SHIVAJI UNIVERSITY, KOHLAPUR

SYLLABUS

Of

B.Sc. Forensic Science (Entire)
First Year

SEMESTER SYSTEM

FIRST/SECOND SEMESTER

Effective from Academic Year

2013-14 onwards

B.Sc. First Year

Forensic Science

Semester I & II

OBJECTIVES

This course is planned to aquatant the student with

i) Use of basic sciences like Biology, Chemistry and Physics in detection of crime.

ii) Detection of crime with scientific aid.

iii) Use of Forensic Psychology in interrogation of suspects.

iv) Extracting information and data from computer storage media in cyber crimes.

v) To make aware of techno crimes and use of new emerging techniques in crime detection.

vi) Role of forensic science in crime detection

vii) To aware them about starting private detective agencies in future.

viii) The Other Rules & Regulations and Standard of passing will be as per General B.Sc. Course

B.Sc. FORENSIC SCIENCE EXAMINATION

The degree of Bachelor of Forensic science shall be conferred on a candidate who satisfies the following conditions:

He must have passed the 12th Science examination conducted by H.S.C. Examination Board of Government of Maharashtra or an examination recognized as equivalent thereto.

Examination pattern for theory and practical

The course of study for the B.Sc. Forensic Science examination is divided in six semesters. Each semester will have nine theory courses and each paper will be scored for 50 marks. There will be four practical course completed in a year and each course has 50 marks.

1. Theory examination of 2 Hrs Duration would be conducted after each semester.

2. Practical examination of 4 Hrs Duration would be conducted only after completion of even semester.

B. Sc. Semester- I
FORENSIC SCIENCE (ENTIRE)

Course Code	Title of Course	Theory
FSC101	Basic of Forensic Science I	50
FSC102	Basic of Forensic Chemistry I	50
FSC103	Basic of Forensic Physics I	50
FSC104	Basic of Forensic Biology I	50
FSC105	Basic of Forensic Psychology I	50
FSC 106	Basic of Digital and Cyber Forensics I	50
FSC107	Basic of Forensic Biochemistry I	50
FSC108	Forensic Accountancy	50
FSC109	English for Communication I	50
Practical course		
FSC111	Forensic Science and Forensic Biology	50
FSC112	Forensic Chemistry and Forensic Biochemistry	50
FSC113	Forensic Physics and Mathematics	50
FSC114	Cyber and digital crime and Psychology	50

[Note: - Practical Examination will be Annual]

B. Sc. Semester- II
FORENSIC SCIENCE (ENTIRE)

Course Code	Title of Course	Theory
FSC201	Basic of Forensic Science II	50
FSC202	Basic of Forensic Chemistry II	50
FSC203	Basic of Forensic Physics II	50
FSC204	Basic of Forensic Biology II	50
FSC205	Basic of Forensic Psychology II	50
FSC206	Basic of Digital and Cyber Forensics II	50
FSC207	Basic of Forensic Biochemistry II	50
FSC208	Forensic statistics	50
FSC209	English for Communication II	50
Practical course		
FSC211	Forensic Science and Forensic Biology	50
FSC212	Forensic Chemistry and Forensic Biochemistry	50
FSC213	Forensic Physics and Statistics	50
FSC214	Cyber and digital crime and Psychology	50

[Note: - Practical Examination will be Annual]

B. Sc. I year (Semester I)

FORENSIC SCIENCE
Paper FSC101

Basic of Forensic Science I   **Marks: 50**

Sr. No.	Topics	No. of Periods
Unit-I	**CRIME SCENARIO IN INDIA** Introduction to crime and history Sociological aspects of crime and criminals in society Types of crime and its causes – property crimes, public order crimes, violent crimes, cybercrimes, juvenile delinquency Society-Criminal interaction and various types of crimes in India Criminal behavior - Theories and literature studies, criminal inheritance and factors responsible	15
Unit-II	**CRIMINOLOGY & LAW** Procedures involved in detection of crime – latest evidence based research in detection and prevention of crime Administrative steps towards crime prevention Different agencies involved in crime detection and prevention Indian Police System – State & Central level, The Police Act of 1861,Medico-legal experts, Judiciary system	15
Unit-III	**DEVELOPMENTAL GROWTH OF FORENSIC SCIENCE** Introduction to Forensic science – nature, need and function Laws and Principles, basics of Forensic Science Historical development and scope of Forensic Science in India	15

FORENSIC SCIENCE
Paper FSC102
Basic of Forensic Chemistry I   **Marks: 50**

Sr. No.	Topics	No. of Periods
Unit-I	**LIQUID STATE AND SOLUTIONS** Liquid state: free volume of liquid and density measurement, physical properties of liquid, Vapor pressure, surface tension surfactants, viscosity, molar refraction, optical activity structure of liquid. Solutions: Method of exploring concentration of solutions, binary liquids, vapor pressure, composite diagram of binary liquids and solutions, distillation, fractional distillations, vacuum distillations. Conductance, conductometry, electro motive force, potentiometery	15
Unit-II	**CHEMICAL THERMODYNAMICS AND CHEMICAL KINETICS** Chemical thermodynamics and kinetics, first law of thermodynamics, Internal energy, enthalpy second law of thermodynamics, entropy and its significance, free energy and work function , Rate of reaction, order of molecularity reaction, slow reaction and fast reaction, first order reaction, half life period of first order reaction, Activation energy, temperature dependence of activation energy, explosive reactions, Oscillatory reactions.	15
Unit-III	**INTRODUCTION TO PERIODIC TABLE** Study of modern periodic table, long form of periodic table, periodic properties, atomic radii, ionization potential, electron affinity electro negativity, metallic characters, non metallic characters and magnetic properties, comparative study of S and P block elements.	15

FORENSIC SCIENCE
Paper FSC 103

Basic of Forensic physics I

Marks: 50

Sr. No.	Topics	No. of Periods
Unit-I	**NEWTON'S LAW OF MOTION AND FLUIDE MECHANICS** Elasticity, elastic properties of matter, elastic constants and their interrelation. Fluid dynamics, Equation of continuity, Bernoulli's theorem, stream line and turbulent flow, Newton's law of coefficient of viscosity, Poiseuille's equation	15
Unit-II	**STUDY 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, Ultrasonic wave, applications of ultrasonic waves.	15
Unit-III	**STUDY OF LIGHT** Cardinal points, Thin lens and its combinations, Aberration and it's types, interference in thin films, fringes in wedge shaped film, Newton's rings.	15

FORENSIC SCIENCE
Paper FSC104

Basic of Forensic Biology I

	Semester:-I Max Marks:-50	45 Periods
Sr. No.	**Topics**	**No. of Periods**
Unit-I	**CELL BIOLOGY, ORGANIC AND BIOCHEMICAL COMPOUNDS** 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 fluids	15
Unit-II	**PLANT MORPHOLOGY AND ANATOMY** Principles of taxonomy and system of classification of angio sperms (Bentham and Hooker) and Gymnosperms (Chamberlain) Origin of life and Geological time scale. Mechanical and conducting tissue systems in plants	15
Unit-III	**HUMAN PHYSIOLOGY AND ANATOMY** Nutrition - BMR, Calorie value, balanced diet, obesity, digestive system. Skeletal Muscle physiology and Nervous system Physiology, coordination systems, brain functions and receptor organs Respiratory system physiology - exchange of gases, process of pulmonary respiration Mechanism of blood circulation, cardiac mechanism. Morphological study of human body parts and regions - Gross and Microscopic, Microbe-Human interaction	15

FORENSIC SCIENCE
Paper FSC 105

Basic of Forensic Psychology I   **Marks: 50**

Sr. No.	Topics	No. of Periods
Unit-I	THE SCIENCE OF PSYCHOLOGY Concepts of psychology, History of psychology, modern perspectives, types of psychological professionals psychology, The science and research methods, professional and ethical issues in psychology	15
Unit-II	BIOLOGICAL PRESPECTIVE Nerves Neurous: Building the network, central nervous system, peripheral nervous system, Human brain structure and function; sensory systems endocrine system.	15
Unit-III	CONSCIOUSNESS OF PERCEPTION Consciousness, Altered states of consciousness, attention and awareness, sensation and perception, problems in Attention and perception, assessment attention and perception.	15

FORENSIC SCIENCE
Paper FSC 106

Basic of Digital and Cyber Forensics   **Marks: 50**

Sr. No.	Topics	No.of Periods
Unit-I	**BASIC OF COMPUTERS** Computer organization, components of computers – input output device, CPU, memory-RAM, ROM and external storage devices.	15
Unit-II	**DATA REPRESENTATION** integers, real, binary, octal hexadecimal & their conversions logic gates – Negation, OR, AND, X OR etc.	15
Unit-III	**INTRODUCTION TO OPERATING SYSTEM** Basics of operating system, memory structure, concurrency, scheduling, synchronization and memory management examples of operating systems-Windows and Linux	15

FORENSIC SCIENCE
Paper FSC 107

Basic of Forensic Biochemistry I   **Marks: 50**

Sr. No.	Topics	No.of Periods
Unit-I	**ORIGIN OF LIME AND NUCLIC ACID** Origin of life: (Prebiotic world & chemical evolution), Urey Miller'sexperiment, unicellular organisms, multicellular organisms,Concept of biomolecules, molecular interactions biological functions,PH, pk (H-H Equation), buffer (Acidic buffer, basic buffer, biological buffer systems)11 Nucleic acids: Nucleosides, nucleotides, polynucleotide, DNA and itsdifferent forms (A, B, C, D, E, & Z), RNA and its types. Forces stabilizing nucleic acid structure.	15
Unit-II	**CARBOHYDRATES** Carbohydrates: Classification, glyceraldehydes, simple aldose &ketoses, confirmation of D-glucose, biological importance ofcarbohydrates, reactions of monosaccharide (Oxidation, reduction,alkali, osazone), monosaccharide other than glucose (Fructose), glycosidic bond, disaccharides (Sucrose, maltose, lactose), polysaccharides (Starch, glycogen, peptidoglycan.)	15
Unit-III	**LIPIDS** Lipids: Classification, fatty acids (Physical properties, chemical properties, sap value, acid value, iodine no., rancidity); Glysrolipid, (Lecithin, cephalin, plasmogens, cardiolipins); Sphingolipids (Sphingomycelin, cerebrosides, gangliosides); Derived lipid, behavior of lipid in water, bile acid, bile salt, lipoprotein, liposome	15

FORENSIC SCIENCE
Paper FSC 108

Paper: Mathematical Methods   **Marks: 50**

Sr. No.	Topics	No.of Periods
Unit-I	**Arithmetic And Geometric Progressions** Definitions of A.P. and G.P., Formulae for nth term and sum to n terms of A.P. and G.P., Simple examples.	10
Unit-II	**Matrices** Definition and types of Matrices ,Algebra of Matrices (addition, subtraction, scalarmultiplication and multiplication of matrices)Examples on operation of MatricesInverse of a matrix by a ad joint method Rank of a Matrix (Definition) and examples. System of Linear equation. i) Non homogenean ii) Homogenean With examples Eigen values and eigen vectors with simple examples	15
Unit-III	**Differential equation** Defination of ordinary differential equation and degree, order of differential equation Exact differential equation with simple examples. Linear differential equation dypyQdx+ = method of solution with simple examples. Bernoulli's differential equation with examples. Application of differential equation i) Growth and decay problems ii) Newton's law of cooling with examples.	20

FORENSIC SCIENCE
Paper FSC 109

Paper: English for Communication I   **Marks: 50**

Sr. No.	Topics	No.of Periods
	## Section I: Communication Skills Unit 1 Describing Objects/Processes/Experiments Unit 2 Narration (events of the present & the past) Unit 3 Information Transfer and Interpretation of Data	20
	## Section II: Reading Comprehension Unit 4 When the Mop Count did not Tally, by Sudha Murthy Unit 5 The Thermostatic Man, by Gordon Challis Unit 6 The Axe, by R. K. Narayan Unit 7 Making the Most of Life, by Robert Lynd Unit 8 Sonnet to Science, by Edgar Allan Poe	25

Division of Teaching hours:
1. Communication Skills = 12 X 3 = 36 Hours
2. Reading Skill = 7 X 4 = 28 Hours

Pattern of Question Paper
SEMESTER I
Total Marks: 50

		Reading Comprehension	
Q.1	A	Multiple choice objective questions on Reading Comprehension (minimum one question should be set on each unit)	**05**
	B	Textual objective type questions to be set on vocabulary items, such as, synonyms, antonyms, pair of words, usage of phrases and changing classes of words by using suffixes	**05**
Q.2	A	Answer in 3 to 4 sentences each (3 out of 5)	**09**
	B	Write short notes in about 50 to 60 words each (2 out of 3)	**06**
		Communication Skills	
Q.3	A	Unit No. 1 Describe Objects	**05**
	B	Unit No. 1 Describe Processes/Experiments	**05**
Q.4	A	Unit No. 2 Narration OR	**05**
	A	Unit No. 2 Piece of conversation regarding personal problems / experiences	
	B	Unit No. 3 Study the following pie diagram/table/flowcharts/tree diagram and write a paragraph with the help of it.	**10**

FORENSIC SCIENCE
Practical FSC111

Practical: - Forensic Science and Forensic Biology

Max Marks:-50

Every candidate appearing for examination must produce a journal showing that he has completed **not less** than ten experiments during the semester. The journal must have been examined and signed periodically by a member of laboratory staff and certified at the end of semester by head/ Co-ordinator of the Department.

Sr. No.	Forensic Science topics	
1	Collection and Handling of toxicological samples	2 nos.
2.	Collection and Handling of Petroleum samples	2 nos.
3.	Collection and Handling of murder case samples	2 nos.
4.	Collection and Handling of toxicological samples	2 nos.
5.	Study of Bomb Blast scene	2 nos.
6.	Collection and Handling of firing crime scene samples	2 nos.
7.	Collection and Handling of Hit and run crime scene samples	2 nos.
8.	Collection and Handling of fire crime scene samples	2 nos.

Note:-Minimum 08 experiments should be conducted

Sr. No.	Forensic Biology experiment	
1.		2
2.	Study of morphological types of red blood cells	1
3.	Study of plant-material (wild and cultivated from families, magloniaceae, combretaceae, amaranthaceae,	2

	convolovalacea	
4.	Study of conducting tissue, -xylem and phloem elements in angiosperms and Gymnosperms as seen in L.S. and R.C.S.	2
5.	Glassware Sterilization & Preparation of media and its sterilization	1
6.	Antigen-antibody reaction (blood groupings)	1
7.	Study of body fluids	1
8.	Radial immune diffusion analysis	1
9.	Isolation of chromosomal DNA	1
10	Restriction digestion of DNA	1
11	thin layer chromatography, determination of RF values	1

Note:- Minimum 08 experiments should be conducted

FORENSIC SCIENCE
Practical FSC 112
Practical: - Forensic Chemistry and Forensic Biochemistry

Max Marks:-50

Practical: - Forensic Chemistry

Sr. no.	Name of experiment	
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 of given acid	2 nos.
6.	Inorganic micro / semi micro qualitative analysis	2 nos.
7.	Identification of organic compound	3 nos.

Note:-Minimum 08 experiments should be conducted

Practical: -Forensic Biochemistry

Sr. no.	Name of experiment	
1.	Preparation of buffers (Phosphate buffer, acetate buffer) and determination of pH with pH meter	1 nos.
2.	General test for carbohydrates and ditection of unknown carbohydrate (Glucose, fructose, maltose, sucrose, xylose and starch)	2 nos.
3.	Estimation of reducing sugar from apple juice by Benedict's Method.	1 nos.

4.	Quantitative method for amino acid by Ninhydrin method.	1 nos.
5.	Protein estimation (Biuret method)	1 nos.
6.	Estimation of cholesterol (Iron reagent).	1 nos.
	Chromatography- separation of Amino acids, sugars, using paper chromatography	2 nos.
8.	Qualitative analysis of sugar, proteins, lipids and nucleic acids	2 nos
10.	Estimation of Glucose by 3,5 Dinitro salicylic acid methodFormal titration for estimation of aminoacids	1 nos.

Note:-Minimum 08 experiments should be conducted

FORENSIC SCIENCE
Practical FSC 113

Practical: - Forensic Physics and Forensic Accountacy

Max Marks:-50

Sr. no.	Forensic Physics Experiments
1.	Poission's Ratio
2.	Y by vibration
3.	Viscosity of liquid by Poiseullie's method
4.	Spectrometer (determination of angle of prism A)
5.	LCR series resonance
6.	Velocity of sound in Air by Resonating bottle
7.	Frequency of AC mains
8.	Photovoltaic cell : Inverse Square Law
9.	Cardinal Points by Newton's method
10.	Newton's rings
11.	Wavelength of He-Ne LASER
12.	Refractive index by using liquid lens
13.	Bridge rectifier (to study load regulation)
14.	Transistor (CE) characteristics: Output characteristics
15.	Study of Basic Logic Gates
16.	De Morgan's theorems

Note:-Minimum 08 experiments should be conducted

Sr. No.	Forensic Accountancy	Practical 15
1	Applications of differential equation i) Growth & decay ii) Newton's law of cooling	02
2	Eigen values & Eigen vectors	02
3	Complex numbers: Geometrical representation of complex numbers (Argand's diagram) Graphical representation of $Z^-, Z_1 + Z_2, Z_1 - Z_2, Z_1.Z_2, Z_2, Z_2/Z_2, [Z-a] = b$	02
	Statistics	
1	Frequency distribution – Graphical, Histogram, ogive curve [less & greater than].	02
2	Measures of central tendency (Grouped and Ungrouped) A. M., Median, Mode.	02
3	Measures of Dispersion – Range, s. d., C. V. combined s. d.	01
4	Correlation, Regression. Scattered diagram, Karl Pearson's correlation coefficient, eqn of Regression line	02
5	Testing of Hypothesis: Large sample test: Normal, proportion. Small sample test.: x2, t, f.	02

FORENSIC SCIENCE
Practical FSC 114

Practical: - Digital and Cyber Crime and Forensic Psychology

Max Marks:-50

Sr. No.	Digital and Cyber Crime experiments
1.	Finding results of different logic gates and 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 and writing data on floppy, CD,DVD, USB thumb drive
5.	Working with external storage devices using Linux-reading writing data on floppy, CD, DVD, USB, thumb drive.
6.	Understanding LAN-client/server, user creation, password protection.
7.	Use of internet- visiting websites with given URL, searching in formation using search engine.
8.	Use of E-mail, creating e-mail, sending and receiving e-mails with attachments.
9.	Networking commands- like ping, IP config. etc, with various switches.
10.	Tracing E-mail, finding senders IP address, of received email, tracing route of email received using tool available on internet, e.g. Visual Trace Route etc.

Forensic psychology Experiments

Sr. No.	Name of experiment	
1.	**Basics of Forensic Psychology** 1. Introduction of Psychology Practicals. 2. Conduction of Personality Test. • D.A.P. • H.T.P. 2 nos.	1 nos. 2 nos. 2 nos.
2.	Conduction of Personality Test. a. Eyescenk Personality Inventory b. Children Personality Questionnaire c. Sack's Sentence Completion test.	2 nos. 2 nos. 2 nos.
3.	Visit to Rehabilitation centre,Mental Hospital/ FSL.	

B. Sc. Semester- II
FORENSIC SCIENCE (ENTIRE)

Course Code	Title of Course	Theory
FSC201	Basic of Forensic Science II	50
FSC202	Basic of Forensic Chemistry II	50
FSC203	Basic of Forensic Physics II	50
FSC204	Basic of Forensic Biology II	50
FSC205	Basic of Forensic Psychology II	50
FSC206	Basic of Digital and Cyber Forensics II	50
FSC207	Basic of Forensic Biochemistry II	50
FSC208	Forensic Statistics	50
FSC209	English for Communication II	50
	Practical course	
FSC211	Forensic Science and Forensic Biology	50
FSC212	Forensic Chemistry and Forensic Biochemistry	50
FSC213	Forensic Physics and Statistics	50
FSC214	Cyber and digital crime and Psychology	50

[Note: - Practical Examination will be Annual]

B. Sc. I year (Semester II)

FORENSIC SCIENCE
Paper FSC201
Basic of Forensic Science II

	Semester –II Max. Marks:-50	45 Periods
Unit-I	**FORENSIC SCIENCE LABORATORIES AND FACILITIES**Growth of Forensic Science Laboratories in India – Central and State level LaboratoriesEducational setup in Forensic Science in IndiaServices and functionalities provided by various FSLsVarious divisions in the FSL – Ballistics, Biology, Chemistry Documents, Physics, Psychology, Serology, Toxicology	15
Unit-II	**CRIME SCENE MANAGEMENT** Types of crime scenes – primary, secondary, crime scenes based on size of EvidenceCrime scene Management – initial response, role of first responding officer, duty managementForensic Scientists, Investigating officers and their assigned role and duties Role of the Police and Judiciaries, Fire Brigade, Medico-legal officers and other experts	15
Unit-III	**PHYSICAL EVIDENCE COLLECTION & PACKAGING** Physical evidence, types and importance in a criminal investigation Protecting a scene of crime – various steps involved, contamination issues. Recovery and preservation of samples from a crime scene – biological, toxicological, petroleum, explosives, trace items, projectiles and bullets	15

B. Sc. I year (Semester II)

FORENSIC SCIENCE
Paper FSC202

Basic of Forensic Chemistry II

	Semester-II Max. Marks:-50	45 Periods
Unit I	**INTRODUCTION OF ANALYTICAL TECHNIQUES** Gravimetric analysis, volumetric analysis, chromatographic separation, the liquid chromatography, Electrophoresis, Thermal methods	15
Unit-II	**INTRODUCTION OF INORGANIC AND ORGANIC CHEMISTRY** Empirical and molecular formulae, hybridization, nature of chemical bonding, polarization, hydrogen bonding, Vander walls forces, IUPAC nomenclature of alkanes, alkenes, haloalkanes, alcohol ether aldenydes, ketones, carboxylic acids, nitro compounds, nitrites including cyclic analogues and also aromatic compounds, naphthalene, anthrones and phenanthrones, reactive intermediates and related reactions.	15
Unit-III	**INTRODUCTION OF CHEMICAL COMPOUNDS** Heterocyclic chemistry: natural products, petroleum products, drugs, insecticides, pesticides etc introduction to dyes, paints, polymers.	15

B. Sc. I year (Semester II)

FORENSIC SCIENCE
Paper FSC203

Basic of Forensic Physics II

Semester-II		Max. Marks:-50	
Unit- I	**LASER AND FIBER OPTICS** Production of LASER, types of LASER, properties and application of LASER, optical fibers, propagation of light through optical fiber, Angle of acceptance and numerical aperture, solar cell.		15
Unit-II	**RADIOACTIVITY** Review of nuclear composition, nuclear properties and half life, Radioactive decay schemes, Applications of Radio Isotopes, Carbon dating, Radiometric dating.		15
Unit-III	**ELECTRONIC CIRCUITS AND DIGITAL ELECTRONICS** Basics of LR, CR, LCR Circuits, Diode and it's characteristics, Bridge Rectifier with π filter , Transistor and its characteristics, Single stage CE amplifier, Logic gates , derived gates(NAND, NOR),De-Morgan's theorem. .		15

B. Sc. I year (Semester II)

FORENSIC SCIENCE
Paper FSC 204

Basic of Forensic Biology II

	Semester-II Max. Marks:-50	45 Periods
Unit-I	**MICROBIOLOGY AND BIOTECHNOLOGY** Microscopy - Principles and types Historical introduction to microbiology Basics of Microbiology and concepts of Pure culture techniques. Broad classification of microorganisims Fundamentals of Recombinant DNA technology and its application in Heath and Diseases, • Western and Southern Blot techniques	15
Unit-II	**EVOLUTION AND GENETICS** Origin of life and Geological time scale Theories and evidences of evolution - Darwinism, Lamarkism, fossil record and biochemical evidences. Origin and Concept of Species Genetic Materials - Structural organization and functions Mendelian Principles, Mendels Laws and Ratio Sex linked inheritance, sex determination and crossing over - Karyotyping analysis, Chromosomal mapping, DNA and RNA structural types	15
Unit-III	**IMMUNOLOGY** Immunity and Immune System Structure and interaction of antigens and antibody B cell / T cell development, diversity and recognitionImmunoglobulins structure - transplantation and types, immune system disorders.Failures of Body defenses	15

B. Sc. I year (Semester II)

Basic of Forensic Psychology II

	Semester-IIMax. Marks:-50	**45 Periods**
Unit-I	LEARNING AND MEMORY Learning process, Types of learning, models of memory, stages of memory, encoding, retention and retrieval, forgetting, brain and memory, problem in learning and memory.	15
Unit-II	COGNITION, MOTIVATION AND EMOTION Thinking, decision making and problem solving intelligence and language, motivation: Types of approaches Emotion, stress and coping.	15
Unit-III	THEORIES OF PERSONALITY Understanding personality, type and Trait, theories of personality, psychoanalytic model, behavioristic model social cognitive model, Humanistic model, Biological model assessment of personality.	15

B. Sc. I year (Semester II)

FORENSIC SCIENCE
Paper FSC 206

Basic of Digital and Cyber Forensics II

	Semester –II Max Marks:-50	(45 Periods)
Unit-IV	File system and networking:- Introduction to file system, FAT12, FAT16, FAT32, NTFS, EXT2, EXT3, HFS, Basics of networking- types of topologies, LAN, MAN, WAN.	15
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 and policies	15
Unit-VI	Cyber crime and 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.	15

B. Sc. I year (Semester II)

FORENSIC SCIENCE
Paper FSC 207

Basic of Forensic Biochemistry II

	Semester –II **Max Marks:-50**	**(45 Periods)**
Unit-I	**Protein:** Amino acid classification (Side chain, nature of R group,incorporation in proteins), structure &properties of amino acids, acid base behavior and reactions, zwitterions, peptide bond, Determination of primary structure (Sanger's method, Edman's method, Dansyl chloride, Dabsyl chloride), Forces stabilizing secondary structure, Ramchandran plot, Tertiary structure (Describe different bonds)Quaternary structure Hb& antibody)	13
Unit-II	**Protein purification :**Method of cell disruption (Blenders, grinding with abrasives, presses, enzymatic method, sonication); Salt participation- Salting in, salting out, organic solvent precipitation, dialysis, ultra filtration, paper electrophoresis, centrifugation (Basics, Principal, Svedberg's constant)	10
Unit-III	**Enzymes:**Introduction, IUB classification, active site, energy of activation, transition state hypothesis, lock and key hypothesis, induced fit hypothesis, allosteric enzymes, enzyme inhibition, MM equation, Line weaver- Burk plot, Eadie-Hofstee plot.Co-enzymes: Thiamine, riboflavin, niacin, pyridoxol phosphate, lipoic acid, panthothenic acid, folic acid. (Introduction, structure, chemistry, sources, daily requirement, deficiency, biological functions)	22

B. Sc. I year (Semester II)

FORENSIC SCIENCE
Paper FSC208

Forensic Stastatics

	Semester –II Max Marks:-50	(45 Periods)
Unit-I	**Introduction to statistics and collection of data.** 1.1 Meaning of statistics 1.2 Scope of statistics in Biological and medical sciences 1.3 Primary and Secondary data 1.4 Classification of data, Inclusive and Exclusive methods, Discrete and Continuous frequency distribution. 1.5 Cumulative frequencies 1.6 Graphical representation :- Histogram and ogive curves	09
Unit-II	**Measures of central tendency and measures of dispersion** 2.1 Concept of measures of central tendency 2.2 Definitions of A.M., Median, Mode, Quartiles, Weighted mean, Examples on ungrouped and grouped data. 2.3 Properties of A.M. (statement only) 2.4 Methods of obtaining mean & quartiles graphically 2.5 Concept of measures of dispersion . Absolute and Relative measures of dispersion. 2.6 Definitions of Range, Q.D, S.D and variance , coefficient of variation. Examples on grouped and ungrouped data	13
Unit-III	**Correlation and Regression** 3.1 Concept of correlation between two variables and types of correlation. 3.2 Method of obtaining correlation (i) by scattar diagram method ii) By Karl Pearson Correlation coefficient iii) By Spearman's Rank correlation	28

		coefficient with and without tie.
		Properties of correlation coefficient.
		3.3 Examples on ungrouped data
		3.4 Concept of regression, Lines of regression
		Regression coefficients and properties without proof.
		3.5 Examples on ungrouped data.
		3.6 Idea of multiple and partial correlation
		Probability and Sampling
		4.1 Definition of sample space, Outcomes, events, exhaustive events, Mutually exclusive events, Equally likely events, certain events impossible events.
		4.2 Definition of probability, Limits of probability. Probability of complementary event, Additive law of probability. Simple illustrative examples.
		4.3 Definition of conditional probability, Multiplicative law of probability, Independent events, Simple illustrative examples.
		4.4 Idea of population and sample. Simple Random Sampling and Stratified Random sampling. Advantages and disadvantages of both the methods.
		4.5 Testing of hypothesis Simple and composite hypothesis, Null and alternative hypothesis, types of errors, Critical region, Acceptance region, level of significance.
		4.6 Tests of significance: Chi square tests, t tests and F

B. Sc. I year (Semester II)

FORENSIC SCIENCE
Paper FSC209

English for Communication II

	Semester –II Max Marks:-50	(45 Periods)
	Section I: Communication Skills Unit 9 Preparing a C.V. and Writing a Letter of Application Unit 10 Facing an Interview Unit 11 Arguing/Expressing Your Point of view	20
Unit-II	Section II: Reading Comprehension Unit 12 The Meaning of True Wealth, by ChetanBhagat Unit 13 While the Auto Waits, by O. Henry Unit 14 A Poison Tree, by William Blake Unit 15 A Guardian Angel, by Ruskin Bond Unit 16 Night of the Scorpion, by Nissim Ezekiel	25

Division of Teaching hours:
1. Communication Skills = 12 X 3 = 36 Hours
2. Reading Skill = 7 X 4 = 28 Hours

Pattern of Question Paper

Reading Comprehension			
Q.1	A)	Multiple choice objective questions on Reading Comprehension (minimum one question should be set on each unit)	**05**
	B	Textual objective type questions to be set on vocabulary items, such as, synonyms, antonyms, pair of words, usage of phrases and changing classes of words by using suffixes	**05**
Q.2	A)	Answer in 3 to 4 sentences each (3 out of 5)	**09**
	B)	Write short notes in about 50 to 60 words each (2 out of 3	**06**
Communication Skills			
Q.3	A	Unit No. 9 Write a Letter of Application	**05**
	B	Unit No. 9 Write a C. V. for the above application	**05**
Q.4	A	Unit No.10 Complete the following interview	**05**
	B	Unit No. 11 Express your agreement or disagreement on the following topics.	**05**
		Unit No. 11 Express your opinions or views on the following topic in 5 to 6 sentences.	**05**

Nature of Question Paper

Nature of Question Paper for all (Theory) papers U.G. Courses under Faculty of Science.

	Nature of Question paper	
Q.1	Multiple Choice based objective type question (four options for each question be given)	10
Q.2	Attempt any two of the following (out of three)	20
Q.3	Shot notes (4 out of 6)	20
	Total	50

Nature of question paper:

Annual Practical Examination

A) Every candidate must produce a certificate from the Head/ Co-ordinator of the Department in his college, stating that he has completed in a satisfactory manner a practical course on the lines laid down from time to time by the Academic Council on the recommendations of the Board of Studies and that the laboratory Journal has been properly maintained. Every candidate must have recorded his/her of the Department at the end of the year. Candidates are to producetheir journals at the practical examination and such journals will be taken into account by the examiners in assigning marks.

B) The practical examination will be of 6 hours duration and will be conducted on twosuccessive days (3 hours per day)

Marks for Practical Examination:

Practical Question paper should be drafted as per need of subject. Minimum experiments should be taken 16 for per practical course (Per subject 08)

General format of practical examination as below:

Q.1 Major Experiment (any one)   20 marks

          OR

Q.1 Minor experiment (any two)   20 marks

Q.2 Journal and oral   10 marks

Note: Experiments may be arranged as per convenience of the examiner. All rules , regulation and standard of passing for practical and theory examination will be applicable as per general B.Sc. course.

Reference Books:

Paper: FSC 101 and 201

1) Henry Lee's Crime Scene handbook by Henry 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 by Stuart H. James.

5) Criminalitics : An Introduction to forensic science, by Richard Saferstein.

6) Computer crime and computer forensic by A.K. Tiwari

7) Criminal profiling: An introduction to a behavioral evidence analysis by Brent E. Turvey.

8) Forensic Science in criminal investigation and trial by B.R. Sharma

9) Handbook of forensic psychology by Veerraghavan

10) Text book of medical purisprudence, forensic medicine and toxicology by C.K. Parikh.

11) The identification of firearms and forensic Ballistics by Barrard and Gerald.

12) Illustrated guide to crime scene investigation by Nicholas PetracoHallsherman.

13) Techniques of crime scene investigation by Barry A.J. Fischer.

List of Books

Paper: FSC 102 and 202

1) Thermodynamics for chemistry by S. Glasstone

2) Principles of physical chemistry by Puri, Sharma and Pathania.

3) Advanced inorganic chemistry by Madan, Malik &Tuli.

4) Concise inorganic chemistry by J.D. Lee.

5) Organic Chemistry by Morison and Boyed

6) Heterocyclic chemistry by Gupta & Kumar Vol I &Vol II

7) Insecticides with modes of Action by I. Ishaya and D. Deghilee.

8) Natural products by S.U. Bhat.

9) Instrumental analysis by Skoog, Holler & Crouch.

10) Physical chemistry practicals J.B. Yadav.

11) Qualitative analysis by Vogel.

12) Essentials of Physical Chemistry, A. Bahl, B.S. Bahl and G.D. Tuli.

13) Instrumental methods of chemical analysis by G.R. Chatwal& S.K. Anand.

List of Books

Paper: FSC 103 and 203

1. Principle of Electronic by V.K. Gupta

2. Digital Electronics by Malnino

3. Digital Electronics by Flloyd

4. Op-amp by Gaikwad

5. Engineering Physics by Gaur and Gupta

List of Books
Paper: FSC 104 and 204

1) Principle of Biochemistry by Lehninger
2) Harper's Biochemistry by Murray
3) Biological spectroscopy by LaKowicz
4) Analytical Biochemistry by Holme
5) Enzyme Kinetics by Plownan
6) Biophysical chemistry by Upadhyay.
7) General microbiology by Powar-Dayinawala
8) DNA cloning by Clover
9) Plant Anatomy by Faha
10) Gymnospherm by Chamberlein

List of Books
Paper: FSC 105 and 205

1) Psychology: The University of Mumbai edition (New Delhi: Pearson edition) by Ciccorelli, S.K. and Meyor G.E.
2) Psychology: from science to Practice by Baron, R.A. Kolsher M J .
3) Understanding Psychology by Fieldman R.S.
4) Psychology: An introduction by Lahey B.B.
5) Introduction to Psychology by Kalat J.W.
6) Introduction to Psychology by King & Morgan
7) Forensic Psychology by Christopher Cronin.
8) History of Forensic Psychology by Bartol, C.R. and Bartol, A.M.

List of Books
Paper: FSC 106 and 206

1)   Cyber law in India by FarooqAhmand- Pioneer Books

2)   Information technology law and Practice by Vakul Sharma

3)   The Indian cyber law by Suresh T. Vishwanathan

4)   Guide to Cyber & E. commerce laws by P.M. Bukhi

5)   Guide to Cyber laws by Rodney D. Ryder

6)   The information technology Act 2008 Bare Act

7)   Computer Forensic Principle and practice by Linda Volonino, Reynaldo, Anzaldua and Jana Godwin

8)   First Responder's guide to computer forensics by Richard Nolan et.al.

9)   Digital evidence and computer Forensics Crime

10)   The regulation of cyber space by Andrew Murray, 2006 Routledge-Cavendish.

11)   Scene of the cyber crime: Computer forensics Handbook by syngress.

12)   List of websites for more information available on"
     http://www.gary/essler.net library/forensinus/html

List of Books
Paper 109 and 209
1) Algebra and geometry by G. V. Khumbojkar.
2) Calculus and differential equation (Phadakeprakashan).
    Prof. L. G. Kulkarni, Dr. P. B. Jadhav
3) Shantinarayan - Text Book of Matrices

Recommended books for statistics:
1) Goon A. M., Gupta M. K. and Dasgupta B.: Fundamentals of mathematical statistics vol. I & II. World Press, Calcutta.
2) Gupta &Kapoor: Fundamental of mathematical statistics.
3) Thingale T. K. and Dixit P. G. (2003): A text book of paper- I for B.Sc. I, NiraliPublication, Pune.
4) Waiker and Lev: Elementary Statistical methods.
5) Rohatgi V. K. and Sauh A. K. Md E. (2002) An Introduction to probability and statistics (John Wiley & Sons-Asia).

6) Thigale T. K. and Dixit P. G. (2003): A text book Of paper II for B.Sc. I.

7) Meyer P. L. (1970): Introductoryto probability and statistical Application. Addisionwesly.

List of Books:
Paper 108 and 208
1) Biochemistry – Nelson & Cox
2) Biochemistry - Stryer
3) Enzymes - Trevor Palmer
4) Biochemistry - Voiet&Voiet
5) Biochemistry - J. L. Jain
6) Basic Biophysics- M. Daniel
7) Biochemistry - Powar and Chatwal
8) Protein Purification- Harris and Angel
9) Practical biochemistry – Keith Wilson And Walker
10) Principles of Biochemistry - T. N. Pattabriraman.
11) Biochemistry 3rd Edition – Hames& Hopper.
12) General Biochemistry – J. H. Well.
13) Biochemistry – J. H. Ottaway& D. K. Apps
14) Biochemistry – Trchan
15) Text Book of Biochemistry- R. A. Joshi.
16) Biochemistry – U. Satyanarayanan
17) Biochemistry a Functional Approach – Robert W McGilvery& Goldstein
18) Text Book of Biochemistry – A.V. S. S. Rama Rao
19) Clinical Biochemistry –Praful B. Godkar.