UNIVERSITY OF MUMBAI
No.UG/467 of 2009

CIRCULAR: -

The Directors/Heads of the recognized Science Institutions concerned the Principals of the affiliated Colleges in Science are hereby informed that recommendation made by the Ad-hoc Committee relating to Forensic Science a meeting held on 9th September, 2009 has been accepted by the Academic Cou at its meeting held on 17th September, 2009 vide item No.4.20 and subseque approved by the Management Council at its meeting held on 25th September, 2 vide item No.21 and that, in accordance therewith, the B.Sc. in Forensic Scie has been introduced from the academic year 2009-2010.

Further that in exercise of the powers conferred upon the Managen Council under Section 54(1) and 55(1) of the Maharashtra Universities Act, 1 it has made **Ordinances 5892, 5893 and Regulations 8191, 8192, 8193, 8194 8195** including the Scheme of Examination and Syllabus relating to the F.Y.B in Forensic Science is as per Appendix and that the same has been brought force with effect from the academic year 2009-2010.

MUMBAI-400 032
12th December, 2009

PRIN. K. VENKATARAMANI
REGISTRAR

To,

The Directors/Heads of the recognized Science Institutions concerned the Principals of the affiliated Colleges in Science.

A.C./4.20/17.09.2009
M.C./21/25.09.2009

****

No. UG/467-A of 2009, MUMBAI-400 032 12th December, 2009

Copy forwarded with compliments for information to :

1) The Dean, Faculty of Science.
2) The Convener of the Ad-hoc Committee of Forensic Science.
2) The Controller of Examinations.
3) The Co-ordinator, University Computerization Center.

Enclosure to Item No. 4.20
17/9/2009

UNIVERSITY OF MUMBAI

Ordinances, Regulations,

Scheme of Examinations & Syllabus

for

F.Y. B.Sc.

In

Forensic Science

(Introduced from the academic year 2009-2010)

UNIVERSITY OF MUMBAI

O5892:- **Title of the Course: -B.Sc. Forensic Science.**
O5893:- Eligibility: 12th Science Pass
O8191:- Duration of the Course: - Three Years (Full Time.)
R8192:- Fee Structure: - As Per the State Government Rules
R8193:- Intake Capacity – 50 (reservation as per state Govt.Rule)
R8194:- Teacher Qualifications: - As per the U.G.C./ State Government Norms and Experts from Forensic Science Field and Related Industry with minimum 3 years of experience.
R8195:- Standard of Passing: -

a. Candidate who secures minimum 50% in each subject/ paper be declared to have passed the examination.

b. Candidate who secures a minimum of 50% marks in each paper and an aggregate of 60% and above marks on the whole shall be declared to have passed the examinations in the First Class.

c. Candidate who secures a minimum of 50% marks in each paper and an aggregate of 70% and above marks on the whole shall be declared to have passed the examinations with Distinction.

Medium of Instruction: English
At least two Field Visits at Forensic Science Laboratory

Course Structure for B.Sc. Forensic Science
Effective from the academic year 2009 - 2010

First Year:

PAPER	TITLE OF PAPER	MARKS				LECTURES	Practicals (20 Parcticals)
		Term I	Term II	Practical	Total		
I	Basic of Forensic Science	30	30	40	100	90	54
II	Basic of Forensic Chemistry	30	30	40	100	90	54
III	Basic of Forensic Physics	30	30	40	100	90	54
IV	Basic of Forensic Biology	30	30	40	100	90	54
V	Basic of Forensic Psychology	30	30	40	100	90	54
VI	Basic of Digital and Cyber Forensic	30	30	40	100	90	54

Second Year:

PAPER	TITLE OF PAPER	MARKS				LECTURES	Practicals (20 Parcticals)
		Term I	Term II	Practical	Total		
I	Advanced Forensic Science	30	30	40	100	90	54
II	Advanced Forensic Chemistry	30	30	40	100	90	54
III	Advanced Forensic Physics	30	30	40	100	90	54
IV	Advanced Forensic Biology	30	30	40	100	90	54
V	Advanced Forensic Psychology	30	30	40	100	90	54
VI	Advanced Digital and Cyber Forensic	30	30	40	100	90	54

Third Year:

PAPER	TITLE OF PAPER	MARKS				LECTURES	Practicals (25 Parcticals)
		Term I	Term II	Practical	Total		
I	Applied Forensic Chemistry	30	30	40	100	90	68
II	Applied Forensic Physics	30	30	40	100	90	68
III	Applied Forensic Biology	30	30	40	100	90	68
IV	Applied Forensic Psychology	30	30	40	100	90	68
V	Applied Digital and Cyber Forensic	30	30	40	100	90	68
VI	Project Work in Forensic Science	----	----	----	100	----	68

Syllabus for F.Y. B.Sc. Forensic Science

aper I: Basic of Forensic Science

Paper II: Forensic Chemistry

Paper III: Forensic Physics

Paper IV: Forensic Biology

Paper V: Forensic Psychology

Paper VI: Digital and Cyber Forensic

Paper I : Basics of Forensic Science

15 lectures per unit

Unit I:
Introduction to crime, Sociological aspects in society, Criminal behavior, Types of crime, Monitoring system in society, Crime scenario in India

Unit II:
Detection of crime, Different Agencies involved, in crime: Police, Medico-legal experts, Judiciary offices

Unit III:
Scope and development of forensic Science, Forensic Science in India, Growth of core laboratories, Set up in Country

Unit IV:
Facilities provided in Forensic Science laboratories for Chemical, Physical, Biological, Psychological, digital and cyber crime detection and analysis

Unit V:
Detection of crime scene, crime scene management, Role of forensic scientists, Investigative officers, Forensic doctors, fire brigade, Judiciary.

Unit VI:
Importance of physical evidence, collection of physical evidence in crimes like murder, theft, extortion, explosion etc.

Practicals based on Paper I- Basics of Forensic Science
(Minimum 15 experiments should be conducted)

Collection and Handling of toxicological samples	2 nos.
Collection and Handling of petroleum samples	2 nos.
Collection and Handling of murder case samples	2 nos.
Collection and Handling of toxicological samples	2 nos.
Study of Bomb Blast Scene	2 nos.
Collection and Handling of firing crime scene Samples	2 nos.
Collection and Handling of Hit and run crime scene Samples	2 nos.
Collection and Handling of fire crime scene Samples	3 nos.

List of Books:

1. Henry Lee's Crime Scene Handbook by Henry C Lee
2. Forensic Biology by Shrikant H. Lade
3. Crime Scene Processing and Laboratory Work Book by Patric Jones
4. Forensic Science: An Introduction to Scientific and Investigative Techniques 3rd ed. by Stuart H. James
5. Criminalistics: An Introduction to Foresnic Science, 9th ed. By Richard Saferstein
6. Compute Crime and Computer Forensic by Dr. R.K. Tiwari
7. Criminal Profiling: An Introduction to a Behavioral Evidence Analysis, 3rd ed. By Brent E. Turvey
8. Forensic Science in Criminal Investigation and Trial, 4th ed. By B.R. Sharma
9. Handbook of Forensic Psychology Dr. Veerraghavan
10. Crime Scene Management with Special Emphasis on National level Crime Cases by Dr. Rukmani Krishnamurthy under publishing
11. Text Book of Medical Jurisprudence, Forensic Medicine and Toxicology by Parikh C.K.
12. The Identification of Firearms and Forensic ballistics by Barrard and Gerald

Paper II : Forensic Chemistry

Unit I:

1. Liqyuid ste: Free volume of liquid and density measurement, Physical properties of liquid, vapor pressure, surface tension, surfactants, viscosity, molar refraction, optical activity Structure of liquid

2. Solutions: Method of exploring concentration of scolutions, Binary liquids, vapor pressure, composite diagram of binary liquids and Solutions, Distillation, fractional distillation, Vaccum Distillation

3. Conducatnce, Conductometry, Electro Motive Force, Potentiometry

Unit II:

1. Chemical Thermodynamics and kinetics, first law of thermodynamics, Internal Energy, Enthalpy, Second law of thermodynamics, Entropy and its significance, free energy and work function

2. Rate of reaction, Order of molecularity of reaction, slow reaction and fast reaction, first order reaction, Half life period of first order reaction, Activation energy, temperature dependence of activation enrgy, Explosive reactions, Oscillatory reactions

Unit III:

Study of Modern Periodic Table, Long form of Periodic Table, Periodic properties, atomicradiation, , ionization potential, electron affinity, electronegativity, metallic characters, Non- metallic characters and magnetic properties, Comparative study of S and P block elements

Unit IV:

Gravimetric analysis, Volumetric analysis, Chromatographic separation, The liquid chromatography, electrophoresis, thermal methods

Unit V:

Empirical and molecular formulae, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Van der walls forces, IUPAC nomenclature of alkanes, alkenes, haloalkanes, alcohol, ether, aldehydes, ketones, coraboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthornes, Reactive intermediates and related reactions.

Unit VI:

Heterocyclic Chemistry: Natural products, Petroleum products, drugs, insecticides, pesticides etc, Introduction to dyes, Paints, polymers

Practicals based on Paper II : Forensic Chemistry

(Minimum 12 experiments should be conducted)

1.	To determine the density of given liquid	2 nos.
2.	To determine the viscosity of given liquid	2 nos.
3.	To determine the surface tension of given liquid	2 nos.
4.	Standardization of given liquid by primary standard	2 nos.
5.	To determine strength given acid	2 nos.
6.	Inorganic micro/ semi micro qualitative analysis	2 nos.
7.	Identification of organic compound	3 nos.

List of Books

1. Thermodynamics for Chemists by S, Glasstone
2. Principles f Physical Chemistry and Puri, Sharma and Pathania
3. Advanced Inorganic Chemistry by Madan , Malik and Tuli
4. Concise Inorganic Chemistry by J.D. Lee
5. Organic Chemistry by Moris and Boyed
6. Heterocyclic Chemistry by Gupta and Kumar Vol I and Vol II
7. Insecticides with Modes of Action by I. Ishaya and D. Deghilee
8. Natural Products by S.V. Bhat
9. Instrumental Analysis by Skoog, Holler and Crouch
10. Practical Books:
11. Physical Chemistry Parcticals by J.B. Yadav
12. Qualitative Analysis by Vogel

Paper III : Forensic Physics

Unit I:

Interpretation and applications of Newton's laws of motion, Pseudo forces, Elastic properties of matter, elastic constants and their interrelations.

Fluid dynamics, Equation of continuity, Bernoulli's equation, Stream line and turbulent flow, Lines of flow in air foil, Purseuille's equation.

Unit II:

Velocity of sound, noise and sound Intensity measurement, echo, reverberation, Sabine's Formula, absorption coefficient, Acoustics of buildings and factors affecting Acoustics of buildings, Sound distribution in an auditorium, Introduction to ultrasonic, Production of ultrasonic waves, Applications of ultrasonics

Unit III:

Refraction through thin layers, thick lens, thick lens and lens combinations, Aberrations, Interference in thin films, fringes in wedge shaped films, Newton's rings, Simple table spectrophotometer, total internal reflection.

Unit IV:

Production of LASER, Types of LASER, Properties and applications of LASER,

Optical fibers, Propagation of light through optical fiber, Angle of acceptance and numerical aperture, losses, Solar cells.

Unit V:

Review of nuclear composition, nuclear properties and half life, Radioactive decay schemes, Applications of Radio Isotopes, Radiometric dating

Unit VI:

Basics of LR, CR, LCR circuits, Rectifier circuits, Timer circuits, Transistor and its characteristics, Introduction to OPAM, remote sensing and controlling, Photo-sensors, Logic gates and their applications, Flip- flops and counters.

Practicals based on Paper III : Forensic Physics

(Minimum 12 experiments should be conducted)

1. Fly wheel
2. Y by vibration
3. η of Poisseuli Method
4. Spectrophotometer(determination of angle of prism A)
5. Refractive index of liquid by using LASER
6. Ultrasonic interferometer
7. Sound Intensity measurement
8. Laser parameter
9. Solar cell
10. Combination of lenses
11. Newton's rings
12. Wedge shaped film
13. Frequency of AC mains,
14. LDR characteristics
15. LCR series resonance
16. Bridge rectifier(to study load regulation)
17. Transistor(CE) characteristics
18. DeMorgan's Theorems
19. Ex-or gate, NAND and NOR as universal building blocks.

Paper IV : Forensic Biology

Unit I:
Cell Structure and Function in Prokaryotes and Eukaryotes

Properties, Classification and function of carbohydrates, proteins, nucleic acids and lipids

Study of blood components and body fluid analysis

Unit II:
Principles of Taxonomy and systems of classification of angiosperms (Bentham and Hooker) and Gymnosperms (Chamberlain)

Origin of life and Geological time scale

Mechanical and conducting tissue systems in plants

Unit III:
Acid , Base and Buffers

Beer and Lambert's law, colorimetry and spectrophotometry

Principles methods and applications of Chromatography and electrophoresis

Unit IV:
Basics of Microbiology and concept of Pure culture technique

Microscopy- Principle and types of Microscopy

Broad Classification of Microorganisms

Unit V:
Immunity and Immune System

Structure and interaction of antigens and antibody

ELISA, Western Blot and Southern Blot techniques

Unit VI:
Genetic Materials- Structural organization and function
Mendelian Principles, Sex linkage and sex determination

Recombinant DNA technology and its applications in Health and Diseases

Practicals based on Paper IV : Forensic Biology

Qualitative analysis of sugars, proteins, lipids and nucleic acids (1)

Study of morphological types of red blood cells (1)

Study of Plant Material (Wild and Cultivated from families Magnoniaceae, Combretaceae, Amaranthaceae, Convolvulaceae) (2)

Study of conducting tissue- Xylem and phloem elements in Angiosperms and Gymnosperms as seen in L.S. and R.L.S. (2)

Preparation of media and sterilization (1)

Antigen- Antibody reaction (Blood Groupings) (1)

Study of body fluids (1)

Radial Immunodiffusion Analysis (1)

Isolation of Chromosomal DNA (1)

Restriction digestion of DNA (1)

Chromatography- Separation of Amino acids, sugars, lipids using Paper chromatography and Thin layer chromatography. Determination of RF Values. **(2)**

References:

1.	Principles of Biochemistry	Lehninger	1993
2.	Harper's Biochemistry	Murray	1993
3.	Physical Chemistry	Atkins	1991
4.	Physical Chemistry	Castellan	1993
5.	Biological Spectroscopy	Lalcowicz	1983
6.	Analytical Biochemistry	Holme	1983
7.	Enzyme Kinetics	Plownan	1972
8.	Enzyme Structure and Mechanism	Ferst	1977
9.	Biophysical Chemistry	Upadhyay	1977
10.	Biochemistry	Satyanarayamn	1999
11.	Microbiology	Pelczar	1986
12.	Microbiology	Devis	1980
13.	General Microbiology	Powar- Daginawala	------
14.	Cell Biology	Powar	------
15.	Principles of genetics	Gardner	1991
16.	DNA Cloning	Glover	1985
17.	Molecular Cloning	Maniatis	1982
18.	Fundamental Immunology	Paul	1987
19.	Essential Immunology	Roitt	1988
20.	Molecular Biology of Gene	Watson	------
21.	Transgenic animals	Grosveld	1992
22.	Transgenic Plants	Hiatt	1992
23.	Industrial Microbiology	Casida	1990
24.	Nucleic acid and protein sequence analysis- A practical approach	Bishop	1987
25.	Gymnosperms	Chamberlein	
26.	Flora of Bentham	R. Hooker	
27.	Genes and Evolution	Jha	
28.	Plant Anatomy	Faha	
29.	Ecolgy	Odum	

Paper VI : Digital and Cyber Forensics

Unit I: Basics of Computers

Computer organization, Components of computers – Input & Output devices, CPU, Memory – RAM, ROM and external storage devices.

Unit II: Data representations

Integers, real, binary, octal, hexadecimal & their conversions. Logic gates – Negation, OR, AND, XOR etc.

Unit III: Introduction to Operating System

Basics of Operating System, Memory structure, concurrency, scheduling, synchronization & memory management. Examples of Operating Systems – Windows & Linux.

Unit IV: File Systems & Networking

Introduction to file systems – FAT12, FAT16, FAT32, NTFS, Ext2, Ext3 & HFS.

Basics of Networking – Types of topologies, LAN, MAN, WAN.

Unit V: Introduction to Internet

World Wide Web, E-mails, Chat, Search Engines, Networking Protocols.

Network Security – Threats, Vulnerabilities, Access Control, Virus, Trojans, etc.

Security plan & policies.

Unit VI: Cyber Crime & Digital Evidence

What is cyber crime, types of cyber crimes, Digital Evidence, Digital Vs Physical Evidence, Nature of Digital Evidence, Precautions while dealing with Digital Evidence.

Practicals based on VI : Digital and Cyber Forensics

1. Finding results of different logic gates & their combinations.
2. Working with Windows – File (creation, modification, deletion, attributes), Folder (creation, nesting, attributes)
3. Working with Linux – File (creation, modification, deletion, attributes), Folder (creation, nesting, attributes)
4. Working with external storage devices using Windows – Reading & Writing data on Floppy, CD, DVD, USB Thumbdrive.
5. Working with external storage devices using Linux – Reading & Writing data on Floppy, CD, DVD, USB Thumbdrive.
6. Understanding LAN – Client / Server, User creation, password protection.
7. Use of Internet – Visiting websites with given URL, searching information using search engine.
8. Use of E – mail – Creating e – mail ID, sending & receiving e – mails with attachments.
9. Networking commands – like ping, IPConfig, etc. with various switches.
10. Tracing E – mail – Finding senders IP Address of received e – mail, tracing route of e – mail receive I using tools available on internet e.g. Visual Trace Route etc.

List of Books:

1. Cyber Law in India by Farooq Ahmad- Pioneer Books
2. Infromation Technology Law and Practice by Vakul Sharma- Universal Law Publishing Co. Pvt. Ltd.
3. The Indian Cyber Law by Suresh T. Vishwanathan- Bharat Law House New Delhi
4. Guide to Cyber and E- Commerce Laws by P.M. Bukshi and R.K. Suri- Bharat Law House, New Delhi
5. Guide to Cyber Laws by Rodney D. Ryder- Wadhwa and Compney, Nagpur
6. The Information technology Act, 2000- Bare Act- Professional Book Publishers, New Delhi.
7. Computer Forensics: Principles and Practices by Linda Volonino, Reynaldo Anzaldua and Jana Godwin -Pearson Prentice-Hall 2007.
8. First Responder's Gude to Computer Forensics by Richard Nolan et al.- Carnegi Mellon, 2005.
9. Digital Evidence and Computer Crime, 2nd ed. By Eoghan Casey- Acdemic Press, 2004.
10. The Regulation of Cyberspace by Andrew Murray, 2006- Routledge –Cavendish.
11. Scene of the Cybercrime: Computer Forensics Handbook by Syngress.
12. Security and Incident Response by Keith J. Jones, Richard Bejtlich and Curtis W. Rose
13. List of Websites for more information is available on :
    Http://www.garykessler.net.library/forensicsurl.html

— XXX —