the prescribed lectures.

References.

1. **HCV** : Concepts of Physics – H. C. Verma (Part – I) 2002 Ed. Bharati Bhavan Publishers.
2. **HP** : Mechanics Hans and Puri, 2nd Ed. Tata McGraw Hill.
3. **EG** : Basic Thermodynamics-Evylen Guha (Narosa Publication)
4. **SPP** : Fundamentals of vibration and waves – S.P Puri (Tata McGraw Hill)
5. **MS** : Properties of matter and Acoustics R Murugeshan and K. Shivaprasath, S Chand & Co.Ltd. (2005-Ed)
6. **TM** : Classical Dynamics – Thornton and Marion (5th Ed.) Thomson Books.
7. **SB** : A Text Book of Optics, N. Subramaniyam and Brij Lal, S. Chand and Co. 22nd Ed. (1994)
1. **SP** : Modern Physics Concept and Applications – Sanjeev Puri, Narosa Publication.

Additional References

Unit – I

1. **TM :** Classical Dynamics – Thornton & Marion (5th Ed)
2. **DSM :** Element of Properties of Matter – D S Mathur, S Chand & Co.
3. **HRW :** Fundamental of Physics (extended) – Haliday, Resnick and Walker (6th Ed.), John Wiley and Sons.

Unit - II

1. Heat and Thermodynamics – M. W Zemonsky & R H Dittman. McGraw Hi
2. Theory and Experiments on Thermal Physics – D. K. Chakrabarti (2006 Ed) Central book.

Unit - III

1. A Text book of Sound - Subramanyam and Brij Lal
2. A Text book of Sound - M. N. Srinivasan, Himalaya Publishing House
3. Acoustics – Waves and Oscillations - S. N. Sen – Wiley Estern Ltd.
4. Sound – F. G. Mee. Heinemann Educational Books Ltd.

Unit – IV

1. **DSM :** Element of Properties of Matter – D.S. Mathur, S. Chand & Co. (Ed. 2001)
2. **KRS :** Mechanics – K R Symon – Addision – Wesley Publishing Co.

Unit – V

1. Principles of Optics – B. K. Mathur and T. P. Pandya (3rd Ed.) 1981, McGraw Hill International.
2. Fundamentals of Optics – Khanna and Gulati (1994), S. Chand.
3. Optics – C. L. Arora, S. Cand & Co. Ltd (2001)

Unit – VI

1. Fundamentals of Optics – Jenkins and White. (4th Ed) McGraw Hill International.
2. Optics – Ajoy Ghatak (2nd Ed.) Tata McGraw Hill.
3. Electronic Communication System and Device – Kennedy. (4th Ed) Tata McGraw Hill.
4. Fibre Optics – Kaiser, McGraw Hill.

F. Y. B. Sc. PHYSICS
PAPER – II

(Electricity, magnetism, electronics, atomic, nuclear and modern Physics.)

UNIT – I

(15 lect.)

1. **Transient response of circuits:**
Series LR, CR and LCR circuit. Growth and decay of current

CR : 14.1 to 14.3

2. **Alternating current theory:** *(Concept of L, R and C : **Review**)*
Complex numbers, AC circuit containing pure R, Pure L and pure C, Series L-R, C-R and LCR circuits.
Resonance in LCR circuit (both series and parallel) Power in AC circuit, Q factor.
Transformer : (Ref. CR : Art 5.12 Omit phasor diagram & Auto transformer)

CR - 15.2 ,15.5 to 15.12

UNIT – II

(15 lect.)

1) Nuclear atom, electron orbits, atomic spectra, Bohr atom, energy levels and spectra, correspondence principal, nuclear motion, atomic excitation.
2) X-Rays production, continuous and characteristic X ray spectra, X-Ray Diffraction, Bragg's Law,

AB : 4.1 to 4.8, 2.4, 2.5, 2,6.

UNIT – III

(15 lect.)

1) **Rectifier Circuit :** *(Half wave and Full wave rectifier : **Review**)*
Bridge rectifier: Efficiency and Ripple factor of Full wave Rectifier, Filter circuits: types of filter circuits – capacitor filter, choke input filter, π Filter, Voltage stabilization – Zener diode as voltage stabilizer.

VKM : 9.10 to 9.20, 9.22, 9.23.

2) **Transistor as amplifier** – CB, CE, CC modes. Definition of gain α, β (dc &ac) and relation between them. CE amplifier: - operation, Load line Analysis, operating point, cut off and saturation points.

VKM : 11.7 to 11.17, 11.21

3) **Digital electronics** *(Logic Gates : Review)*
De-Morgan's Theorems, NAND & NOR as Universal Building blocks.
EX-OR gate : Logic expression, logic symbol, truth table, Implementation using basic gates and its applications : Controlled inverter, Half Adder, Full adder.

VKM : 28.8 to 28.14, 28.19
LM : 6.7

UNIT – IV

(15 – Lect)

1. **a) Circuit theorems:**
Thevenin theorem, Norton theorem, Reciprocity theorem, Maximum power transfer theorem.

CR : 7.7, 7.8, 7.9, 7.10, 7.11.

b) A C bridges:
General AC Bridge, Maxwell, de-Sauty, Wien, Schering.

CR : 15.14

2. **Electromagnetic Measuring Instruments:**
General theory of MCG, Dead beat and Ballistic galvanometer.
Difference between Dead beat and Ballistic galvanometer.

CR – 12.1, 12.2, 12.4, 12.5.

UNIT–V

(15 – lect.)

1. Nuclear composition, some nuclear properties, stable nuclei, binding energy, Meson theory of nuclear forces.
2. Radioactive decay: Five kinds, Radioactivity and the Earth, Radiation Hazards, Half-Life, Radiometric Dating, Successive Disintegration A =>B =>C(stable), Radioactive Series and Radioactive Equilibrium.

AB : 11.1 to 11.4, 11.7, 12.1 to 12.3.

UNIT –VI

(15 – lect.)

2. Compton Effect, Pair production, Photons and Gravity, Gravitational Red Shift.

3. De Broglie Waves, Wave function, Particle Diffraction, Davisson Germer Experiment. Heisenberg's Uncertainty Principle.

AB : 2.7, 2.8, 2.9, 3.1, 3.2, 3.5, 3.7, 3.8, 3.9.

Note:

A good number of numerical examples are expected to be covered during the prescribed lectures.

References :

1. **CR** : Electricity and Magnetism- D. Chattopadhaya and P. C. Rakshit (4^{th} Ed) Reprint – 2000) Books and Allied (P) Ltd.

2. **AB** : Concepts of Modern Physics – A. Beiser (6^{th} Ed), Tata McGraw Hill.

3. **VKM** : Principles of Electronics – V. K. Mehta and Rohit Mehta (2006 revised Ed), S. Chand and Co.

4. **LM** : Digital Principles and Applications – Leach and Malvino (5^{th} Ed), Tata McGraw Hill.

Additional References

Unit I and IV

1. Mechanics and Electrodynamics – Brij Lal, N. Subramaniyam, Jivan Seshan (Revised and enlarged Ed – 2005) S. Chand.
2. Schaum's Outline Series – Electricity and magnetism – Administer.

Unit – III

1. Electronic Principles and applications – A B Bhattacharya, Central Publisher.
2. Electronic Devices and Circuit Theory – Boylestad and Nashelsky (6^{th} Ed.). Prentice Hall of India.
3. Electronic Principles – A P Malvino (5^{th} Ed.), Tata McGraw Hill.
4. Digital Principles and Applications – A P Malvino, McGraw Hill International.
5. Digital Electronics – Tokheim (4^{th} Ed.) – McGraw Hill International Edition.

Unit II, V and VI

1. Perspectives of modern Physics – A Beiser, Tata McGraw Hill.
2. Quantum Mechanics – S B Singh, M K Bagde, Kamal Singh, S Chand (Reprinted 2000).
3. Nuclear Physics – S B Patel, New Age International Pvt. Ltd.
4. Atomic and Nuclear Physics – S. N. Ghosal (2^{nd} Ed. 2000) S Chand & Co.
5. Atomic and Nuclear Physics - A. B. Gupta and Deepak Ghosh, Books & Allied (P)Ltd. (2^{nd} Ed. 1999.)

REVISED SYLLABUS IN F. Y. B. Sc. PHYSICS PRACTICALS

Paper – I

(Mechanics, Properties of matter, Heat, Sound, Light.)

(Group A)

Regular experiments

1. Flywheel
2. Torsional oscillations
3. Bifilar Pendulum
4. Helmholtz Resonator
5. Y by Vibration
6. η By Poisseuli Method
7. J by Electrical Method
8. Spectrometer (determination of angle of prism A)
9. Spectrometer (determination of refractive index μ of material of prism)
10. Combination of lenses
11. Newton's rings
12. Wedge Shaped Film

Paper II

(Electricity, magnetism, electronics, modern physics)

(Group B)

Regular experiments

1. Thevenin's theorem
2. Norton's theorem
3. LR circuit
4. CR circuit
5. Frequency of AC mains
6. LDR characteristics
7. LCR Series Resonance
8. Bridge rectifier (to study load regulation)
9. Zener diode as regulator
10. Transistor (CE) characteristics
11. DeMorgan's Theorems
12. EX-OR Gate, NAND and NOR as Universal Building Blocks.

Demonstration experiments

1. Angular momentum conservation (Rotating platform)
2. Brewster's law
3. Laser beam divergence, intensity
4. Use of oscilloscope
5. Charging and Discharging of a capacitor
6. Use of PC for graphs, demonstration experiments
7. Single Slit Fraunhoffer diffraction.
8. Faraday's Induction Experiment

Skill Experiments

1. Use of Vernier Callipers, Micrometer Screw Gauge and Travelling Microscope
2. Graph plotting
   (Exponential, Straight line with intercept, Resonance curve etc.)
3. Spectrometer : Schuster's Method
4. Use of DMM

Note:-

The practical examination system will remain same as at present, but skills will be tested within the given experiment. Viva-voce should be based on the work as recorded in the journal.

REFRENCES

1. Advanced course in Practical Physics D. Chattopadhya, PC. Rakshit & B. Saha. (6th Edition) Book & Allied Pvt. Ltd.
2. B Sc Practical Physics – Harnam Singh S. Chand & Co. Ltd. – 2001
4. A Text book of advanced Practical Physics – Samir Kumar Ghosh New Central Book Agency – (3rd edition)
5. B Sc. Practical Physics – CL Arora (1st Edition) – 2001 S. Chand & Co. Ltd.
6. Practical Physics – CL Squires – (3rd Edition) Cambridge University Press
7. University Practical Physics - D C Tayal. Himalaya Publication
8. Advanced Practical Physics – Worsnop & Flint.