Faculty of Biomedical Science

JSS ACADEMY OF HIGHER EDUCATION & RESEARCH
(DEEMED TO BE UNIVERSITY) MYSURU

JSS Academy of Higher Education & Research
(Deemed to be University)
Re-Accredited "A+" Grade by NAAC
Sri Shivarathreeshwara Nagara Mysuru - 570015, Karnataka

Regulation & Syllabus

B.Sc. FORENSIC SCIENCES
2023

BSc

REGULATIONS AND CURRICULUM

B.Sc. Forensic Sciences

2023

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Sri Shivarathreeshwara Nagara, Mysuru - 570015, Karnataka

REGULATIONS

B.Sc. Forensic Sciences

Courses offered in Allied Health Sciences

a. Bachelor of Science in Medical Laboratory Technology [B.Sc. (MLT)]

b. Bachelor of Science in Anesthesia & Operation Theatre Technology [B.Sc. (AOTT)]

c. Bachelor of Science in Renal Dialysis Technology [B.Sc. (RDT)]

d. Bachelor of Science in Respiratory Care Technology [B.Sc. (RCT)]

e. Bachelor of Science in Medical Imaging Technology [B.Sc. (MIT)]

f. Bachelor of Science in Cardiac Care Technology [B.Sc. (CCT)]

g. Bachelor of Science in Perfusion Technology [B.Sc. (PT)]

h. Bachelor of Science in Emergency Medicine Technology [B.Sc. (EMT)]

i. Bachelor of Science in Physician Assistant in CTVS [B.Sc. (P A)]

j. Bachelor of Science in Optometry [B.Sc. (optometry)]

k. Bachelor of Science in Forensic Science [B.Sc. (FS)]

l. Bachelor of Science (Honors) in Genetics & Genomics [B.Sc. (G & G)]

m. Bachelors of Occupational therapy (BOT)

1. Eligibility for admission

A candidate seeking admission to the Bachelor of Science Degree in Allied HealthSciences [a) to m) above], shall have studied English as one of the principal subjects and shall have passed (except for B.Sc. Imaging Technology):

a) Two year Pre-University examination or equivalent as recognized by JSS AHER, Mysore (JSSAHER) with Physics, Chemistry and Biology as principal subjects of study.

OR

b) Pre-degree course from a recognized University considered as equivalent by JSSAHER, (two years after ten years of schooling) with Physics, Chemistry and Biology as principal subjects of study.

OR

c) Any equivalent examination recognized by the JSSAHER for the above purpose, with Physics, Chemistry and Biology as principal subjects of study.

OR

d) Vocational higher secondary education course conducted by Vocational Higher Secondary Education, Government of Kerala with five subjects including Physics, Chemistry, Biology and English in addition to vocational subjects conducted, considered equivalent to 'plus - two' [10+2] examinations of Government of Karnataka Pre University Course.

OR

e) Two years diploma from a recognized Government Board in a subject for which the candidate desires to enroll in the respective Allied Health Sciences course and shall have passed 'plus two' [10+2] with Physics, Chemistry and Biology, as principal subject

OR

f) Three years diploma from a recognized Government Board in a subject for which the candidate desires to enroll in the respective Allied Health Sciences course, with Physics, Chemistry and Biology as principal subjects during the tenure of the course.

OR

g) Senior secondary course with Physics, Chemistry and Biology as principal subject of study equivalent to class XII, of open school education system of the central government and state government approved institutions.

h) In case of B.Sc. Imaging Technology the candidate shall have passed Pre- University or equivalent examination with Physics, Chemistry, Biology and Mathematics, as principal subjects of study.

1. Duration of the course

Duration shall be for a period of Six semesters (three years)

2. Medium of instruction

The medium of instruction and examination shall be in English.

3. Attendance

Candidates should have attended at least 75% of the total number of classes conducted in an academic year, from the date of commencement of the term to the last working day, as notified by the University, in each of the subjects prescribed for that year (theory, practicals, and clinical separately) to be eligible to appear for the University examinations. Candidates lacking prescribed percentage of attendance in any subject shall not be eligible to appear for the University examination in that subject in that semester. However students will have to put up 75% attendance in the additional classes conducted by the department to appear for supplementary examination.

4. Internal assessment (IA)

There shall be a minimum of two Internal assessment examinations in theory and practical of each core subject spread over evenly in each semester. The average marks of the two IA examinations shall be submitted to the University at least 15 days before the commencement of the University examination. The University shall have access to the records of IA examinations. Candidates have to secure 40% marks in the IA theory and practical separately in each subject to become eligible to appear for the University examination. The marks of the IA examinations must be displayed on the notice board of the respective departments within a fortnight from the date of IA examination. If a candidate is absent for any of the IA examinations due to genuine and satisfactory reasons, such a candidate may be given a re-examination, within a fortnight.

5. Subject and hours of teaching for theory and practical's

The number of hours of teaching theory and practical, course wise in each semester are shown in table I, II, III, IV, V and VI.

There are three compulsory core subjects in each semester. Language, Allied and Skill enhancement subjects are mandatory for all courses. Candidates shall select one elective subject each in fifth and sixth semester from the list mentioned in the table VII.

Table I: Distribution of teaching hours in first year subjects.

Category	Subjects	Theory hours	Credits	Tutorials hours	Credits	Practical hours	Credits	Total hours	Total credits
Core - 1	Anatomy	45	3	15	1	30	1	90	5
Core - 2	Physiology	45	3	15	1	30	1	90	5
Core - 3	Basic Biochemistry	45	3	15	1	30	1	90	5
Ability Enhancement -1	English	30	2	-	-	-	-	30	2
Ability Enhancement - 2	Kannada	30	2	-	-	-	-	30	2
Value added course 1	Yoga	15	1	-	-	15	-	30	1
Total Credits	20								

Table II: Distribution of teaching hours in Second Semester subjects

Category	Subjects	Theory hours	Credits	Tutorials hours	Credits	Practical hours	Credits	Total hours	Total credits
Core - 4	General Pathology	45	3	15	1	30	1	90	5
Core - 5	General Microbiology	45	3	15	1	30	1	90	5
Core - 6	Pharmacology	45	3	15	1	30	1	90	5
Value added course 2	Crime and Society	30	2	-	-	-	-	30	2
Allied - 1	Psychology	30	2	-	-	-	-	30	2
Skill Enhancement-1	Soft skills	15	1	-	-	-	-	15	1
Total Credits	20								

Table III: Distribution of teaching hours in Third Semester subjects

Category	Subjects	Theory hours	Credits	Tutorials hours	Credits	Modality Posting + Practicals	Credits	Total hours	Total Credits
Core - 7	Forensic Dermato-glyphics	45	3	15	1	90	3	150	7
Core - 8	Criminal Law	45	3	15	1	90	3	150	7
Core - 9	Introduction to Forensic Science	45	3	15	1	90	3	150	7
Skill Enhancement-2	Computer application	30	2	-	-	-	-	30	2
Value added course-3	Environment Science and Health	30	2	-	-	-	-	30	2
Total Credits	25								

Table IV: Distribution of teaching hours in Fourth Semester subjects

Category	Subjects	Theory hours	Credits	Tutorials hours	Credits	Modality Posting + Practicals	Credits	Total hours	Total Credits
Core - 10	Criminalistics	45	3	15	1	90	3	150	7
Core - 11	Technological Methodsin Forensic Science	45	3	15	1	90	3	150	7
Core - 12	Questioned Documents	45	3	15	1	90	3	150	7
Skill Enhancement-3	Biostatistics andResearch methodology	30	2	-	-	-	-	30	2
Value added course -4	Constitution of India	30	2	-	-	-	-	30	2
Total Credits	25								

Table V: Distribution of teaching hours in Fifth Semester subjects

Category	Subjects	Theory hours	Credits	Tutorials hours	Credits	Modality Posting + Practicals	Credits	Total hours	Total Credits
Core - 13	Forensic Chemistry and Physics	45	3	15	1	90	3	150	7
Core - 14	Forensic Medicine	45	3	15	1	90	3	150	7
Core - 15	Forensic Biology & Serology	45	3	15	1	90	3	150	7
Elective 1		30	2	-	-	-	-	30	2
Allied - 2	Pharmacology and Pharmaceutical Drug Analysis	30	2	-	-	-	-	30	2
Total Credits	25								

Table VI: Distribution of teaching hours in Sixth Semester subjects

Category	Subjects	Theory hours	Credits	Tutorials hours	Credits	Modality Posting + Practicals	Credits	Total hours	Total Credits
Core - 16	Forensic Anthro pology	45	3	15	1	90	3	150	7
Core - 17	Forensic Toxicology	45	3	15	1	90	3	150	7
Core - 18	Forensic Ballistics	45	3	15	1	90	3	150	7
Elective-2		30	2	-	-	-	-	30	2
Allied-3	Digital Forensics	30	2	-	-	-	-	30	2
Total Credits	25								

Table VII: Elective Subjects

Elective Subjects	Offering Departments
Fifth Semester	
Immunotechniques in diagnosis of diseases	Pathology and Microbiology
Dental Radiography	Radio diagnosis
Pulmonary Function Testing	Pulmonary Medicine
Telemedicine	Dermatology (Dr Kantharaj)
Hands on training in Continuous ambulatory peritoneal dialysis	Nephrology
Echocardiography (Cardiology)	Cardiology
Echocardiography (CTVS)	Cardio Thoracic Vascular Surgery
Difficult airway intubation	Anesthesiology
Accident Investigation	Forensic Medicine
Forensic Psychology	Forensic Medicine
Sixth Semester	
Molecular Techniques	Biochemistry
Digital Subtraction Angiography	Radio diagnosis
Polysomnography	Pulmonary Medicine
Practice Management	Health system management studies
Renal Transplant	Nephrology
Coronary angiography	Cardiology
Intra Aortic Balloon pump	Cardio Thoracic Vascular Surgery
Ventilator management	Anesthesiology
DNA Typing	Forensic Medicine
Introduction to biometry	Forensic Medicine

Extension Activity

The following extension activities shall be provided for the ability enhancement of the candidates, to provide better health care services. The certificate shall be provided by the offering departments. The Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) shall be as per the American Heart Association guidelines and certification

Extension Activity	**Courses**	**Semester**	**Offering departments**
Phlebotomy	All courses	III	Anaesthesiology
Basic life support *(compulsory on payment basis)	All courses	IV	Emergency medicine
Small Project/data Analysis/Industrial visit	All courses	V	Concerned departmentsof the Course
Advanced cardiac life support *(Compulsory on payment basis for Said Courses)	Respiratory Care Technology, Emergence Medicine Technology, Anaesthesia and OT Technology, Cardiac Care Technology	VI	Emergency medicine

6. End Semester Examination

a) University examinations (UE): The University shall conduct examination forthe core subjects at the end of each semester. The candidates, who satisfy therequirement of attendance and internal assessment, shall be eligible to appearfor the University examination. The head of the institution shall verify the same before forwarding the applications to the University within stipulated time along with the prescribed fee.

a) Non-University Examinations (NUE): Examination for Languages, Allied subjects, Skill enhancement, value added courses and Elective subjects shall be conducted by the college and the marks obtained shall be submitted to the University along withthe IA marks of the core subjects at least 15 days before the commencement of the University examination. The marks of non-core subjects shall be incorporated in the marks card issued by the University.

a) The candidate must have passed all the previous subjects (Core/Language/Skill enhancement/Allied/elective), to appear for the sixth semester University examination.

7. Scheme of Examination:

Distribution of subjects and marks for each semester theory and practicalexaminations are shown in the Table - VIII, IX, X, XI, XII and XIII.

Table VIII: Distribution of Subjects and marks for First Semester theory andpractical examination

Category	Subjects	Theory				Practical			
		IA	UE	NUE	Total	IA	UE	NUE	Total
Core - 1	Anatomy	40	60	-	100	15	35	-	50
Core - 2	Physiology	40	60	-	100	15	35	-	50
Core - 3	Basic Biochemistry	40	60	-	100	15	35	-	50
Ability Enhancement -1	English		-	50	50	-	-	-	-
Ability Enhancement - 2	Kannada	-	-	50	50	-	-	-	-
Value added course 1	Yoga	-	-	50	50	-	-	-	-

Table IX: Distribution of Subjects and marks for Second Semester theory andpractical examination

Category	Subjects	Theory				Practical			
		IA	UE	NUE	Total	IA	UE	NUE	Total
Core - 4	**General Pathology**	**40**	**60**	**-**	**100**	**15**	**35**	**-**	**50**
Core - 5	**General Microbiology**	**40**	**60**	**-**	**100**	**15**	**35**	**-**	**50**
Core - 6	**Pharmacology**	**40**	**60**	**-**	**100**	**15**	**35**	**-**	**50**
Value added course 2	**Crime and Society**	**-**	**-**	**50**	**50**	**-**	**-**	**-**	**-**
Allied - 1	**Psychology**	**-**	**-**	**50**	**50**	**-**	**-**	**-**	**-**
Skill Enhancement-1	**Soft skills**			**50**	**50**				

Table X: Distribution of Subjects and marks for Third Semester theory andpractical examination

Category	Subjects	Theory				Practical			
Core - 7	**Forensic Dermatoglyphics**	**IA**	**UE**	**NUE**	**Total**	**IA**	**UE**	**NUE**	**Total**
		40	**60**	**-**	**100**	**15**	**35**	**-**	**50**
Core - 8	**CriminalLaw**	**40**	**60**	**-**	**100**	**15**	**35**	**-**	**50**
Core - 9	**Introduction to Forensic Science**	**40**	**60**	**-**	**100**	**15**	**35**	**-**	**50**
Skill Enhancement-2	**Computer application**	**-**	**-**	**50**	**50**	**-**	**-**	**-**	**-**
Value added course-3	**EnvironmentScience and Health**	**-**	**-**	**50**	**50**	**-**	**-**	**-**	**-**

Table XI: Distribution of Subjects and marks for Fourth Semester theory and practical examination

Category	Subjects	Theory				Practical			
Core – 10	Criminalistics	IA	UE	NUE	Total	IA	UE	NUE	Total
		40	60	-	100	15	35	-	50
Core – 11	Technological Methods in Forensic Science	40	60	-	100	15	35	-	50
Core – 12	Questioned Documents	40	60	-	100	15	35	-	50
Skill Enhancement-3	Biostatistics and Research methodology	-	-	50	50	-	-	-	-
Value added course -4	Constitution of India	-	-	50	50	-	-	-	-

Table XII: Distribution of Subjects and marks for Fifth Semester theory and practical examination

Category	Subjects	Theory				Practical			
Core - 13	Forensic Chemistry and Physics	IA	UE	NUE	Total	IA	UE	NUE	Total
		40	60	-	100	15	35	-	50
Core - 14	ForensicMedicine	40	60	-	100	15	35	-	50
Core - 15	Forensic Biology &Serology	40	60	-	100	15	35	-	50
Elective 1		-	-	50	50	-	-	-	-
Allied-5	Pharmacology and Pharma - ceutical Drug Analysis	-	-	50	50	-	-	-	-

Table XIII: Distribution of Subjects and marks for Sixth Semester theory and practical examination

Category	Subjects	Theory				Practical			
Core - 16	Forensic Anthropo-logy	IA	UE	NUE	Total	IA	UE	NUE	Total
		40	60	-	100	15	35	-	50
Core - 17	Forensic Toxicology	40	60	-	100	15	35	-	50
Core - 18	Forensic Ballistics	40	60	-	100	15	35	-	50
Elective 2		-	-	50	50	-	-	-	-
Allied-6	Digital Forensics	-	-	50	50	-	-	-	-

Question paper pattern for end semester University theory examinations

(60 marks) Duration: Two hours

- Short Essay : 04 questions out of 06 =04x05=20
- Short Answer: 10 questions = 10x03=30
- Very Short Answer: 05 questions = 05x02=10
- Total = 60 Marks

Question paper pattern for end semester Non-University theory examinations(50 marks)

MCQs 50 marks/Written theory assessment for 50 marks/Theory & practical assessment for 50 marks

8. Examiners

- Appointment of Examiners:
  Examiners shall be appointed by the University to conduct the end semester University examinations, from the panel of examiners approved by the Board of Studies. For Practical examinations, there shall be two internal/One Internal & one External examiners. Theory paper shall be valued by both the examiners.

- Qualification and Experience of Examiners:
  For question paper setting and external examiner: Post graduation in the respective field with five years of teaching experience. For Internal examiners: Post graduation in the respective field with three years of teaching experience.

9. Criteria for pass

Core Subjects: Candidates are declared to have passed in a subject, if they secure 40% of marks in university examination and internal assessment added together. Theory & practical shall be considered as separate subjects. If a candidate passes in practical examination but fails in theory paper, such candidate is exempted from reappearing for practical but shall have to appear in the subsequent examination for the theory paper in which the candidate has failed or vice versa. The minimum prescribed marks to pass in Language papers, allied papers, skill enhancement value based papers and elective papers shall be 35% of the maximum marks prescribed for a subject.

10. Grading of performances

- Letter grades and grade points allocations
  Based on the performances, each student shall be awarded a final letter grade at the end of the semester for each course. The letter grades and their corresponding grade points are given in Table - XIV.

Table - XIV: Letter grades and grade points equivalent to percentage of marks and performances

Percentage of Marks obtained	Letter Grade	Grade Point	Performance
90.00 – 100	O	10	Outstanding
80.00 - 89.99	A	9	Excellent
70.00 - 79.99	B	8	Good
60.00 - 69.99	C	7	Fair
50.00 - 59.99	D	6	Satisfactory
40.00 - 49.99	E	5	Average
Less than 40	F	0	Fail
Absent	AB	0	Fail

A candidate who remains absent for any end semester examination shall be assigned a letter grade of AB and a corresponding grade point of zero. He/she should reappear for the said evaluation/examination in due course.

a) The Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester. For example, if a student takes five courses (Theory/Practical) in a semester with credits C_1, C_2, C_3, C_4 and C_5 and the student's grade points in these courses are G_1, G_2, G_3, G_4 and G_5, respectively, and then students' SGPA is equal to:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4G_4 + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

The SGPA is calculated to two decimal points. It should be noted that, the SGPA for any semester shall take into consideration the F and ABS grade awarded in that semester. For example, if a learner has a F or ABS grade in course 4, the SGPA shall then be computed as:

$$\text{SGPA} = \frac{C_1G_1 + C_2G_2 + C_3G_3 + C_4 * \text{ZERO} + C_5G_5}{C_1 + C_2 + C_3 + C_4 + C_5}$$

b) Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VI semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VI semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the course(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$\text{CGPA} = \frac{C_1S_1 + C_2S_2 + C_3S_3 + C_4S_4 + C_5S_5 + C_6S_6}{C_1 + C_2 + C_3 + C_4 + C_5 + C_6}$$

where C_1, C_2, C_3,…. is the total number of credits for semester I,II,III,…. and S_1, S_2,S_3,….is the SGPA of semester I,II,III,….

11. Declaration of class

The class shall be awarded on the basis of CGPA as follows:

First Class with Distinction	= CGPA of. 7.50 and
aboveFirst Class	= CGPA of 6.00 to 7.49
Second Class	= CGPA of 5.00 to 5.99
Pass Class	= CGPA of 4.00 to 4.99

12. Carry over

A candidate who fails in core/language/skill enhancement/value based/allied/elective subjects of first semester to Fifth semester shall be permitted to carryover those subjects upto fifth semester. However, the candidate must have passed all the previous subjects (core/language/ skill enhancement/value based/ allied/elective) to appear for the sixth semester University examination.

13. Award of Ranks/Medals

Ranks and Medals shall be awarded on the basis of final CGPA. However, candidates who fail in one or more subject during the course shall not be eligible for award of ranks.

14. Award of degree

A candidate who has passed in all the subjects (core/language/allied/skill enhancement/value based/elective papers) of all the semesters and has successfully completed the internship shall be eligible for award of degree.

15. Revaluation and Re-totaling of answer papers

There is no provision for revaluation of the answer papers in any examination. However, the candidates can apply for re-totaling by paying prescribed fee.

16. Maximum duration for completion of course

A candidate shall complete the course within six years from date of admission, failing, which candidate shall re-register for the course.

B.Sc. Forensic Science

Program outcomes

At the end the program the Forensic Science student should be able to

PO 1: Demonstrate the acquisition of comprehensive knowledge amd skills related to basic medical sciences

PO 2: Demonstrate the acquisition of comprehensive knowledge about criminal behavior and functionaries of Criminal Justice system.

PO 3: Demonstrate the acquisition of comprehensive knowledge about all types of print in Biometric domain

PO4: Demonstrate the acquisition of comprehensive knowledge and skills of a forensic scientist.

PO5: Demonstrate the acquisition of comprehensive knowledge and skills related to criminalistics scene.

PO6: Demonstrate the ability of application of knowledge and skills of forensic analysis

PO7: Demonstrate the acquisition of comprehensive knowledge and skills about documentation procedures

PO8: Demonstrate the ability of application of medical knowledge and skills to crime scene investigation and detection

PO9: Demonstrate the acquisition of comprehensive knowledge and skills related to forensic anthropology and toxicology

PO 10: Demonstrate the acquisition of comprehensive knowledge and skills related to Ballistics

I Semester
Core-1 Anatomy

Course Outcome:

At the end of the course, students should know

CO1: Demonstrate the acquisition of comprehensive knowledge of basic tissues of the body.

CO2: Demonstrate the acquisition of comprehensive knowledge of gross anatomy of muscles, joints and organ system of human body

CO3: Demonstrate the acquisition of analysing the applied aspects concerned to human body.

CO4: Demonstrate the skill of identification of viscera of organ systems of human body

CO5: Demonstrate the skill of identification of microscopic structure of basic tissues and organs and correlate with their functions

CO6: Demonstrate the acquisition of comprehensive knowledge regarding the general embryology with congenital anomalies

Theory

Unit I **03hrs**

Organization of the human body

Introduction to the human body

Definition and subdivisions of anatomy

Anatomical position and terminology

Cell – Definition of a cell, shapes and sizes of cells

Parts of a cell – cell membrane, cytoplasm, cell organelles

Cell division – definition and main events in different stages of mitosis and meiosis

Tissues – Tissues of the body

Characteristics, functions and locations of different types of tissues

Epithelial tissue – definition, classification with examples

Glands – classification with examples

Connective tissue and Nervous tissue

Unit II **06hrs**

Locomotion and Support

Locomotion and support

Cartilage – structure, types with examples

Skeletal system

Classification, structure, functions and ossification

Name, location and features of bones of the body.

Joints – Definition, types of joints with examples

Name, location, type, bones forming, movements possible in the synovial joints of the body.

Muscular system

Muscular tissue – skeletal muscle - gross anatomy and histology

Cardiac and smooth muscle – histology

Muscles of upper limb, lower limb, thorax, abdomen and head and neck

Unit III **12hrs**

Maintenance of the Human Body

1. Cardio-vascular system

Types and structure of blood vessels, capillaries

Heart – location, coverings, external and internal features of heart, Blood supply of heart

Systemic arteries and veins – major arteries and veins of the body

Lymphatic system

Lymphoid organs – structure and functions

2. Respiratory system

Organs of respiration, location, features of nasal cavity, pharynx, larynx, trachea, bronchi, lungs and pleura

3. Digestive system

Organs of digestive system, location, features of oral cavity, Tongue, pharynx, oesophagus, stomach, intestine and accessory organs of digestion – salivary glands, liver and pancreas.

Unit IV

1. Excretory system and reproductive system **12hrs**

Organs of urinary system, location and features of kidneys, ureter, urinary bladder and urethra

Male and female reproductive organs. Location, features of scrotum, testis, epididymis, vas deferens, seminal vesicle, ejaculatory ducts, prostate gland, penis and spermatic cord

Location and features of uterus, its supports, uterine tube, ovary and mammary gland

2. Embryology I - IV week

gametogenesis, structure of sperm, growth of the ovarian follicles, events of 1st, 2nd and 3rd weeks of development, folding of embryo, derivatives of germ layers, placenta

Unit V **12hrs**

Control Systems of the Body

1.Nervous system

Introduction, coverings and blood supply of brain and spinal cord

Spinal cord – location, external features and internal structure of spinal cord

Brain – subdivisions, location, external features and internal structure of medulla oblongata, pons and midbrain, cerebellum and cerebrum.

Thalamus and hypothalamus

Basal ganglia

Ventricles – location, formation and circulation of CSF

Cranial nerves

2.Sense organs

Location and features of olfaction, eye, ear and skin

3.Endocrine system

Name of the endocrine glands, location and features, histology of pituitary gland, thyroid gland, parathyroid, suprarenal gland, pancreas, testis and ovary. Hormones secreted by each gland.

Practical : **30hrs**

1. Demonstration of parts of microscope and its uses
2. Demonstration of skeleton and joint
3. Demonstration of deltoid and gluteus maximus, Cubital fossa
4. Demonstration of heart and its blood supply, demonstration of major arteries ofupper limb and lower limb, histology of cardiac muscle and histology of vessels
5. Demonstration of location and parts of lungs, histology of trachea and lungs
6. Demonstration of location of stomach, small and large intestines. Location andfeatures of pancreas, liver and gall bladder
7. Demonstration of location and features of kidney, ureter, urinary bladder and urethra. Histology of urinary system except urethra
8. Demonstration of location of male and female reproductive organs
9. Demonstration of brain and spinal cord
10. Histology of cornea and retina

Practical Examination : 35 Marks

1. GrossAnatomy- Discussion of any one specimen
3. Discussion of specimens of Cardiovascular system, Respiratory System,Gastrointestinal system, Urinary system, Reproductive system
2. Spotters - Cardiovascular system, Respiratory System, Gastrointestinal system, Urinary system, Reproductive system
3. Histology discussion of any one demonstrated slide

Recommended Books Recent Editions:

1. Ross and Wilson: Anatomy and Physiology in Health and illness
2. Understanding HumanAnatomy and Physiology, William Davis (p) MC Graw Hill
3. Essentials of Human Embryology. Bhatnagar, Orient Blackswan Pvt. Ltd.
4. Anatomy for B.Sc Nursing by Renu Chauhan. Arichal publishing company 2012
5. Hand book ofAnatomy BD Chaurasia
6. Basics in Human Anatomy for B.Sc. Paramedical Courses 1st edition 2008 Jaypee Publishers

Reference books:

1. B D Chaurasia: Regional Anatomy. Vol I, II, III 6th edition

I Semester

Core- 2 Physiology

Course Outcome:

At the end of the course, students should know

CO1: Demonstrate the acquisition of comprehensive knowledge in the basic physiological concepts of general physiology.

CO2: Demonstrate the acquisition of comprehensive knowledge of circulation in human body.

CO3. Demonstrate the acquisition of comprehensive knowledge of all organ system of the body

CO4. Perform and analyse the investigation of blood.

Contents:

Theory Unit -I

General physiology and Blood

General Physiology **(2 Hrs)**

- Homeostasis with body fluid compartments
- Cell membrane, types of transport across cell membrane Membrane potential-RMP & AP

Blood **(7 Hrs)**

- Composition and function of blood:Haemopoiesis
- Haemoglobin : types & functions:RBC structure & function ,destruction. Anaemia & Jaundice
- WBC: types & functions. Immunity: definition & classification
- Platelets: structure & function. Haemostasis :steps in brief ,anticoagulant eg
- Blood groups: types, incompatibility, blood transfusion.
- Lymph: composition and functions

Unit -II

Digestive system & Respiratory system

Digestive System **(3Hrs)**

- Organization and functions of digestive system
- Saliva: composition & functions
- Mastication and deglutition
- Functions of stomach
- Gastric juice: composition & functions
- Types of gastric motility
- Liver: functions, bile juices: composition & function, functions of gall bladder
- Pancreatic juice: composition & functions
- Small intestine: succus entericus, types of motilities
- Large intestine: functions

Respiratory system **(4 Hrs)**

- Functions of respiratory system. Mechanism of breathing {inspiration and expiration}
- Surfactant: composition and function. Lung volumes and capacities
- Pulmonary ventilation, alveolar ventilation, dead space
- Transport of oxygen and carbon di oxide {only difference}
- Hypoxia: definition, types, dyspnea, apnea, hyperventilation

Unit -III

Cardiovascular and Endocrine system

Cardiovascular system **(4Hrs)**

- List the properties of cardiac muscle
- Origin spread of cardiac impulse
- ECG: Definition, normal ECG, diagram in lead II
- Cardiac cycle: definition, normal duration, phases
- Heart sounds types, normal characteristics
- Blood pressure: Definition, components, normal values, factors affecting it
- Name different regional circulation, effect of exercise on CVS (brief)

Endocrine System **(7 Hrs)**

Name the different endocrine glands, hormones secreted by them

HORMONE: Structure, Function, name the disorders involved with that hormone{hypo and hyper secretion}

Unit -IV

Excretory system and Reproductive system

Excretory System **(4Hrs)**

- Types of nephrons and its differences, JG Apparatus
- GFR: definition , normal values , factors affecting
- Tubular functions: absorption and secretion in different segment
- Micturition process
- Skin and body temperature

Reproductive system **(3Hrs)**

- Puberty in male and female
- Spermatogenesis, semen composition& analysis
- Functions of Testosterone
- Functions of Estrogen
- Functions of Progesterone.
- Menstrual cycle: uterine and ovarian cycle (brief only)
- Contraception both in men and women: types

Unit -V

Muscle nerve physiology, Nervous system and Special senses

Muscle nerve physiology **(2Hrs)**

- Classification of neurons and nerve fiber. List of properties of nerve fibers
- Neuroglia: types
- Types of muscle, steps of neuromuscular transmission ,E-C coupling ,muscle contraction

Nervous system **(5Hrs)**

- Synapse: types, list properties, list functions
- Receptor: structure, type, sensation carried by it , list the properties
- Reflex: reflex arc, classification, functions
- Ascending tract: list them and its function
- Descending tract: list them and its function
- Cerebral cortex: different lobes and its functions
- functions of basal ganglia, thalamus, hypothalamus
- functions of cerebellum
- CSF: composition and function

Special senses **(4Hrs)**

- Olfaction: tract, types of smell, odorant, receptor, name the applied aspect
- Gustation: pathway, types of tastes, taste buds, name the applied aspect
- Vision: rods, cones, differences, dark & light adaptation, visual pathway & name the applied aspect, errors of refraction & its correction, colour blindness, cataract
- Audition: functions of external ear, middle ear & inner ear, content of middle ear & inner ear, Organ of Corti, hearing pathway, name the applied aspect

Practicals **(30 Hrs)**

- Haemoglobinometry.
- Haemocytometry
- Total leucocyte count.
- Total Red blood cell count.
- Determination of blood groups.
- Differential WBC count.
- Determination of clotting time, bleeding time.
- Erythrocyte sedimentation rate (ESR). Determination of packed cell Volume,Calculation of Blood indices: CI, MCH, MCV, MCHC.
- Blood pressure recording.
- Spirometery,Artificial Respiration

Practical Examination: 35 Marks

1. Estimation of Hemoglobin.
2. Determination of Blood Groups.
3. Determination of Bleeding and Clotting time.
4. Spotters-Haemocytometer, (Identification of cells) Differential Count,Sphygmomanometer, Spirometer .

Recommended Books Recent Editions

1. A.K.Jain, Human Physiology and Biochemistry for Physical Therapy and Occupational Therapy, 1st Ed. Arya Publication.
2. Dr. Venkatesh.D and Dr. Sudhakar H.S. Basic of Medical Physiology, 3rd Ed.,Wolter-Kluwer Publication.
3. Chaudhari (Sujith K) Concise Medical Physiology 6th Ed. New Central Book.

Reference Books

1. A.K.Jain, Text book of Physiology for Medical Students, 8th Ed. AryaPubliction.
2. Guyton (Arthur) Text Book of Physiology.13ed Ed. Prism Publishers.
3. Ganong (William F) Review of Medical Physiology. 27th Ed. Appleton.

I Semester

Core- 3- Basic Biochemistry

Course outcome:

At the end of the course, students should know

CO1: Demonstrate acquisition of comprehensive knowledge of cellular structure with its functions

CO 2: Demonstrate acquisition of comprehensive knowledge and skills related to Biomedical importance of macromolecules and micromolecules.

CO 3: Demonstrate acquisition of comprehensive knowledge of the enzymes

CO 4: Demonstrate acquisition of comprehensive knowledge and skills related to biochemical components of blood, urine and body fluids.

CO 5: Demonstrate acquisition of comprehensive knowledge of biochemical importance of nutrition

CO 6: Demonstrate acquisition of comprehensive knowledge of quality control and biomedical waste management in medical laboratory.

Unit I **12hrs**

Chemistry of Cell & Chemistry of Carbohydrates, Proteins, Lipids &Nucleotides-

- Cell- Structure & Function of Cell Membrane, Subcellular Organelles, and their Functions.
- Carbohydrates- Definition, Classification & Biological importance of carbohydrates, Derivatives of Monosaccharides.
- Proteins- Definition & Classification of amino acids. Definition & Classification of Proteins based composition, conformation, and function. Functions Plasma proteins, Biologically important peptides and their functions, and Immunoglobulins -structure and functions
- Lipids- Definition, Classification, Biological importance, and Functions of Lipids. Structure and functions of Cholesterol, types and functions of Lipoproteins. Fatty acids -definition and Classification
- Nucleotides- Structure and Functions of DNA & RNA. Biologically important nucleotides and their functions.

Unit II **06 hrs**

Enzymes & Acid base balance

- Enzymes- Definition and Classification. Factors affecting enzyme activity. Coenzymes and Cofactors. Enzyme inhibition – types and their importance.
- Acids, Bases & Body Buffers -Definition with examples, and regulation of pH in brief.

Unit III **12hrs**

Vitamins & Minerals

- Vitamins-Classification, Sources, RDA, Functions (in brief), deficiency manifestations and hypervitaminosis of fat-soluble vitamins A, D, E and K.
- Sources, RDA, Functions (in brief), deficiency manifestations of water-soluble vitamins – Thiamine. Riboflavin, Niacin, Pyridoxine, Biotin, Pantothenic acid, Folic acid , cobalamin and Ascorbic acid.
- Minerals-Classification.

- Calcium, Phosphorus, Iron , copper Iodine, zinc, calcium, phosphorous, sodium, potassium & chloride -Sources, RDA, Functions (in Brief), deficiency manifestations.

Unit IV **05hrs**

Nutrition, Blood chemistry & Urine Chemistry

- Nutrition- Nutrients, Calorific value of food, BMR and factors affecting BMR, respiratory quotient and its applications, biological value of proteins, nitrogen balance, Protein energy malnutrition.
- Blood chemistry- Biochemical components & their reference ranges in normal & diseased states- glucose, urea ,creatinine , electrolytes, total proteins and albumin.

Unit V **10hrs**

Clinical Biochemistry-

- Specimen Collection - Blood, Urine and Body fluids. Preanalytical, analytical and postanalytical errors
- Clinical Biochemistry- Parameters to diagnose Diabetes & Cardiovascular diseases.
- Diagnostic enzymology, Assessment of arterial Blood gas status and electrolyte balance, Point of Care Testing. Renal Function tests(in brief), Liver function tests(in brief), Biomedical Waste Management.

Practicals **30hrs**

1. General Reactions of Carbohydrates.
2. Identification of carbohydrates
3. Color reactions of Proteins.
4. Reactions of Non-Protein nitrogenous substances.
5. Demonstration of pH meter, Colorimeter, and spectrophotometer.
6. Demonstration of Chromatography and Electrophoresis.

Practical Examination: 35marks

1. Identification carbohydrates or NPN substances - 10 Marks
1. Color reactions of Proteins - 15 Marks
1. Spotters - 10 Marks

Recommended books Recent edition.

1. Textbook of Biochemistry - D.M.Vasudevan
2. Biochemistry - Pankaja Naik
3. Clinical Biochemistry - Principles and Practice - Praful. B. Godkar
4. Textbook of Biochemistry - Chatterjea and Shinde
5. Textbook of Clinical Chemistry - Norbert W Teitz

Reference Books Recent Edition

1. Harpers Biochemistry

2. Clinical Biochemistry-Michael L. Bishop
3. Textbook of Biochemistry-Rafi M.D
4. Lippincott's Illustrated review of Biochemistry
5. Practical Clinical Biochemistry-Harold Varley

I Semester

Language-1English

Unit I Introduction

1. Study Techniques - Reading Comprehension

Exercises on reading passages and answering questions based on the passage.

2. Organization of Effective Note TakingWhy good note-taking is important

Effective note-taking is an important practice to master at university. You have a lot of new knowledge and you need to develop reliable mechanisms for recording and retrieving it when necessary. But note-taking is also a learning process in itself, helping you to process and understand the information you receive.

3. Use of the Dictionary

Tips on how to use the dictionary

1. Choose the right dictionary.
2. Read the introduction.
3. Learn the abbreviations.
4. Learn the guide to pronunciation.
5. Looking Up a Word
    - Find the section of the dictionary with first letter of your word.
    - Read the guide words.
    - Scan down the page for your word.
    - Read the definition.
6. Online dictionaries
7. Research various facts.
8. Thesaurus

It is a dictionary of synonyms and antonyms, such as the online Thesaurus.com.Enlargement of Vocabulary

Roots : A to G Effective Diction

Foreign Expressions - meaning and pronunciation

Unit II

Applied Grammar

a) Correct Usage

The Eight Parts of Speech

1. Noun
2. Pronoun
3. Adjective
4. Verb
5. Adverb
6. Preposition

7. Conjunction
8. Interjection

b) The Structure of SentencesWhat is a sentence?

What are clauses? What are phrases? Types of sentences:

- Simple sentences
- Compound sentences
- Complex sentences

c) The Structure of Paragraphs

1. What is a Paragraph?

Paragraphs are comprised of sentences, but not random sentences. A paragraph is a group of sentences organized around a central topic.

2. The Secrets to Good Paragraph Writing: Four Essential Elements The four elements essential to good paragraph writing are: unity, order, coherence, and completeness.
3. Paragraph Structure

A paragraph consists of 3 main structures :

- Claim
- Evidence
- Analysis

d) Enlargements of Vocabulary Roots: H to M

Unit III

Written Composition

a) Precise writing and Summarizing

1. Definition of precise: A precise or summary is an encapsulation of someone's writing or ideas. Technically it should be one - third the length of the actual passage given.
2. Definition of summary: Summaries may not always follow a direct line through what they're summarizing - if you want to summarize someone else's ideas in a few sentences, it might make more sense if you begin with their conclusion, and work back to the arguments they use to develop that conclusion.

Guidelines to follow while writing a summary are:

- Divide…and conquer.
- Read.
- Reread.
- One sentence at a time.
- Write a thesis statement.
- Check for accuracy.
- Revise.

b) Writing of a Bibliography

1. What is a bibliography?

A bibliography is an alphabetical list of all materials consulted in the preparation of your assignment.

2. What is an annotated bibliography?

An annotated bibliography is an alphabetical list of books or articles for which you have added explanatory or critical notes.

3. Why you must do a bibliography?

- To acknowledge and give credit to sources of words, ideas, diagrams, illustrations and quotations borrowed, or any materials summarized or paraphrased.
- To show that you are respectfully borrowing other people's ideas, not stealing them, i.e. to prove that you are not plagiarizing.

4. What must be included in a bibliography?

- Author
- Title
- Place of publication
- Publisher
- Date of publication
- Page number(s) (for articles from magazines, journals, periodicals, newspapers, encyclopedias, or in anthologies)

5. Writing a bibliography in MLA style

1. Standard Format for a Book:

Author. Title: Subtitle. City or Town: Publisher, Year of Publication.

If a book has no author or editor stated, begin with the title. If the city or town is not commonly known, add the abbreviation for the State or Province.

2. Standard Format for a Magazine, Periodical, Journal, or Newspaper Article: Author. "Title: Subtitle of Article." Title of Magazine, Journal, or Newspaper Day, Month, Year of Publication: Page Number(s).

a) Enlargement of Vocabulary Roots - N to S

Unit IV

Reading and Comprehension

- Review of selected materials and express oneself in one's words Seminar for students on powerpoint presentation and book review.
- Enlargement of Vocabulary Roots - T to Z

Unit V

The study of Varioius forms of Composition

a. Paragraph

Exercises for students on short paragraph topics.

b. Essay

How to Write an Essay

The writing of an essay has three stages :

- Essay writing
- Close reading
- Research

c. Letter

Mechanics of writing formal and business letters. Exercises on writing letters for students.

d. Summary

Writing reports: project report, magazine article and reporting in newspaperson sporting events.

e. Practice In Writing

Exercises and assignments on report writing for students

Unit VI

Verbal Communication

a) Discussions And Summarization Tips on taking minutes of a meeting Why Meeting Minutes Matter

Meeting minutes are important. They capture the essential information of a meeting - decisions and assigned actions. The following instructions will help you take useful and concise meeting minutes.

Before the Meeting

If you are recording the minutes, make sure you aren't a major participant in the meeting. You can't perform both tasks well.

Create a template for recording your meeting minutes and make sure you leave some blank space to record your notes.

Decide how you want to record your notes. If you aren't comfortable relying on your pen and notepad, try using a tape recorder or, if you're a fast typist, take a laptop to themeeting.

During the Meeting

As people enter the room, check off their names on your attendee list. Ask the meeting lead to introduce you to meeting attendees you aren't familiar with. This willbe helpful later when you are recording assigned tasks or decisions.

After the Meeting

Review the notes and add additional comments, or clarify what you didn't understand right after the meeting.

a) Debates

Group Discussions:

1. Do's in a group discussion:

- Be confident. Introduce yourself with warm smile and get into topic soon
- Have eye contact with all group members

- Learn to listen
- Be polite
- Be a good team player. Move with all group members and help them when needed.

2. Don'ts in a group discussion:
- Don't be harsh when you are interrupted
- Don't interrupt the other person
- Don't try to push your ideas on others
- Don't argue. Everyone is free to express their idea

3. Do's in a group discussion:
- Be confident. Introduce yourself with warm smile and get into topic soon
- Have eye contact with all group members
- Learn to listen
- Be polite
- Be a good team player. Move with all group members and help them when needed.

4. Don'ts in a group discussion:
- Don't be harsh when you are interrupted
- Don't interrupt the other person
- Don't try to push your ideas on others
- Don't argue. Everyone is free to express their ideas

c) Oral Reports

An oral report is a presentation, usually done for a student's teacher andclassmates, though it can also be done for a larger segment of the school community, for parents, or for a more open group, depending on the circumstances. For example, at a science fair, a student might present a report on his or her project periodically for the class, for other visitors who pass by, and for judges.

d) Use in Teaching Writing of dialogues

Originating from dialogues, the Greek word for conversation, the term dialogue refers to a verbal conversation between two or more people.

When writing dialogues, it is important to adhere to specific grammar rules. Thefollowing points need to be remembered while writing dialogues for role play
- Quotation Marks
- Periods
- Question Marks
- Commas
- Capitalization and Paragraphs
- How Dialogue Enhances Writing

Dialogue reveals information about the speaker(s) within a written work. Dialoguealso enhances the story line and plot.

a) Exposes Character Traits

Through indirect characterization, dialogue reveals details about a character bywhat they say, how they say it, and perhaps what they choose not to say.

b) Unveils Mood/Emotions

A character's word choice, description of tone, and choice of language reveal the inner state of the character without directly "telling" the audience. Showinginstead of telling creates a deeper understanding of the character through the eyes of the reader or audience.

c) Reveals Motivation/Influences

Dialogue can illuminate a character's internal motivation or desires.

d) Establishes Relationships

Seeing how a character addresses and responds to other characters shows the type of relationships that they form and where their relationships currently stand. Dialogue can demonstrate how relationships change throughout the course of the story. It can show how a character changes or responds to various situations.

Exercises for students on preparing a dialogue exchange between two people

- On the street (with a vegetable vendor)
- At college with a lecturer (regarding admissions)
- In a bank with the manager (for opening a bank account)
- Telephone conversation with a hotel receptionist (make room reservations)
- Telephone conversation (taking an appointment with the dentist/doctor)

I Semester

Language 2- Kannada

ಕನ್ನಡ : ಒಂದು

ಪಠ್ಯಕ್ರಮದ ರೂಪರೇಖೆ

ಸ್ಥಾನ	: ಬಿ.ಎಸ್.ಸಿ. (ಅಲೈಡ್ ಹೆಲ್ತ್ ಸೈನ್ಸ್‌ಕೋರ್ಸ್) ಮೊದಲವರ್ಷ
ಸಮಯ	: 30 ಘಂಟೆಗಳು (ಮೂವತ್ತು ಘಂಟೆಗಳು)
ಪಠ್ಯಕ್ರಮದ ವಿವರಣೆ	: ವಿದ್ಯಾರ್ಥಿ/ ವಿದ್ಯಾರ್ಥಿನಿಯರು ದಿನನಿತ್ಯ ಸಂಪರ್ಕಿಸಬಹುದಾದ ಜನಸಾಮಾನ್ಯರೊಡನೆ ಶುಶ್ರೂಷೆಗೆ ಸಂಬಂಧಿಸಿದಂತೆ ಕನ್ನಡದಲ್ಲಿ ಸಂಭಾಷಣೆ ಮಾಡಲು ಹಾಗೂ ತಿಳುವಳಿಕೆ ನೀಡಲು ಸಹಕಾರವಾಗುವಂತೆ ಪಠ್ಯಕ್ರಮದ ಮಾದರಿಯನ್ನು ಅಳವಡಿಸುವುದು.
ಉದ್ದೇಶ	: ದಿನಬಳಕೆಯ ವ್ಯವಹಾರದಲ್ಲಿ ಶುಶ್ರೂಷಣೆಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಕನ್ನಡ ಭಾಷೆಗೆ ಅಳವಡಿಕೆ. ಕನ್ನಡೇತರರಿಗೆ ಕನ್ನಡ ಭಾಷೆಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಪಠ್ಯಕ್ರಮದ ವಿವರಣೆ

ಘಟಕಒಂದು (ಆರು ಘಂಟೆಗಳು)	: ಅಕ್ಷರಮಾಲೆ, ಸ್ವರಗಳು, ವ್ಯಂಜನಗಳು,, ಕಾಗುಣಿತ, ಬರವಣಿಗೆ, ಅಭ್ಯಾಸ.
ಚಟುವಟಿಕೆ	: 1. ಕನ್ನಡ ವರ್ಣಮಾಲೆಯ ಅಕ್ಷರಗಳನ್ನು ಬರೆಯಿರಿ.
ಘಟಕಎರಡು (ಆರು ಘಂಟೆಗಳು)	: ಪದಪರಿಚಯ, ಪದಪುಂಜ, ದಿನಬಳಕೆಯ ಪದಗಳು, ಸಂಬಂಧಗಳು, ನಾಮಪದ, ಸರ್ವನಾಮ, ಅಂಕಿಗಳ ಪರಿಚಯ, ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು.
ಚಟುವಟಿಕೆ	: 1. ನಿಮಗೆ ತಿಳಿದಿರುವ ವಿವಿಧ ರೋಗಗಳ ಹೆಸರುಗಳನ್ನು ಪಟ್ಟಿಮಾಡಿ. 2. ನಿಮಗೆ ತಿಳಿದಿರುವ ತಿಂಡಿ – ತಿನಿಸುಗಳ ಹೆಸರುಗಳನ್ನು ಪಟ್ಟಿಮಾಡಿ.
ಘಟಕಮೂರು (ಆರು ಘಂಟೆಗಳು)	: ಲಿಂಗ, ವಚನ, ಅವ್ಯಯ, ತಿಂಡಿ – ತಿನಿಸುಗಳ ಪರಿಚಯ, ದೇಹದ ಅಂಗಗಳ ಪರಿಚಯ, ವಿವಿಧ ಬಗೆಯ ರೋಗಗಳ ಪರಿಚಯ.
ಚಟುವಟಿಕೆ	: ರೋಗಿಯ ವಿವರ ತಿಳಿಯಲು ಆಸ್ಪತ್ರೆಯಲ್ಲಿ ಬಳಸಲಾಗುವ ನಮೂನೆಯ ಮಾದರಿಯನ್ನು ರಚಿಸಿ.
ಘಟಕ ನಾಲ್ಕು (ಆರು ಘಂಟೆಗಳು)	: ಶುಶ್ರೂಷಣಾ ಪದಗಳು, ಆಸ್ಪತ್ರೆಯಲ್ಲಿ ಬಳಸುವ ವಿವಿಧ ನಮೂನೆಗಳ ಪರಿಚಯ, ನಮೂನೆಗಳ ರಚನೆ.
ಚಟುವಟಿಕೆ	: ಶುಶ್ರೂಕರು ಮತ್ತು ರೋಗಿಯ ನಡುವಿನ ಸಂಭಾಷಣೆಯ ಮಾದರಿಯನ್ನು ತಯಾರಿಸಿ.
ಘಟಕ ಐದು (ಆರು ಘಂಟೆಗಳು)	: ಶುಶ್ರೂಕರ ಹಾಗೂ ರೋಗಿಗಳ ನಡುವೆ ನಡೆಯುವ ಸಂಭಾಷಣೆಗೆ ಬೇಕಾದ ವಾಕ್ಯಗಳ ಪರಿಚಯ.

ಅಧ್ಯಯನಕ್ಕೆ ಶಿಫಾರಸ್ಸು ಮಾಡಲಾಗಿರುವ ಗ್ರಂಥಗಳು

1. ಕನ್ನಡ ವ್ಯಾಕರಣ (8,9 ಮತ್ತು 10ನೇ ತರಗತಿಗಳಿಗೆ ಕರ್ನಾಟಕ ಸರ್ಕಾರ, ಪಠ್ಯಪುಸ್ತಕಗಳ ಇಲಾಖೆ)	
2. ವ್ಯವಹಾರಿಕಕನ್ನಡ	: ಎಚ್ಚೆಸ್ಕೆ
3. ಪತ್ರಲೇಖನ	: ಕನ್ನಡಸಾಹಿತ್ಯಪರಿಷತ್ತು
4. ಲೇಖನಕಲೆ	: ಎನ್‌ಪ್ರಹ್ಲಾದರಾವ್
5. ಆರೋಗ್ಯ ಮತ್ತು ಇತರೆ ಪ್ರಬಂಧಗಳು	: ಡಾ॥ ಪಿ.ಎಸ್ ಶಂಕರ್
6. ವೈದ್ಯ ಪದಗಳ ಹುಟ್ಟುರಚನೆ	: ಡಾ॥ ಡಿ.ಎಸ್.ಶಿವಪ್ಪ

ಕನ್ನಡ: ಎರಡು

ಪಠ್ಯಕ್ರಮದರೂಪರೇಖೆ

ಸ್ಥಾನ	: ಬಿ.ಎಸ್ಸಿ(ಅಲೈಡ್ ಹೆಲ್ತ್ ಸೈನ್ಸ್‌ಕೋರ್ಸ್) ಮೊದಲ ವರ್ಷ
ಸಮಯ	: 30 ಘಂಟೆಗಳು (ಮೂವತ್ತು ಘಂಟೆಗಳು)
ಉದ್ದೇಶ	: ಜನರ ಆರೋಗ್ಯದ ಬಗ್ಗೆ ಸಮುದಾಯಕ್ಕೆ ತಿಳುವಳಿಕೆ ಕೊಡುವುದು.

Value Added Course
Yoga

Learning Objectives

1. To define Yoga and understand the history of yoga
2. To understand general concept and practice of yoga.

Syllabus
Yoga theory- 15 hours

Unit I: History & Origin of Yoga: **(2 hours)**

1.1 Introduction to Yoga

1.2 Introduction to Yoga education & its importance.

1.3 Evolution of Yoga- Concept about yoga origin, Pre-vedic & Vedic period

1.4 Modern view about yoga.

Unit: II General Perspective of Yoga **(3 hours)**

1.1 Definitions of Yoga, Objectives of Yoga, Importance of yoga and Misconceptions about Yoga.

1.2 Principles of Yoga,

1.3 Brief Introduction of schools of Yoga.

1.4 Yogic Lifestyle.

Unit: III Introduction to Yoga practises: **(10 hours)**

3.1 Standing & Sitting Series of Asanas

3.2 Supine & Prone Series of Asanas.

3.3 Relaxation technique & its importance.

3.3 Pranayama & its importance

REFERENCE:

1. Lal Basant Kumar: Contemporary Indian Philosophy, Motilal Banarsidas Publishers Pvt. Ltd, Delhi, 2013
2. Dasgupta S. N: History of Indian Philosophy, Motilal Banarsidas, Delhi, 2012
3. Singh S. P: History of Yoga, PHISPC, Centre for Studies in Civilization Ist, 2010
4. Singh S. P & Yogi Mukesh: Foundation of Yoga, Standard Publication, New Delhi, 2010
5. G.C Pande, Histroy of science, philosophy, and culture of Indian Civilization Vol.VII part 10 Centre for Studies in Civilisations.
6. Asana, Pranayama, Bandha, Mudra by Swami Satyananda Saraswati Bihar School of Yoga.

Yoga practical- 15 hours

All Yogic sessions will be started with brief theory of technique of yogic practices, name of the practice, precautionary measures to be taken before, during and after practice of yoga & its benefits. This will enhance the students to learn different techniques of yoga.

Unit I: Breathing Practices & Sukshma Vyayama (Loosening exercise)

1.1 Hands stretch breathing , Hand In & out breathing.

1.2 Sukshma Vyayama*: All Joints Rotation*: Fingers, Wrist, Elbows, Shoulder rotation, Neck Flexion/ Extension, Neck rotation, knee movements & ankle joint movements

1.3 Hip rotation, extension and all possible movements.

1.4 Stretching: Forward, Backward & Sideward bending & Situps.

Unit II: Asanas, Pranayama & Relaxation technique.

1.1 Suryanamaskara (12 Series of asansa)

1.2 Standing Series: Ardha Chakräsana , Ardhakati Chakräsana, Trikonasana, Vrikshansana, Tadasana;

1.3 Sitting Series: Vajräsana, paschimotasnasana Ustrasana, Vakrāsana,; **Prone Series:** Bhujangasana, Shalabasana ;**Supine series:** Uttitapadasana & setubhandasana,

1.4 Pranayama & Relaxation technique: Suryabedana, Chandrabedana, Anuloma Viloma; Relaxation technique- Quick relaxation technique.

Reference:

1. Asana by Swami Kuvalyananda Kaivalyadhama, Lonavla.
2. Asana, Pranayama, Bandha, Mudra by Swami Satyananda Saraswati Bihar School of Yoga.
3. Light on Yoga, by B.K.S Iyengar,Harper Collins Publishers.
4. Surya Namaskar by Saraswati, Swami Satyananda, Bihar School of Yoga.

II Semester
Core 4-General Pathology

Course outcome:

At the end of the course student should be able to

CO1: Demonstrate the acquisition of comprehensive knowledge of cell pathology and repair

CO2: Demonstrate the acquisition of comprehensive knowledge of pathogenesis, morphology and complications of hematological diseases of the body.

CO3: Perform and analyse basic hematology techniques.

CO4: Acquisition of Knowledge of workflow and to perform basic investigations in Transfusion medicine and clinical pathology.

CO5: Demonstrate the acquisition of comprehensive knowledge of handling, storage and quality assurance of cytology lab.

Unit I **10 hrs**

General pathology-Introduction- & scope of pathology

1. Cell injury and Cellular adaptations- Normal cell, Cell injury- types, etiology, morphology, Cell death-autolysis, necrosis, apoptosis, Cellular adaptations- atrophy, hypertrophy, hyperplasia, metaplasia.
2. Inflammation-Introduction, acute inflammation-vascular events, cellular events, chemical mediators, chronic inflammation- general features, granulomatous inflammation, tuberculosis.
3. Healing and repair- Definition, different phases of healing, factors influencing wound healing, fracture healing.
4. Haemodynamic disorders- Edema, hyperemia, congestion, hemorrhage, embolism, thrombosis, infarction.
5. Neoplasia- defintion, nomenclature, features of benign and malignant tumors, spread of tumors, dysplasia, carcinoma in situ, precancerous lesions.
6. Environmental and nutritional pathology-smoking, obesity and vitamin deficiencies.

Unit- II **10 hrs**

Hematological Disorders **5 hrs.**

1. Introduction and hematopoiesis
2. Anemia-introduction and classification (morphological and etiological).
3. Iron deficiency anemia: distribution of body iron, iron absorption, causes of iron deficiency, lab findings, megaloblastic anemia: causes, lab findings.
4. Hemolytic anemias: definition. Causes, classification, and lab findings.
5. WBC disorders- quantitative disorders, leukemia-introduction, Pancytopenia.
6. Bleeding disorders- Introduction, Classification, causes of inherited and acquired bleeding disorders, thrombocytopenia, DIC, laboratory findings.

Basic Hematological Techniques **5 hrs**

1. Characteristics of good technician, Blood collection- methods (capillary blood, venipuncture, arterial puncture) complications, patient after care.
2. Anticoagulants, transport of the specimen, preservation, effects of storage, separation of serum and plasma, universal precautions.
3. Complete hemogram- CBC, peripheral smear, BT, CT, PT, APTT, ESR, PCV
4. Automation in hematology-principles of autoanalyzer -3 part, 5 part and six part analysers and coagulometer-interpretation of autoanalyzer results.
5. Disposal of the waste in the laboratory.

Unit- III **5 hrs**

Transfusion Medicine

1. Selection of donor, blood grouping, Rh typing, cross matching, and storage.
2. Transfusion transmitted diseases, transfusion reactions, components- types, indications.

Clinical Pathology

1. Examination of cerebrospinal fluid-physical examination, chemical examination, microscopic examination.
2. Examination of body fluids (pleural, pericardial and peritoneal), physical examination, chemical examination, microscopic examination.
3. Sputum examination.

Unit- IV **10 hrs**

1. Blood collection- methods (capillary blood, venipuncture, arterial puncture) complications, patient after care.
2. Handling and storage of samples in hematology
3. Interpretation of autoanalyzer results- complete blood count and erythrocyte Indices- MCV, MCH, MCHC.
4. Reticulocyte staining and counting.
5. Staining of peripheral smear and Differential leucocyte count
6. Quality assurance in hematology.
7. Introduction and basics of histopathology –Handling, storage, and processing of specimens.

Unit- V **10 hrs**

1. Introduction to clinical pathology and Urinalysis- collection. Preservatives, physical, chemical examination and microscopy
2. Physical examination; volume, color, odor, appearance, specific gravity and ph,
3. Chemical examination; strip method- protein- heat and acetic acid test, sulfosalicylic acid method, reducing sugar- benedicts test, ketone bodies- rotheras test, bile pigments- fouchet method, bile salt- hays method, blood- benzidine test, urobilinogen and porphobilinogen- ehrlich aldehyde and schwartz test, bence jones protein, microscopy.
4. Handling and storage of samples in cytology and clinical pathology.
5. Quality assurance in cytology and clinical pathology

Practicals **30 hrs**

1. Laboratory organization- Reception of specimen, dispatch of reports, records keeping. Laboratory safety guidelines.
2. SI units and conventional units in hospital laboratory.
3. Basic requirements for hematology laboratory, glasswares for hematology, pipettes and equipments for haematology lab and anticoagulant vials.
4. Blood collection- methods (capillary blood, venipuncture, arterial puncture) complications, patient after care.
5. Determination of haemoglobin.
6. Determination of ESR and PCV.
7. RBC count and TLC by hemocytometer.
8. Differential leukocyte count and Absolute eosinophil count
9. Interpretation of autoanalyser results- complete blood count and erythrocyte Indices- MCV, MCH, MCHC.
10. Reticulocyte staining and count.
11. Introduction to clinical pathology and Urinalysis- collection. Preservatives, physical, chemical examination and microscopy- semiautomated and automated methods

Physical examination; volume, color, odor, appearance, specific gravity and pH,

Chemical examination; strip method- protein- heat and acetic acid test, sulfosalicylic acid method, reducing sugar- benedicts test, ketone bodies- Rothera's test, bile pigments- fouchet method, bile salt- hays method, blood- benzidine test, urobilinogen and porphobilinogen- Ehrlich aldehyde and Schwartz test, Bence jones protein, microscopy.

12. Charts.

Practical Examination: 35 marks.

1. Spotters
2. Hemoglobin estimation and blood grouping
3. Charts
4. Urinalysis

Recommended Books Recent Editions.

1. Basic Pathology Robbins Saunders, an imprint of Elsevier Inc., Philadelphia, USA.
2. Text book of Pathology Harsha Mmohan Jaypee Brothers, New Delhi.
3. Practical Pathology P. Chakraborthy, Gargi Chakarborty New Central book agency, Kolkata.
4. Text book of Haematology Dr Tejinder Singh Arya Publications, Sirmour (H P)
5. Text book of Medical Laboratory Technology Praful Godkar Bhalani Publications house, Mumbai.
6. Textbook of Medical Laboratory Technology Ramanik Sood.
7. Practical Haematology Sir John Dacie Churchill Livingstone, London.
8. Todd and Sanford, Clinical Diagnosis and Management by Laboratory Methods John Bernard Henry, All India Traveller Bookseller.
9. Histopathology Techniques, Culling.
10. Histopathology Techniques Bancroft.
11. Diagnostic Cytopathology Koss.
12. Diagnostic Cytopathology Winfred Grey.

13. Hand book of Medical Laboratory Technology, CMC Vellore.
14. Basic Haematological Techniques Manipal.

II Semester

Core 5- General Microbiology

Theory

Course outcome:

At the end of the course student should be able to

CO1: Demonstrate the acquisition of knowledge of morphology of bacteria, viruses, parasites and fungal pathogens causing human infections

CO2: Demonstrate capability to practice appropriate staining techniques, sterilization and disinfection techniques used in microbiology

CO3: Demonstrate the acquisition of knowledge of immunity, immunization schedule and role of Immunoprophylaxis.

CO4: Demonstrate the acquisition of knowledge about infection control and practices in laboratory.

CO5: Demonstrate capability to explain the concepts and principles of compound microscope and its applications

Unit - I **09 hours**

General Microbiology

- Introduction to Medical microbiology and Classification of microorganisms
- Morphology and Physiology of bacteria
- Sterilization and Disinfection practices followed in a tertiary care centre including CSSD and recent advances.
- Culture methods
- Infection
- Specimen collection and laboratory diagnosis of infectious diseases

Immunology

- Antigen
- Antibodies
- Immunity
- Vaccines and immunization schedule, Immunoprophylaxis

Unit – II **09 hours**

Systemic bacteriology

- Staphylococcus, *Streptococcus pyogenes* and Pneumococcus
- Overview of Clostridia and *C. tetani*
- *M. tuberculosis*
- Enterobacteriaceae - Klebsiella, *E. coli,* Proteus
- Non-fermenters - Pseudomonas and Acinetobacter

Unit – III **09 hours**

Parasitology

- Introduction to parasitology and lab diagnosis of parasitic infections

- Protozoa - *Entamoeba histolytica*, Giardia, trichomonas, Malaria, Hook worm and Round worm

Unit – IV **09 hours**

Mycology

- Introduction to mycology and lab diagnosis of fungal infections
- Yeasts - Candida and Cryptococcus
- Moulds – Aspergillus, Zygomycetes

Virology

- General properties of viruses and laboratory diagnosis of viral infections
- Blood borne viral infections - Hepatitis B and C viruses, HIV

Unit – V **09 hours**

Applied microbiology

- Hospital acquired infections - Causative agents, transmission methods, investigation, prevention and control of hospital Acquired infections.
- SSI, VAP, CAUTI, CLABSI
- Overview of opportunistic infections – Definition, predisposing factors and etiological agents
- Standard and universal precautions
- Biomedical waste management

Practicals **30 hours**

1. Compound microscope and demonstration of the parts.
2. Demonstration of sterilization equipment's - hot air oven, autoclave- principle, mechanism of action, preparation of the materials and quality control
3. Disinfection practices in a tertiary care centre - Disinfection of OT, Wards, OPD, dialysis units and laboratories
4. Testing of water, air and environmental surveillance
5. Demonstration of commonly used culture media with and without growth- Nutrient agar, blood agar, chocolate agar, Mac Conkey medium, Lowenstein-Jensen media, AST plate and Robertson cooked meat broth
6. Classification of Stains and Procedure and interpretation of Grams staining

Practical examination : 35 marks

Spotters, Culture media, Equipments, Slides
Discussion:
1.Gram stain
2.Ziehl- Neelsen stain

Reference Books

1. Ananthanarayan & Panikar's Textbook of Microbiology – Latest Edition University Press.
2. Parasitology (protozoology and helminthology Parasitology) by K D Chatterjee
3. Text and Practical Microbiology for MLT by C P Baveja, Arya publications
4. Textbook for laboratory technicians by RamnikSood. Jaypee publishers
5. Textbook of parasitology by Paniker. 7th edition

II Semester

Core - 6 - Pharmacology

Course outcome:

At the end of the course student should be able to

CO1: Demonstrate the acquisition of comprehensive knowledge of basics of pharmacology

CO2: Demonstrate the acquisition of comprehensive knowledge about the pharmacokinetics and pharmacodynamics of drugs

CO3: Demonstrate the capability of enlisting the drugs used on various organ system of the body including hormones and chemotherapy

CO4: Demonstrate the capability of enlisting the drugs used on emergency conditions

CO5: Demonstrate the capability of enlisting the uses of various devices and instruments used in hospital setting.

C06: Demonstrate the skills of identifying the devices, instruments, drugs and dosage forms

Content

UNIT I- General Pharmacology, ANS, PNS. **9 Hrs**

- Sources of Drugs
- Route of drug administration
- Pharmacokinetics (Absorption, Metabolism, Distribution, Excretion)
- Pharmacodynamics (Mechanisms of action)
- Adverse drug reactions
- ANS : Adrenergic drugs -Adrenaline,
- Anti adrenergic-alpha and beta blockers
- Cholinergic drugs-Acetyl choline
- Anti cholinergic agents-Atropine

Unit II- PNS, CVS, Renal system **9 hrs**

- Skeletal muscle relaxants-
- Local anaesthetics-lignocaine, LA + vasoconstrictor
- CVS-ionotropic agents -Digoxin,
- Antianginal drugs-GTN,
- Antihypertensives-
- Management of different types of shock and Plasma expanders
- Renal system-Diuretics Antidiuretics-Vasopressin

Unit III- CNS, Blood **9 hrs**

- CNS-general Anaesthetics
- Sedative hypnotics-
- Antiepileptics
- Opioid analgesics-
- NSAIDS-

- Respiratory system-treatment of cough And Bronchial asthma
- Blood-Hematinics, Anticoagulants -Warfarin, Heparin
- Thrombolytics & Antiplatelet drugs-streptokinase,/ aspirin,

Unit IV- GIT, Chemotherapy **9 hrs**

- GIT-drugs used in peptic ulcer-
- Antiemetics -Metoclopramide, Domperidone, Ondansetron
- Purgatives & Laxatives
- Drugs used in Diarrhea- ORS, Super ORS, Antimotility drugs (loperamide,
- diphenoxylate)
- Chemotherapy-general considerations MOA, Resistance, Prophylaxis

Unit V- Chemotherapy, Hormones **9 hrs**

- Anti-bacterial, anti-fungal, anti-viral, anti-protozoal, anti-helminthic
- Cancer chemotherapy (names, common Adverse effects, general principles in the treatment of cancer)
- Hormones-Thyroid and antithyroid drugs, Insulin, glucagon, antidiabetic drugs, corticosteroids, oestrogen, progesterone, oxytocin

Practicals: **30 hrs**

- Dosage forms
- Solid Dosage forms
- Liquid Dosage forms
- Gaseous Dosage forms
- Oral route
- Parenteral routes
- Novel routes
- Fixed dose combination- Amoxycillin+ clavulanic acid-cotrimoxazole, Lignocaine+ Adrenaline
- Drug stations-Adrenaline, dopamine, Dobutamine)
- Drug stations-Corticosteroids (hydrocortisone, prednisolone, inhalational steroids) Drug stations-common antibiotics (Amoxycillin, Ciprofloxacin, Azithromycin, Metronidazole, Cephalosporins)
- Drug stations-Insulin preparations
- Instrument & devices (Nasogastric tube, laryngoscope, Different Catheters, Nebulizers, Inhalers, Rota halers)

Practical examination: 35 marks

1. Dosage Form: Capsules, Tablets, Syrup, IV, IM, SC, IA , Intra Articular -

Advantages (1 Mark), Disadvantages (1 Mark) Examples (1 Mark)

2. Mention the name of the Device/Instruments and uses: Inhalers, Rota halers, Space halers, Drip sets, Vasofix, Ryle's tube, Urinary catheter, Endotracheal tube, Hand gloves
3. 10 Spotters

Recommended Books

1. K.D. Tripathi, Essentials of Medical Pharmacology, V. Edition, M/s. Jaypee Brothers, Post Box, 7193, G-16, Emca House, 23/23, Bansari Road, Daryaganj, New Delhi.
2. Padmaja Udaykumar -Pharmacology for Allied Sciences
3. R. S. Satoskar, S.D. Bhandarkar, S. S. Ainapure, Pharmacology and Pharmacotherapeutics, 18th Edition, Single Volume, M/s Popular Prakashan, 350, Madan Mohan Marg, Tardeo, Bombay - 400 034.

II Semester

Allied-1 Crime and Society

OBJECTIVES

After studying this paper, the students will know

- The importance of criminology.
- The causes of criminal behavior.
- The significance of criminal profiling to mitigate crime.
- The consequences of crime in society.
- The elements of criminal justice system.
- Human Rights and its protection

CONTENTS

Theory:

Unit 1: Basics of Criminology **6 Hrs**

Definition, aims and scope.

Theories of criminal behavior – classical, positivist, sociological.

Criminal anthropology.

Unit 2 : Crime and Criminal Patterns **6 Hrs**

Elements, nature, causes and consequences of crime. Deviant behavior. Hate crimes, organized crimes and public disorder, domestic violence and workplace violence. White collar crimes

Unit 3: Crime **6 Hrs**

Juvenile in conflict with Law. Social change and crime. Psychological Disor- ders and Criminality. Situational crime prevention and Victimology.

Unit 4: Criminal Justice System- I **6 Hrs**

Broad components of criminal justice system. Policing styles and principles.

Police's power of investigation.

Unit 5: Criminal Justice System- II **6 Hrs**

Filing of criminal charges. Community policing. Policing a heterogeneous society.

Correctional measures and rehabilitation of offenders.

Human rights and criminal justice system in India.

Suggested Readings

1. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientific and Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).
2. D.E. Zulawski and D.E. Wicklander, Practical Aspects of Interview and In- terrogation, CRC Press, Boca Raton (2002).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
4. J.L. Jackson and E. Barkley, Offender Profiling: Theory, Research and Prac- tice, Wiley, Chichester (1997).
5. R. Gupta, Sexual Harassment at Workplace, LexisNexis, Gurgaon (2014

II Semester

Allied -2- Psychology

DESCRIPTION: This course is designed to enable the students to develop understanding about basic concepts of psychology and its application in personal and professional life. It further provides students opportunity to recognize the significance and application of counselling skills.

Objectives : On completion of the course, the students will be able to

1. Identify the importance of psychology in individual and professional life.
2. Understand biological basis of human behaviour
3. Understand mental health and hygiene
4. Understand personality and gain experience in personality assessment
5. Understand stress and learn coping strategies
6. Learn suicide prevention and counselling skills

Unit -I

- Meaning of Psychology
- Scope of Psychology- Scope, branches and methods of psychology
- Relationship with other subjects
- Applied psychology to solve everyday issues

Unit -II

Personality Introduction: Meaning, definition, Classification, measurement and evaluation of personality

Unit -III

Biological basis of behavior –Introduction

- Body mind relationship
- Genetics and behaviour
- Inheritance of behaviour
- Brain and behaviour.
- Psychology and sensation – sensory process normal and abnormal.

Unit-IV

Mental health and mental hygiene

- Concept of mental health and mental hygiene
- Characteristic of mentally healthy person
- Warning signs of poor mental health
- Promotive and preventive mental health strategies and services
- Defense mechanism and its implication
- Frustration and conflict – types of conflicts and measurements to overcome

Unit-V

- **Intelligence** – Meaning of intelligence – Effect of heredity and environment in intelligence, classification, Introduction to measurement of intelligence tests – Mental deficiencies
- **Learning –** Definition of learning, types of learning, Factors influencing learning – Learning process, Habit formation
- **Memory**-meaning and nature of memory, factors influencing memory, methods to improve memory, forgetting

Unit VI:

Stress

- Hans Selye Model of stress. Lazarus and Folkman model of stress.
- Sources of stress. Stress, disease and health.
- Coping strategies and styles- emotion focused and problem focused
- Relaxation techniques

Unit VII:

Counselling

- Counselling-meaning and definition.
- Micro skills of counselling
- Psychotherapy- meaning and definition.
- Relaxation-types.
- Suicide and suicide prevention

Recommended Books Recent Editions.

1. C.P. Khokhar (2003) Text book of Stress Coping and Management Shalab Publishing House.
2. S.M.Kosslyn and R.S.Rosenberg (2006) Psychology in Context. PearsonEducation Inc.
3. C.R. Carson, J.N. Bitcher, S.Mineka and J.M. Hooley (2007), Abnormal Psychology13th, Pearson Education, Inc.
4. D.A. Barlow and V.M. Durand (2004) Abnormal Psychology Wadsworth,Thompson Learning, 3rd edition USA.
5. R.J . Gerrig & P.G. Zimbardo (2006) Psychology and life, Pearson Education, Inc.
6. Pestonjee, D.M. (1999). Stress & Coping, The Indian Experience 2nd edn. NewDelhi, Sage India Publications.

Skill Enhancement Course

Soft Skills

Learning objectives

- To give each student a realistic perspective of work and work expectations
- To help formulate problem solving skills, to guide students in making appropriate and responsible decisions
- To create a desire to fulfill individual goals, and to educate students about unproductive thinking, self-defeating emotional impulses, and self- defeating behaviors

Unit I

- Definition of soft skills, Soft skills and Hard Skills, Advantage of Soft Skills,
- Real life scenarios, Measurement of soft skills.
- Self Discovery, Definition of Self, Identification of Strengths and weakness of self, Setting goals, Personal beliefs, values and ethics.

Unit II

- Mindsets: Types of Mindsets, Developing a learning and Growth mindset,
- Developing a positive outlook towards life, Increasing emotional and Spiritual intelligence.
- People skills, Types of people - passive, assertive and aggressive people, Developing assertive personality, dealing with aggressive and submissive people.

Unit III

- Communication Skills: Definition of Communication, Verbal and Nonverbal communication, Telephone and internet communication, Common mistakes in communication.
- Interpersonal skills: Listening skills, Understanding body language, polite communication and people friendly attitude.

Unit IV

- Time management: Importance of punctuality, Efficient time handling,
- Avoiding leakage of time and procrastination
- Stress Management: Definition of Stress, Positive and negative stress. Handling major projects through effective delegation.

Unit V

- Organizational behavior: Definition of an organization, Understanding the rules and regulations of an organization, Creating an ideal working Environment.
- Professional attitude-Definition and developing an effective professional attitude.
- Leadership Skills: Developing a positive attitude, Presentation and public speaking skills, effective handling of the team and sub ordinates. Recognizing and encouraging talents in Sub ordinates.

Recommended books

1. Barun Mitra (2016), Personality Development and Soft Skills, 2nd edition, Oxford University Press
2. Alex K (2014), Soft Skills Paperback, S Chand & Company
3. Peggy Klaus (2008) The Hard Truth About Soft Skills: Workplace Lessons Smart People Wish They'd Learned Sooner 1st edition, HarperBusiness.
4. Sanjay Kumar, Pushp Lata (2018) Communication Skills Paperback 1st edition, Oxford University Press
5. John Hayes (1994), Interpersonal Skills: Goal Directed Behavior at Work, Routledge.
6. Gurdeep Singh Gujral (2013) Leadership Qualities for Effective Leaders, VIJ Books (India) Pty Ltd.

BSc. Forensic Science

III Semester

Core-7- Forensic Dermatoglyphics

Course outcome:

At the end of the course, student should be able to

CO1: Demonstrate the ability to analyse the fundamental principles and biological basis of fingerprints

CO2: Demonstrate the acquisition of knowledge and skills about identification and various techniques of development of finger prints on crime scene

CO3: Able to interpret various method of creation of criminal identity

CO4: Capability of application of chelioscopy and other prints in identification of individualization.

Contents

Theory

Unit 1: Basics of Fingerprinting **09 hrs**

Introduction and history, with special reference to India. Biological basis of fingerprints. Formation of ridges. Fundamental principles of fingerprinting. Types of fingerprints. Fingerprint patterns. Fingerprint characters/minutiae. Plain and rolled fingerprints. Classification and cataloguing of fingerprint record. Automated Fingerprint Identification System.

Unit 2: Development of Fingerprints **09 hrs**

Latent prints. Constituents of sweat residue. Latent fingerprints' detection by physical and chemical techniques. Mechanism of detection of fingerprints by different developing reagents. Application of light sources in fingerprint detection. Preservation of developed fingerprints. Digital imaging for fingerprint enhancement. Fingerprinting the deceased. Developing fingerprints on gloves.

Unit 3: POROSCOPY **09 hrs**

Significance of poroscopy and edgeoscopy.

Unit 4: LIP PRINTS **09 hrs**

Lip prints - Nature, location, collection and examination of lip prints.

Unit 5: Other Impressions **09 hrs**

Importance of footprints. Casting of foot prints, Electrostatic lifting of latent foot prints. Palm prints. Ear prints and their significance. Palm prints and their historical importance.

Practical:

- To record rolled and plain fingerprints form a living person.
- To identify patterns from recorded fingerprint slips.
- To classify the identified fingerprint pattern slips using Henry's Ten Digit Classification
- To study and identify Ridge Characteristics.

- To develop and lift latent fingerprints from various surfaces.
- To Identify and study pores of fingerprint ridges.
- To identify and study the types of edge geometry of fingerprint ridges.
- To trace and mark surface footprints.
- To lift sunken footprints.
- To develop lip prints and classify them for Chelioscopic comparison.

Practical Examination Pattern (35 marks)

1. Recording of fingerprints of a living person (10 marks)
2. Identification of fingerprint patterns (05 marks)
3. Classification of Fingerprints (05 Marks)
4. Developing and lifting of latent fingerprints (05 Marks)
5. Tracing and marking of surface footprints (05 Marks)
6. Lip Print recording and Classification (05 Marks)

Suggested Readings

1. J.E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton (1983).
2. D.A. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis, CRCPress, Boca Raton (2000).
3. C. Champod, C. Lennard, P. Margot an M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).
4. Lee and Gaensleen's, Advances in Fingerprint Technology, 3rd Edition, R.S.
5. Ramotowski (Ed.), CRC Press, Boca Raton (2013).

III Semester

Core-8- Criminal Law

Course outcome

At the end of the course, student should be able to

CO1: Demonstrate the acquisition of comprehensive knowledge about criminal law

CO2: Demonstrate the skills of interpretation of elements of criminal procedure code related to forensic science

CO3: Demonstrate the acquisition of comprehensive knowledge and skills related to offences pertaining to human body and property.

CO4: Demonstrate the capability to analyze and apply laws pertaining to expert evidence and court procedure.

Theory

CONTENTS

Unit 1: Law to Combat Crime **09 hrs**

Classification – civil, criminal cases.

Essential elements of criminal law.

Constitution and hierarchy of criminal courts.

Criminal Procedure Code.

Cognizable and non-cognizable offences.

Bailable and non-bailable offences.

Sentences which the court of Chief Judicial Magistrate may pass.

Summary trials –Section 260(2).

Judgements in abridged forms – Section 355.

Unit 2: Indian Penal Code **09 Hrs**

Indian Penal Code- General Explanations and General Exceptions.

Offences pertaining to offences against persons – Sections 121A, 299,

300, 302, 304, 304A, 304B, 307, 309, 319, 320, 324, 326, 351, 354, 359, 362.

Sections 375, 376 A, B, C, D, E, F and G, 377 and their amendments.

Unit 3: Indian Penal Code pertaining to offencesagainst property **09 Hrs**

Sections – 378, 383, 390, 391, 405, 415, 420, 441, 463, 489A, 497, 499, 503, 511.

Unit 4: Indian evidence Act and Criminal Procedure Code **09 Hrs**

Indian Evidence Act – Evidence and rules of relevancy in brief.

Expert witness.

Cross examination and re-examination of witnesses.

Sections 32, 45, 46, 47, 57,

58, 60, 73, 135, 136, 137, 138, 141.

Police powers for arrest, search and seizure and Section 293 in the code of criminal procedure.

Unit 4: Special Acts **09 Hrs**

Narcotic, Drugs and Psychotropic Substances Act.

Essential Commodity Act.

Drugs and Cosmetics Act.

Explosive Substances Act.

Arms Act.

Unit 5: Acts Pertaining to Socio-economic and Environmental Crimes **09 Hrs**

Dowry Prohibition Act.

Prevention of Corruption Act.

Wildlife Protection Act.

I.T. Act.

Environment Protection Act.

Untouchability Offences Act

Practicals:

1. To prepare a schedule of five cognizable and five non-cognizable offences.
2. To study the powers and limitations of the Court of Judicial Magistrate of First Class.
3. To prepare a schedule of the offences which may be tried under Section260(2) of Criminal Procedure Code.
4. To study a crime case in which an accused was punished on charge of murder under Section 302.
5. To study a crime case in which an accused was punished on charge of rape under Section 375.
6. To cite example of a case in which the opinion of an expert was called for under Section 45 of the Indian Evidence Act.
7. To prepare a schedule of persons convicted under Narcotics, Drugs and Psychotropic Act statistically analyze the age group to which they be- longed.
8. To study a case in which Explosive Substances Act was invoked.
9. To study a case in which Arms Act was invoked.
10. In light of Section 304B of the Indian Penal Code, cite a case involving dowry death.

Practical Examination Pattern (35 marks)

Expert opinion (20 marks)

Critical analysis of sections of IPC, IEA (15 marks)

Suggested Readings

1. D.A. Bronstein, Law for the Expert Witness, CRC Press, Boca Raton(1999).
2. Vipa P. Sarthi, Law of Evidence, 6th Edition, Eastern Book Co., Lucknow(2006).
3. A.S. Pillia, Criminal Law, 6th Edition, N.M. Tripathi Pvt Ltd., Mumbai(1983).
4. R.C. Nigam, Law of Crimes in India, Volume I, Asia Publishing House, NewDelhi (1965).
5. (Chief Justice) M. Monir, Law of Evidence, 6th Edition, Universal Law Pub-lishing Co. Pvt. Ltd., New Delhi (2002).

III Semester

Core -9- Introduction to Forensic Science

Course Outcome:

At the end of the course the student should be able to

CO 1: Demonstrate the acquisition of comprehensive knowledge about the forensic science to the human society

CO 2: Demonstrate the capability to assess the use of Forensic sciences in India and at international agencies

CO 3: Demonstrate the capability to duties, ethics and reporting of forensic results.

CO 4: Demonstrate the capability to analyse the role of forensic divisions for crime scene management

CO5: Demonstrate the skills to work effectively and respectfully in a team.

CONTENTS

Theory:

Unit 1: History of Development of Forensic Science in India **9 Hrs**

Functions of forensic science.

Historical aspects of forensic science.

Definitions and concepts in forensic science.

Scope of forensic science. Need of forensic science.

Basic principles of forensic science.

Frye case and Daubert standard.

Unit 2: Tools and Techniques in Forensic Science **9 Hrs**

Branches of forensic science.

Forensic science in international perspectives, including set up of INTERPOL and FBI.

Duties of forensic scientists.

Code of conduct for forensic scientists.

Qualifications of forensic scientists.

Data depiction.

Report writing.

Unit 3: Organizational set up of Forensic Science Laboratories in India **9 Hrs**

Hierarchical set up of Central Forensic Science Laboratories, State Forensic Science Laboratories, Government Examiners of Questioned Documents,

Fingerprint Bureaus,

National Crime Records Bureau,

Police & Detective Training Schools,

Bureau of Police Research & Development,

Directorate of Forensic Science and Mobile Crime Laboratories.

Police Academies. Police dogs.

Services of crime laboratories. Basic services and optional services.

Unit: 4 - Forensic science laboratories and facilities **9 Hrs**

Growth of Forensic Science Laboratories in India – Central and State levellaboratories

Educational setup in Forensic Science in India Services and functionalities provided by various FSLs

Various divisions in the FSL – Ballistics, Biology, Chemistry Documents, Physics,

Psychology, Serology, Toxicology

Unit: 5- Crime scene management **9 Hrs**

Types of crime scenes – primary, secondary, crime scenes based on size of evidence

Crime scene Management – initial response, role of first responding officer, duty management Forensic Scientists, Investigating officers and their assigned role andduties. Role of the Police and Judiciaries, Fire Brigade, Medico-legal officers and other experts.

PRACTICAL :

1. To study the history of crime cases from forensic science perspective.
2. To cite examples of crime cases in which apprehensions arose because of Daubert standards.
3. To review the sections of forensic science at INTERPOL and compare with those in Central Forensic Science Laboratories in India. Include suggestions for improvements if any.
4. To study the annual reports of National Crime Records Bureau and depict the data on different type of crime cases by way of smart art/templates.
5. To write report on different type of crime cases.
6. To review how the Central Fingerprint Bureau, New Delhi, coordinates the working of State Fingerprint Bureau
7. To examine the hierarchical set up of different forensic science establish ments and suggest improvements.
8. To examine the list of projects undertaken by the Bureau of Police Research and Development and suggest the thrust areas of research in Police Science.
9. To compare and contrast the role of a Police Academy and a Police Training School.
10. To compare the code of conduct prescribed by different establishments for forensic scientists.

Practical Examination Pattern (35 marks)

1. Report writing of crime cases (15 marks)
2. Code of conduct – Forensic scientists (10 marks)
3. Expert opinion (10 marks)

Suggested Readings

1. B.B. Nanda and R.K. Tiwari, Forensic Science in India: A Vision for theTwenty First Century, Select Publishers, New Delhi (2001).
2. M.K. Bhasin and S. Nath, Role of Forensic Science in the New Millennium,University of Delhi, Delhi (2002).
3. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientificand Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).
4. W.G. Eckert and R.K. Wright in Introduction to Forensic Sciences, 2nd Edi-tion, W.G. Eckert

(ED.), CRC Press, Boca Raton (1997).
5. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
6. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

III Semester

Skill Enhancement-1 Computer Application

Learning Objectives

- To know various aspects of basic components of computer
- To learn the modes of application of basic utility of the computer

Content

- **Introduction to Computer & Operating System**: **Introduction to computers** – Definition, Characteristics, Generation, Applications, Classifications, Hardware, Software, Computer Arithmetic & Number System, Decimal, Binary, Octal & Hexadecimal System.
- **Arithmetic Operations on Binary Numbers**. ASCII, EBCDIC, BCD codes, Fixed point & floating point representation of numbers.
- **Computer Organization & Architecture** – Memory hierarchy, Primary Memory - memory unit, SRAM, DRAM, SDRAM, RDRAM, Flash memory. Secondary storage devices include Magnetic Disk, Floppy Disks, Optical Disks, Magnetic Drum
- **Input Devices, Output Devices**.
- **Softwares** – Introductory ideas of System Software, Application Software, Operating Systems, Translators, Interpreters, Compilers, Assemblers, and Generation of Languages.
- **Operating System :** Definition, Introductory ideas of single user and multi-uer operating system, Time sharing, multitasking, multiprogramming, Batch Processing, on-line processing, spooling.
- **Introduction to Windows** – Windows basics, Windows Accessories, Miscellaneous Windows features, Web Features & Browsers.
- **Networks**: Different types of networks and their application
- **Internet and Intranet:** Similarities in Internet and Intranet, Differences in Internet and Intranet, Effective Internet use.

Computer Viruses: Types of computer viruses, Use of Antivirus software

Application of Computer: General and Health industry

Software: Different types based on applications. Download open-source softwares. Convert one file format into another (Pdf to Word, Word to pdf, etc.). Ways to protect the documents

MS Office: (Theory & Practical)

Word Processing:

- Introduction to Microsoft Word
- Font options in Microsoft Word
- Paragraph Formatting in Microsoft Word
- Heading Styles in Microsoft Word
- Editing Options in the Home Tab
- Clipboard & Format Painter Options in Microsoft Word
- Page Insert Options in Microsoft Word
- Inserting Tables in Microsoft Word

- Insert Pictures in Microsoft Word
- Shapes, Icons & 3d Models in Microsoft Word
- SmartArt Options in Microsoft Word
- Inserting Charts in Microsoft Word
- Text Box & Drop Cap Options in Microsoft Word
- Hyperlink in Microsoft Word
- Header, Footer & Page Number Options in Microsoft Word
- Equations & Symbols in Microsoft Word
- Water Mark, Page Color & Page Border Options in Microsoft Word
- Page Setup Options in Microsoft Word -
- Table of Contents & Table of Figures in Microsoft Word
- Endnote & Footnote Options in Microsoft Word
- Mailings Tab Options in Microsoft Word

Microsoft PowerPoint

- Introduction to Microsoft PowerPoint Interface
- Font & Slide Options in Microsoft PowerPoint
- Paragraph Formatting in Microsoft PowerPoint
- Drawing Tools in Microsoft PowerPoint
- Editing Options in the Home Tab
- Inserting Tables in Microsoft PowerPoint -
- Inserting Pictures in Microsoft PowerPoint
- Screenshot Option in Microsoft PowerPoint
- Inserting Photo Albums in Microsoft PowerPoint
- Inserting Icons in Microsoft PowerPoint
- Inserting 3D Models in Microsoft PowerPoint
- Inserting Smart Arts in Microsoft PowerPoint
- Inserting Charts in Microsoft PowerPoint
- Inserting Videos in Microsoft PowerPoint
- Design Tab Options in Microsoft PowerPoint
- Transitions Tab Options in Microsoft PowerPoint
- Animations Tab Options in Microsoft PowerPoint
- Slide Show Tab Options in Microsoft PowerPoint
- View Tab Options in Microsoft PowerPoint
- Built-in Presentation Templates in Microsoft PowerPoint

Microsoft Excel

- Introduction to Microsoft Excel Interface
- Basic Math Functions
- AutoSum Functions
- Sum IF Function & Remove Duplicates Option
- Sum IF & Sum IFs, Count IF & Count IFs Functions
- Sub Total Function
- Arrays & Sum Product Functions

- Other Math Functions
- Absolute & Relative References
- Formatting Techniques in Excel
- Excel Data Types
- Go to & Replace Options
- Auto Fill Options
- Copy, Paste & Paste Special Options
- Conditional Formatting
- Sort & Filter
- Excel Operators
- Equations Solving in Excel
- Errors in Excel Sheet
- Logical Function IF
- Logical Function IF Error
- Logical Function (IF, Nested IF, OR)
- Logical Function AND
- VLOOKUP Function
- VLOOKUP with Data Validation
- Nested VLOOKUP
- HLOOKUP Function
- Selecting the Chart
- Charts in Excel
- Tables in Excel
- Inserting Comments
- Inserting Hyperlink
- Text Functions
- Date, Time & Reference Functions
- Text to Columns Tool
- Data Consolidation
- Goal Seek Option
- Data Table Optio

III Semester

Allied-3- Environment Science and Health

Learning Objectives

- To know various Environmental factors which affect Health
- To learn the modes of disease transmission and various control measures

Unit I

1. a. Introduction to Environment and Health and Water

Ecological definition of Health, Population perspective of relations, Health & environment perspective of relations, Environmental factors, Environmental Sanitation, Need to study environmental health, Predominant reasons for ill-health in India

1.b. Water

Safe and wholesome water, requirements, uses, sources; sanitary well; Hand pump; water Pollution; Purification of water; large scale & small scale; slow sand filters; rapid sand filters; Purification of Water on a small scale; Household purification, Disinfection of wells; water quality criteria & standards.

Unit II

Air, Light, Noise, Radiation

2 a. Air

Composition, Indices of Thermal Comfort, Air pollutants, Air Pollution - Health Effects, Environmental Effects, Green-house effect, Social & Economic Effects, Monitoring, Prevention & Control.

2. b. Light, Noise, Radiation

Natural and Artificial light; Properties, sources, noise pollution and its control, types, sources, biological effects and protection.

Unit III

Waste and Excreta Disposal

3 a. Disposal of Wastes

Solid Wastes, Health hazards, Methods of Disposal; Dumping, Controlled tipping/ sanitary landfill, Incineration, Composting.

3 b. Excreta Disposal

Public health importance, Health hazards, sanitation barrier, Methods of excreta disposal, unsewered areas and sewered areas, sewage, Modern Sewage Treatment.

Unit IV

Housing and Health and Medical Entomology

4 a. Housing and Health

Human Settlement, Social goals of housing, Criteria for Healthful Housing by Expert Committee

of the WHO, Housing standards- Environmental Hygiene Committee, Rural Housing Standards, Overcrowding, Indicators of Housing.

4 b. Medical Entomology

Classification of Arthropods, Routes of Disease transmission, Control measures.

Unit V

Insecticides and Rodents

5 a. Insecticides

Types, mechanism of action, dosage and application for control of insects.

5 b. Rodents

Rodents and its importance in disease, along with anti-rodent measures.

Reference Books (latest edition)

1. Park K. Park's Textbook of Preventive and Social Medicine. 26th ed. Jabalpur: Banarsidas Bhanot Publishers; 2015. p.135-141
2. Suryakantha. Textbook of Community Medicine with recent advances. 4th edition.
3. Bhalwar R. Textbook of Public Health and Community Medicine. 2nd edition. Pune: Department of Community Medicine AFMC, 2012
4. Essentials of Community Medicine for Allied Health Sciences, JSS University Publications, 2015.

IV Semester
Core -10 – Criminalistics

Course Outcomes:

At the end of the course student should be able to

CO 1: Demonstrate the acquisition of comprehensive knowledge about crime scene management

CO 2: Demonstrate the acquisition of comprehensive knowledge and skills regarding the search and documentation of crime scenes

CO3: Demonstrate the capability to analyse the role of personnel in crime scene

Contents

Theory

Unit 1: Crime Scene Management I **09 Hrs**

- Types of crime scenes – indoor and outdoor. Securing and isolating the crime
- scene.
- Crime scene search methods. Safety measures at crime scenes. Legal considerations at crime scenes.

Unit 2: Crime Scene Management II **09 Hrs**

- Documentation of crime scenes – photography, videography, sketching and re-cording notes.
- Duties of first responders at crime scenes.
- Coordination between police personnel and forensic scientists at crime scenes. The evaluation of 5Ws (who?, what?, when?, where?, why?) and 1H (how?).
- Crime scene logs.

Unit 3: Crime Scene Evidence **09 Hrs**

- Classification of crime scene evidence – physical and trace evidence.
- Locard principle. Collection, labeling, sealing of evidence. Hazardous evidence.
- Preservation of evidence.
- Chain of custody. Reconstruction of crime scene.

Unit 4: Forensic Physics – I **09 Hrs**

- Glass evidence – collection, packaging, analysis. Matching of glass samples by mechanical fit and refractive index measurements. Analysis by spectroscopic methods. Fracture analysis and direction of impact.
- Paint evidence – collection, packaging and preservation. Analysis by destructiveand non-destructive methods. Importance of paint evidence in hit and run cases.
- Fiber evidence – artificial and man-made fibers. Collection of fiber evidence. Identification and comparison of fibers.

Unit 5: Forensic Physics - II **09 Hrs**

- Soil evidence – importance, location, collection and comparison of soil samples.

- Cloth evidence – importance, collection, analysis of adhering material. Matchingof pieces.
- Toolmark evidence. Classification of toolmarks. Forensic importance of toolmarks.Collection, preservation and matching of toolmarks.
- Restoration of erased serial numbers and engraved marks.

Practical

- To examine a crime scene of unnatural death and burglary and prepare recording notes.
- To document a crime scene by rough and scaled sketch
- To reconstruct a crime scene (outdoor and indoor).
- To collect and pack Biological Clue (Hair) from crime scene and suspect
- To collect and pack ballistic evidence from crime scene
- To collect and pack weapons from scene of crime.
- To collect and pack cloth evidence from a scene of crime.
- To compare soil samples by density gradient method.
- To compare paint samples by physical matching method.
- To compare paint samples by layering menthol.
- To compare glass samples by refractive index method.
- To identify and compare tool marks.
- To compare cloth samples by physical matching.

Practical examination pattern (35 MARKS)

1. Sketching and photography of scene of crime (10 marks)
2. Collection and packing of physical clues at the scene of crime (10 marks)
3. Reconstruction and evaluation of scene of crime in Hit and Run, fire, ex-plosion, thefts and burglaries, various types of deaths. (15 marks)

Suggested Readings

1. M. Byrd, Crime Scene Evidence: A Guide to the Recovery and Collection of Physical Evidence, CRC Press, Boca Raton (2001).
2. T.J. Gardener and T.M. Anderson, Criminal Evidence, 4th Ed., Wadsworth,Belmont (2001).
3. S.H. James and J.J. Nordby, Forensic Science: An Introduction to Scientificand Investigative Techniques, 2nd Edition, CRC Press, Boca Raton (2005).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime
5. Scene Investiga*tion*, CRC Press, Boca Raton (2013).

IV Semester

Core 11: Technological Methods in Forensic Science

Course Outcomes:

At the end of the course student should be able to

CO 1: Demonstrate the acquisition of comprehensive knowledge about sample preparation of Forensic importance

CO 2: Demonstrate the acquisition of comprehensive knowledge and skills about various techniques in processing crime scene evidence

CO 3: Demonstrate the skills to assess the utility of various techniques in identification of samples

CO4: Demonstrate the acquisition of comprehensive knowledge about principles and application of photography and videography in crimescene.

Contents

Theory

Unit 1: Instrumentation - I **09 Hrs**

- Sample preparation for chromatographic and spectroscopic evidence.
- Chromatographic methods. Fundamental principles and forensic applications of thin layer chromatography, gas chromatography and liquid chromatography.
- Spectroscopic methods.

Unit 2: Instrumentation - II **09 Hrs**

- Fundamental principles and forensic applications of Ultraviolet-visible spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, atomic emission spectroscopy and mass spectroscopy. X-ray spectrometry.

Unit 3: **Instrumentation – III** **09 Hrs**

- Colorimetric analysis and Lambert-Beer law.
- Electrophoresis – fundamental principles and forensic applications.
- Neutron activation analysis – fundamental principles and forensic applications.

Unit 4: Microscopy **09 Hrs**

- Fundamental principles. Different types of microscopes.
- Electron microscope.
- Comparison Microscope.
- Forensic applications of microscopy.

Unit 5: Forensic photography **09 Hrs**

- Basic principles and applications of photography in forensic science.
- 3D photography. Photographic evidence.
- Infrared and ultraviolet photography.
- Digital photography.

- Videography.
- Crime scene and laboratory photography.

Practicals

- To determine the concentration of a colored compound by colorimetryanalysis.
- To carry out thin layer chromatography of ink samples.
- To carry out separation of organic compounds by paper chromatography.
- To identify drug samples using UV-Visible spectroscopy.
- To take photographs using different filters.
- To take photographs of crime scene exhibits at different angles.
- To record videography of a crime scene.

Practical Examination pattern (35 marks)

1. UV-Visible spectroscopy (10 marks)
2. Paper chromatography (08 marks)
3. Thin layer chromatography (07 marks)
4. Colorimetry analysis. (10 marks)

Suggested Readings

1. D.A. Skoog, D.M. West and F.J. Holler, Fundamentals of Analytical Chemis-try, 6th Edition, Saunders College Publishing, Fort Worth (1992).
2. W. Kemp, Organic Spectroscopy, 3rd Edition, Macmillan, Hampshire(1991).
3. J.W. Robinson, Undergraduate Instrumental Analysis, 5th Edition, MarcelDekker, Inc., New York (1995).
4. D.R. Redsicker, The Practical Methodology of Forensic Photography, 2nd Edition, CRC Press, Boca Raton (2000).

IV Semester

Core-12- Questioned Documents

Course Outcomes:

At the end of the course student should be able to

CO 1: Demonstrate the acquisition of comprehensive knowledge and skills about examination of questioned documents in crime scene

CO 2: Demonstrate the acquisition of comprehensive knowledge about individualization development in hand writing.

CO 3: Demonstrate the skills of identification of Genuine Indian currency notes

CO4: Demonstrate the skills of evidence presentation and analysis of electronic documents.

Contents

Theory

Unit 1: Nature and Scope of Questioned Documents **09 hrs**

- Definition of questioned documents.
- Types of questioned documents.
- Preliminary examination of documents.
- Basic tools needed for forensic documents.
- Examination of documents – ultraviolet, visible, infrared and fluorescence spectroscopy, photomicrography, microphotography, visible spectral comparator, electrostatic detection apparatus.
- Determining the age and relative age of documents.

Unit 2: Comparison of Documents **09 Hrs**

- Comparison of handwriting.
- Development of individuality in handwriting.
- Natural variations and fundamental divergences in handwritings.
- Class and individual characteristics.
- Merits and demerits of exemplar and non-exemplar samples during comparison of handwriting.
- Standards for comparison of handwriting.
- Comparisonof paper, ink, printed documents, typed documents, Xeroxed documents.

Unit 3: Forgeries **09 Hrs**

- Alterations in documents, including erasures, additions, over-writings and obliterations. Indented and invisible writings.
- Charred documents.
- Disguised writingand anonymous letters.
- Signature identification, variations in signature and factors influencing them.
- Examination of signatures for forgeries.

Unit 4: Counterfeiting and its detection **09 Hrs**

- General idea on manufacture of genuine Indian Currency Notes and coins.
- Examination of counterfeit Indian currency notes, and Indian Coins passports, visas, rubber stamps, seals and stamp papers.
- Recording, documentation and courtroom presentation of Questioned Document Evidence by photography and juxtaposition charts.

Unit 5: Electronic Documents **09 Hrs**

- Concept, Scope and reference to Indian laws regarding their admissibility.
- Forensic Speaker identification, Scope, Audiogram and speech characteristics.
- Video analysis, scope and detection of tampered videos.
- Morphing and its detection.
- Steganography and its detection.
- Its use as investigative lead and forensic evidence in courts.

Practical:

- To collect, pack and preserve paper documents.
- To study a handwritten questioned document and prepare a request standard for comparison.
- To Compare a handwritten questioned document with request standards by identification of similarities in characteristics.
- To Compare a handwritten questioned document with non-request standards by identification of similarities in characteristics.
- To study various types of writing instruments and conduct paper chromatography for determination of similarities of the ink.
- Collection and comparison of signatures by physical method and microscopic method.
- Examination of genuine Indian currency notes of all denominations and noting their characteristics as given by the RBI.
- Examination and identification of characteristics of a genuine Indian coin.

Practical Examination Pattern: (35 Marks)

1. Handwriting identification (10 Marks)
2. Ink Identification by Paper Chromatography (10 Marks)
3. Signature Identification (10 Marks)
4. Currency note/Coin examination for Characteristics (05 Marks)

Suggested Readings

1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982).
2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evi- dence in Civil and Criminal Cases, 4th Edition, Foundation Press, New York(1995).
3. R.N. Morris, Forensic Handwriting Identification: Fundamental Concepts and Principles, Academic Press, London (2000).
4. E. David, The Scientific Examination of Documents – Methods and Tech- niques, 2nd Edition, Taylor & Francis, Hants (1997).

IV Semester

Skill Enhancement-2

Biostatistics and Research Methodology

Learning Objectives

1. To have a basic knowledge of Biostatistics and its applications in medicine
2. To know various types of data presentation and data summarization in Medical field
3. To have overview of data analysis and sampling techniques
4. To understand various study designs in Medical field
5. To know applications of various study designs in Medical Research

Biostatistics

Unit I

- Introduction and Presentation of data
- Meaning, Branches of Statistics, Uses of statistics in medicine, Basic concepts, Scales of measurement, Collection of data, Presentation of data; Tabulation, Frequency Distribution, Diagrammatic and Graphical Representation of Data.

Unit II

- Measures of central tendency and Measures of variation
- Arithmetic Mean (Mean), Median, Mode, Partition values, Range, Interquartile range , Mean Deviation, Standard Deviation, Coefficient of Variation.

Unit III

- Probability and standard distributions
- Definition of some terms commonly encountered in probability, Probability distributions, Binomial distribution, Normal distribution, Divergence from normality; Skewness and kurtosis

U**nit IV**

- Census and Sampling Methods
- Census and sample survey, Common terms used in sampling theory, Non-probability (Non random) Sampling Methods; Convenience sampling, Quota sampling, Snowball sampling, Judgmental sampling or Purposive sampling, Volunteer sampling, Probability (Random) Sampling methods; Simple random sampling, Systematic Sampling, Stratified Sampling, Cluster sampling, Multi-stage sampling, Sampling error, Non-sampling error.

Unit V

- Inferential Statistics
- Parameter and statistic, Estimation of parameters; Point estimation, Interval Estimation, Testing of hypothesis; Null and alternative hypotheses, Type-I and Type-II Errors.

Research Methodology

Unit I

- Introduction to research methodology
- Types of research; Quantitative vs. Qualitative, Conceptual vs. Empirical

Unit II

- Study Designs-Observational Studies
- Epidemiological study designs; Uses of Epidemiology, Observational studies, Descriptive studies; Case reports, Case series, Analytical studies; Case control studies, Cohort studies, Cross sectional

Unit III

- Experimental Studies
- Experimental studies (Interventional studies); Randomized control Trials (Clinical trials), Field trials, Community trials and Randomized Trials, Application of study Designs in Medical Research

Recommended Books Recent Editions.

1. K.R.Sundaram, S.N.Dwivedi and V Sreenivas (2010), Medical Statistics, Principles and Methods, BI Publications Pvt Ltd, New Delhi
2. NSN Rao and NS Murthy (2008), Applied Statistics in Health Sciences, Second Edition, Jaypee Brothers Medical Publishers (P) Ltd.
3. J.V.Dixit and L.B.Suryavanshi (1996), Principles and practice of Biostatistics, First Edition, M/S Banarsidas Bhanot Publishers.
4. Getu Degu and Fasil Tessema (2005), Biostatistics, Ethiopia Public Health Training Initiative.
5. Essentials of Community Medicine for Allied Health Sciences, JSS University Publications, 20.
6. Park K. Park's Textbook of Preventive and Social Medicine. 26th ed. Jabalpur: Banarsidas Bhanot Publishers, 2015. p.135-141.
7. Suryakantha. Textbook of Community Medicine with recent Advances. 4th edition.
8. Bhalwar R. Textbook of Public Health and Community Medicine. 2nd Edition. Pune, Department of Community Medicine AFMC, 2012.
9. Leon Gordis. Epidemiology 4th Edition - Elsevier Saunders Publication.

IV Semester
Allied-4 Constitution of India

Learning Objective:

- To know about the fundamental rights and duties of the Constitution.
- To know about the sustainable development and special rights of the backward class and tribes.

Content:

Unit - I

- Meaning of the term 'Constitution'. Making of the Indian Constitution 1946-1950.

Unit - II

- The democratic institutions created by the constitution, Bicameral system ofLegislature at the Centre and in the States.

Unit - III

- Fundamental rights and duties their content and significance.

Unit - IV

- Directive principles of States, policies the need to balance fundamental rights with directive principles.

Unit - V:

- Special rights created in the Constitution for dalits, backwards, women and children and the religious and linguistic minorities.

Unit - VI

- Doctrine of Separation of Powers, legislative, executive and judicial and their functioning in India.

Unit - VII

- The Election Commission and State Public Service commissions.

Unit - VIII

- Method of amending the Constitution.

Unit - IX

- Enforcing rights through writs.

Unit - X

- Constitution and sustainable development in India.

Recommended Books Recent Editions.

1. J.C. Johari. The Constitution of India. A Politico-Legal Study. Sterling Publication, Pvt. Ltd. New Delhi.
2. J.N . Pandey. Constitution Law of India, Allahbad, Central Law Agency, 1998.
3. Granville Austin. The Indian Constitution. Corner Stone of a Nation-Oxford, New Delhi, 20

V Semester

Core-13- Forensic Chemistry & Physics

Course Outcomes

At the end of the course student should be able to

CO 1: Demonstrate the acquisition of comprehensive knowledge about chemical analysis and quality management in Forensic science laboratories

CO 2: Demonstrate the acquisition of comprehensive knowledge and skills about narcotic drugs, psychotropic substances, explosives, petroleum products and beverages

CO 3: Demonstrate the capability to analyze substances under NDPS act

CO 4: Demonstrate the acquisition of comprehensive knowledge about forensic physics

Forensic Chemistry

CONTENTS

Theory:

UNIT I **7 Hrs**

Chemistry

- Introduction to chemistry,
- Types of cases/exhibits received for analysis,
- Overviewof forensic chemical analysis

Quality management:

- Introduction to Quality, Quality Assurance, Quality control, TQM
- Definition of Accreditation, History and development of ISO
- Importance of accreditation in Forensic science laboratories, Process of accreditation, Quality system, Procedure for sample selection, collection, preservation, packaging, identification, storage and transport
- Traceability and Validation of new methods, measurement of uncertainty, Equipment maintenance and calibration, Evaluation of materials and reagents, sample and data handling in the laboratory, sample disposal, Assessment, interpretation and reporting of results
- Proficiency testing, external quality assessment programs, internal audit/External audit, MRM
- Training and conferences

UNIT II **7 Hrs**

Narcotic drugs & psychotropic substances

- Introduction to Controlled Substances, Classification of controlled substances, Precursor chemicals, Narcotic raids and clandestine drug laboratories
- Mandatory provisions of NDPS Act, 1985
- NDPS Drugs, Classification of Drugs
- Commonly abused drugs, Drug dependence and Drug Tolerance
- Designer Drugs, Analysis of Drug of abuse by various chemical and instrumentalmethods

Explosives

- Introduction, classification and chemistry of explosives Various types of IEDs and their reconstruction Mechanism of explosion and their effects
- Systematic examination of explosive and explosion residues (organic and inorganic) by chemical and instrumental techniques and interpretation of results Explosives Act and Explosive Substance Act

UNIT III **7 Hrs**

Fire

- Introduction to Fires, Types of Fires, and Causes of fire, Patterns of fireThermodynamics of fire
- Accelerants and incendiary devices, Forensic Analysis of Fire Debris by Instrumental methods

Forensic Analysis of petroleum products

- Introduction to petroleum products and adulteration in petroleum products
- Analysis of Petrol, Kerosene and Diesel as per BIS Specifications

Forensic Analysis of beverages

- Introduction to Alcoholic and non-alcoholic beverages
- Analysis of alcoholic beverages, country made liquor, illicit liquor and medicinal
- preparations containing alcohol as constituents. Analysis of non-alcoholic beverages like tea, coffee

Bribe Trap Cases:

- Examination of Chemicals (Phenolphthalein) used in Bribe trap cases.

Dyes:

- Introduction to Dyes, Types of Dyes
- Analysis of Dyes used in petrol and kerosene, paints and fibers

Adulterated Food Analysis

- Analysis of samples taken under Food Adulteration Act

Fibers and Forensic Chemical Analysis

- Introduction to fibers, Classification of fibers, Analysis by microscopy, melting point and solubility testing of fibers, Chromatography, Spectroscopy and elemental analysis of fibers.

UNIT: IV **12 Hrs**

NEWTON'S LAW OF MOTION, ELASTICITY & FLUID DYNAMICS

- 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

STUDY OF SOUND

- 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 ultra- sonic waves, applications of ultrasonics.

UNIT: V **12 hrs**

STUDY OF LIGHT

- Refraction through thin layers, thick lens, thick lens and lens combinations,aber- rations, interference in thin films, fringes in wedge shaped films,Newton's rings, simple table spectrophotometer, total internal reflection.

LASER & FIBER OPTICS

- Production of LASER, Types of LASER, Properties and applications of LASER, Opti-cal fibers, Propagation of light through optical fiber, Angle of acceptance and nu- merical aperture, losses, Solar cells.

RADIO ACTIVITY

- Review of nuclear composition, nuclear properties and half life, Radioactive decayschemes
- Applications of Radio Isotopes, Radiometric dating

PRACTICALS

- Qualitative and Quantitative analysis of Narcotic Drugs and Psychotropic
- Substances by color tests, and Instrumental techniques
- Colour tests to determine the probable origin of explosive substances.
- Qualitative analysis of Post blast residue by chemical test and Chromatography methods
- Examinations of petroleum products as per BIS specifications
- Analysis of alcohol in blood by Head space GC
- Analysis of phenolphthalein in bribe cases
- Analysis of food samples by chemical methods

FORENSIC PHYSICS

PRACTICALS

Name of experiment

- Fly wheel
- Y by vibration
- ŋ of posseuli Method
- Spectrophotometer (determination of angle of prism A)
- Refractive index of liquid by using LASER
- Ultrasonic interferometer
- Sound Intensity measurement
- Laser Parameter
- Solar cell

- Combination of lenses
- Newton's rings
- Wedge shaped film
- Frequency of AC mains
- LDR characteristics
- LCR series resonance

Practical Examination (35 marks)

1. Analysis of phenolphthalein in bribe cases (10 marks)
2. Analysis of food samples by chemical methods (05 marks)
3. Filter paper test for detection of genuinity in petrol (05 marks)
4. Analysis of alcohol in blood by Head space GC (05 marks)
5. Any two Physics experiments of 05 marks each.

Reference Books:

1. Maudham Bassett etal; Voget's Textbook of Quantitative Chemical Analy- sis, 6th Ed. Longman Essex
2. I. I. Finar: Oraganic Chemistry vol. II pearson Educatiopn (Sigapore)
3. R. T. Morrison, Rn.N Boyd; Organic Chemistry, 6th Ed. Prentice Hall, NewDelhi
4. Brean S. Furniss Etal; A.I.Vogel Textbook Of Practical Oraganic Chemistry,Addison Wesley Longman, Edinburg
5. A. Burger; Medicinal Chemistry, Vol. Ii, Wiley Interscience, Ny
6. D A Skoog, D.M. West, F.J. Holler; Analytical Chemistry – An Introduction, 7th Ed. Saunders College Pub, Philadelphia, USA
7. Boudreau JE, Etal; Arson & Arson Investigation, Survey & Assessment National Institutes Of Law Enforcement, U.S. Deptt Of Justice, U.S. GovtPrinting Press
8. Dettean J D; Kirk's Fire Investigation, 5th Ed. Prentice Hall, EaglewoodCliffs, N. J.
9. Yinon Jitrin; Modern Methods & Application In Analysis Of Explosives, JohnWiley & Sons, England
10. Working Procedure Manual – Chemistry, Explosives And Narcotics, BPR&D Pub.
11. C.A. Watson; Official And Standardized Methods Of Analysis, Royal Society Of Chemistry, UK
12. Feigl; Spot Test In Inorganic Analysis, Elsevier Pub. New Delhi
13. Feigl; Spot Test In Organic Analysis, Elsevier Pub. New Delhi
14. Silverman; Organic Chemistry Of Drug Design & Drug Action, Elserier Pub. New Delhi
15. Abraham Burger; Medicinal Chemistry & Drug Discovery, 6 Vol Set, 6th EdJohn Wiley & Sons, NY.

Physics:

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

V Semester

Core-14- Forensic Medicine

Course Outcomes:

At the end of the course student should be able to

CO1: Demonstrate the acquisition of comprehensive knowledge and skills related to death investigation

CO 2: Demonstrate the acquisition of comprehensive knowledge about forensic pathology

CO 3: Demonstrate the capability of being first responding officer in crime scene

CO4: Demonstrate the acquisition of comprehensive knowledge and skills about odontology

Contents

Theory

Unit 1: Death Investigations – I **9 Hrs**

- Fundamental aspects and scope of forensic medicine.
- Approaching the crime scene of death. Obtaining first-hand information from the
- caller.
- Rendering medical assistance to the victim, if alive. Protecting life. Recording dying declaration.
- Identifying witnesses and, if possible, suspect. Interviewing onlookers and segregating possible witnesses.
- Suspect in custody – initial interrogation and searchingfor evidence. Assessing the crime scene.

Unit 2: Death Investigations – II **9 Hrs**

- Request for forensic team.
- Importance of command post and log book.
- Management of crowd and media.
- Importance of taking notes.
- Items to be a part of noting.
- Documenting the death scene.
- Processing evidence.
- Evaluation of injuries. Importance of canvass form.
- Indexing the death investigation.
- Handling buried - bodycases search for buried bodies, methods of exhumation.
- Suicide cases – evaluating the type of injuries, gauging the psychological state of victim, suicide notes.

Unit 3: Forensic pathology **9 Hrs**

- Forensic pathology.
- Medico-legal aspects of death. Causes of death. Determinationof time since death.
- Investigation of sexual offences.
- Death by drowning.
- Injuries.Types and classification of injuries.

- Antemortem and post mortem injuries.
- Aging of injuries. Artificial injuries.

Unit 4: Clinical Forensic Medicine **9 Hrs**

- Investigation of sexual offences, dealing Medicolegal cases.

Unit 5: Forensic Odontology **9 Hrs**

- Development, scope and role of forensic odontology in mass disaster and anthropology. Types of teeth and their comparative anatomy.
- Bite marks-Forensic significance of bite marks. Collection, preservation and photography of bite marks evidence. Legal aspects of bite marks.
- Estimation of age from teeth.

Practicals

- To design a questionnaire for the first responder to the death scene.
- To design a protocol to deal with the media at the crime scene.
- To design a checklist for the forensic scientists at the death scene.
- To design a canvass form giving description of an unidentified victim.
- To analyze and preserve bite marks.
- Medico-legal report writing

Practical Examination Pattern (35 marks)

1. Victim profiling (10 marks)
2. Medico- legal Report writing (15 marks)
3. Expert opinion (10 marks)

Suggested Readings

1. K. Smyth, The Cause of Death, Van Nostrand and Company, New York(1982).
2. M. Bernstein, Forensic odontology in, Introduction to Forensic Sciences, 2nd Ed., W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
3. J. Dix, Handbook for Death Scene Investigations, CRC Press, Boca Raton(1999).
4. H.B. Baldwin and C.P. May in, Encyclopedia in Forensic Science, Volume 1,J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London(2000).
5. V.J. Geberth, Practical Homicide Investigation, CRC Press, Boca Raton(2006).
6. T. Bevel and R.M. Gardner, Bloodstain Pattern Analysis, 3rd Edition, CRCPress, Boca Raton (2008).
7. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

V Semester

Core-15- Forensic Biology & Serology

Course Outcomes

At the end of the course student should be able to

CO 1: Demonstrate the acquisition of comprehensive knowledge of significance of biological and serological evidence.

CO 2: Demonstrate the acquisition of comprehensive knowledge and skills related to wildlife and entomology forensics

CO 3: Demonstrate the acquisition of comprehensive knowledge about Genetic markers and its utility in forensic context

CO 4: Demonstrate the acquisition of comprehensive knowledge and skills of blood spatters

Contents

Theory

Unit 1: Biological Evidence **09 Hrs**

- Nature and importance of biological evidence.
- Significance of hair evidence. Transfer, persistence and recovery of hair evidence.Structure of human hair. Comparison of hair samples. Morphology and biochemistry of human hair. Comparison of human and animal hair.
- Types and identification of microbial organisms of forensic significance.
- Identification of wood, leaves, pollens and juices as botanical evidence.
- Diatomsand their forensic significance.

Unit 2: Wildlife Forensics **09Hrs**

- Fundamentals of wildlife forensic. Significance of wildlife forensic. Protected and endangered species of animals and plants. Illegal trading in wildlife items, such asskin, fur, bone, horn, teeth, flowers and plants. Identification of physical evidencepertaining to wildlife forensics. Identification of pug marks of various animals.

Forensic Entomology -

- Basics of forensic entomology. Insects of forensic importance. Collection of entomological evidence during death investigations.

Unit 3: Forensic Importance of Body fluids **09Hrs**

- Common body fluids. Composition and functions of blood. Collection and preservation of blood evidence. Distinction between human and non-human blood. Determination of blood groups. Antigens and antibodies.
- Forensic characterization of bloodstains. Typing of dried stains. Blood enzymes and proteins.
- Semen. Forensic significance of semen. Composition, functions and morphology of spermatozoa. Collection, evaluation and tests for identification of semen. Individualization on the basis of semen examination.
- Composition, functions and forensic significance of saliva, sweat, milk and urine. Tests for their identifications.

Unit 4: Genetic Marker Analysis **09 Hrs**

- Cellular antigens. ABO blood groups. Extracellular proteins and intracellular en-zymes.
- Significance of genetic marker typing data. Sexual assault investigations.

Unit 5: Bloodstain Pattern Analysis **09 Hrs**

- Bloodstain characteristics. Impact bloodstain patterns. Cast-off bloodstain patterns. Projected bloodstain patterns. Contact bloodstain patterns. Blood trails. Bloodstain drying times. Documentation of bloodstain pattern evidence. Crimescene reconstruction with the aid of bloodstain pattern analysis.

Practicals

- To examine hair morphology and determine the species to which the hairbelongs.
- To prepare slides of scale pattern of human hair.
- To examine human hair for cortex and medulla.
- To carry out microscopic examination of pollen grains.
- To carry out microscopic examination of diatoms.
- To cite a crime case in which diatoms have served as forensic evidence.
- To prepare a case report on forensic entomology.
- To prepare a case report on problems of wildlife forensics.
- To determine blood group from fresh blood samples.
- To determine blood group from dried blood sample.
- To carry out the crystal test on a blood sample.
- To identify blood samples by chemical tests.
- To identify the given stain as saliva.
- To identify the given stain as urine.
- To carry out cross-over electrophoresis.
- To study the correlation between impact angle and shape of bloodstain.
- To identify the point of convergence from the bloodstain patterns.

Practical examination pattern (35 marks)

1. Examination of hair (10 marks)
2. Blood analysis (15 marks)
3. Forensic entomology (10 marks)

Suggested Readings

1. L. Stryer, Biochemistry, 3rd Edition, W.H. Freeman and Company, NewYork (1988).
2. R.K. Murray, D.K. Granner, P.A. Mayes and V.W. Rodwell, Harper's Bio-chemistry, APPLETON & Lange, Norwalk (1993).
3. S. Chowdhuri, Forensic Biology, BPRD, New Delhi (1971).
4. R. Saferstein, Forensic Science Handbook, Vol. III, Prentice Hall, New Jer-sey (1993).
5. G.T. Duncan and M.I. Tracey, Serology and DNA typing in, Introduction toForensic Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton(1997
6. W.G. Eckert and S.H. James, Interpretation of Bloodstain Evidence atCrime Scenes, CRC Press, Boca Raton (1989).

7. G.T. Duncan and M.I. Tracey in Introduction to Forensic Sciences, 2nd Edi-tion, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
8. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
9. T. Bevel and R.M. Gardner, Bloodstain Pattern Analysis, 3rd Edition, CRC Press, Boca Raton (2008)

V Semester
Elective 1

Accident Investigations

Learning Objective:

- To know how to collect information and assess the situation of the accident.
- To know how to analyse the speed and tire slip of the vehicle to trace evidence of accident.

Unit 1: Motor Vehicle Accidents

- Accident scene. Sources of forensic information. Eyewitness accounts. Extent of vehicle damage. Visibility conditions. Photographs of accident site. Estimation of speed. Tire marks, skid marks, scuff marks. Maintenance of vehicles. Abandoned vehicles. Importance of air bags. Railway accidents.

Unit 2: Accident Analysis

- Pre-crash movement. Post-crash movement. Collision model. Gauging driver's re-action. Occupants's kinematics. Types of injuries resulting from accident. Biomechanics of injuries. Hit and run investigations. Trace evidence at accident sites.

Unit 3: Tachographs

- Forensic significance of tachograph data. Tachograph charts. Principles of chart analysis. Accuracy of speed record. Tire slip effects. Falsification and diagnostic signals. Route tracing.

Suggested Readings

- T.S. Ferry, Modern Accident Investigation and Analysis, Wiley, New York(1988).
- D. Lowe, The Tachograph, 2nd Edition, Kogan Page, London (1989).
- T.L. Bohan and A.C. Damask, Forensic Accident Investigation: Motor Vehi- cles, Michie Butterworth, Charlottesville (1995).
- S.C. Batterman and S.D. Batterman in Encyclopedia of Forensic Scienc- es, Volume 1, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), AcademicPress, London (2000).

OR

FORENSIC PSYCHOLOGY

Learning Objective: After studying this paper the students will know

- An overview of forensic psychology with its applications.
- The legal aspects of forensic psychology.
- The significance of criminal profiling.
- The importance of psychological assessment in gauging criminal behavior.
- The tools and techniques required for detection of deception.
- The critical assessment of advanced forensic techniques like polygraphy, narcoanalysis and brain electrical oscillation signatures.

Unit 1: Basics of Forensic Psychology

- Definitions and fundamental concepts. Psychology and law; Ethical issues in forensic psychology.
- Assessment of mental competency; Types of mental disorders.
- Psychology of evidence – eyewitness testimony, confession evidence. Criminal profiling.
- Psychology in the courtroom, with special reference to Section 84 IPC.

Unit 2: Psychology and Criminal Behavior

- Psychopathology and personality disorder. Psychological assessment and its importance. Serial murderers. Psychology of terrorism.
- Biological factors and crime – social learning theories, psycho-social factors, abuse.
- Juvenile delinquency – theories of offending (social cognition, moral reasoning),
- Child abuse (physical, sexual, emotional), juvenile sex offenders, legal controversies.

Unit-3:

- Criminal profiling. Understanding modus operandi. Investigative strategy.Violence prediction.

Unit 4: Detection of Deception

- Tools for detection of deception – interviews, non-verbal detection, statement analysis, voice stress analyzer, hypnosis.

Unit-5: Polygraphy

- operational and question formulation techniques, ethical and legal aspects, the guilty knowledge test.
- Narco analysis and brain electrical oscillation signatures – principle and theory, ethical and legal issues.

References:

1. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau. *Scientific Evidence in Civil and Criminal Cases*, 4th Edition, The Foundation Press, Inc., New York (1995).
2. Richard M Saferstein; *Criminalistics*, 8th Edition, Prentice Hall, New Jersey (2004).
3. J.C. DeLadurantey and D.R. Sullivan; *Criminal Investigation Standards*, Harper & Row, New York (1980).
4. E. Elaad in *Encyclopedia of Forensic Science, Volume 2*, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).
5. Forensic Psychology-Dennis Howitt
6. Forensic Psychology, New Trends and Innovations-Rajpal Kaur
7. Criminal Psychology-R.Mishra.

V Semester

Allied 5 - Pharmacology and Pharmaceutical Drug Analysis

Learning objective:

- To know about the basic concepts and kinetics of the drugs
- To know about the drug effects and interactions of commonly used drugs like NSAIDS, narcotics, sedatives and hypnotics.

UNIT I

Basic Concepts of Pharmacology

- Introduction
- Drug Receptor and Pharmacodynamics
- Development and Regulation of drugs

UNIT II

Pharmacokinetics

- Drug metabolism
- Adverse drug reactions and pharmacogenetics
- Drug concentration and pharmacological response
- Post mortem redistribution

UNIT III

Drugs

- Drug effects
- Drug Interaction
- Narcotic Drugs and Psychotropic Substance
- Schedule Drugs, International Classification, National Legislation, Nonscheduled
- Drugs, Designer Drugs analysis, Drugs of abuse, Doping Drugs analysis

UNIT IV

Analgesics (Opiates)

- Opiate Alkaloids, Identification, Quantification, Comparison, Analysis and Profiling by Immunoassays various chemical and instrumental techniques, Heroin and as- sociated Illicit Opiate formulation
- Non-opoid Analgesics Paracetamol and Acetylsalicylic Acid analysis
- Cannabis
- Introduction, Seized drug Identification of Herbal material, Identification of other materials like Hash and Hash Oil by Immunoassays, various chemical and instrumental techniques, Profiling of Cannabis
- Hallucinogens
- LSD (Lysergic Acid diethylamide), Mescaline, Psilocybin, Phencyclidine: Analysis by various chemical and instrumental techniques

UNIT V

Stimulants

- Cocaine: Identification of plant Material (alkaloids) by Immunoassays, Analysis by various chemical and instrumental techniques, Illicit Cocaine Analysis Amphetamines, Methamphetamines: Introduction, Extraction, Derivatization, Analysis by various techniques, Metabolic Profile, Impurity Profiling, Source Differ-entiation

Sedatives and hypnotics

- Barbiturates, Introduction, Classification, Analysis by various chemical and in- strumental techniques
- Benzodiazepines: Introduction and analysis of (Diazepam-Flunitrazepam-Metaz- epam-Nitrazepam-Meprobate-Methaqualone-Chloral Hydrate Zolepidem) by vari- ous chemical and instrumental techniques, Impurity profiling

Reference Books:

1. Klaassen, C. D.,:Casarett and Doull's Toxicology: The Basic Science of Poi-sons, 5th ed, McGraw-Hill, 1995.
2. Moffat, A.C.: Osselton, D. M. Widdop, B. : Clarke's Analysis of Drugs and Poisons in Pharmaceuticals, body fluids and postmortem material, 3rd ed.,Pharmaceutical Press2004.
3. Bogusz, M. J.: Hand Book of Analytical Separations, Vol. 2: Forensic Sci-ence, 1st ed., Elsevier Science, 2000.
4. Siegel, J.A., Saukko, P. J., Knupfer, G.,: Encyclopedia of Forensic Sciences(Vol3), Academic Press, 2000.
5. Rang, P.H., Dale, M.M., Ritter, M.J.: Pharmacology, 4th ed., Harcourt/Chur-chill Livingstone, 2000.
6. Paranjape, H.M., Bothara, G.K., Jain, M.M.: Fundamentals of Pharmacolo-gy, 1st ed., Nirali Prakashan, 1990

VI Semester

Core 16 - Forensic Anthropology

Course Outcomes

At the end of the course student should be able to

CO 1: Demonstrate the acquisition of comprehensive knowledge and skills related to forensic anthropology in identification of persons

CO 2: Demonstrate the acquisition of comprehensive knowledge and skills related to human bones

CO 3: Demonstrate the acquisition of comprehensive knowledge and skills related to somatoscopy and somatometry

CO4: Demonstrate the acquisition of comprehensive knowledge and skills required for facial reconstruction and its implication in forensic science.

Contents

Theory

Unit 1: Significance of Forensic Anthropology **9 Hrs**

- Scope of forensic anthropology. Study of human skeleton. Nature, formation, and
- identification of human bones.

Unit 2: Determination of age, sex, stature from skeletal material **9 Hrs**

Unit 3: Personal Identification – Somatoscopy **9 Hrs**

- Somatoscopy – observation of hair on head, forehead, eyes, root of nose, nasal bridge, nasal tip, chin, Darwin's tubercle, ear lobes, supra-orbital ridges, physiognomic ear breadth, circumference of head. Scar marks and occupational marks.

Unit 4: Personal Identification – Somatometry **9 Hrs**

- Somatometry – measurements of head, face, nose, cheek, ear, hand and foot, body weight, height.
- Indices - cephalic index, nasal index, cranial index, upper facial index.

Unit 5: Facial Reconstruction **9 Hrs**

- Portrait Parle/ Bertillon system. Photofit/identi kit. Facial superimposition techniques.
- Cranio facial super imposition techniques – photographic super imposition, video-superimposition, Roentgenographic superimposition. Use of somatoscopic and craniometric methods in reconstruction. Importance of tissue depth in facial re-construction.
- Genetic and congenital anomalies – causes, types, identification and their forensic significance.

Practicals

- To determine of age from skull and teeth.
- To determine of sex from skull.
- To determine sex from pelvis.

- To study identification and description of bones and their measurements.
- To investigate the differences between animal and human bones.
- To perform somatometric measurements on living subjects.
- To carry out craniometric measurements of human skull.
- To estimate stature from long bone length.
- To conduct portrait parley using photofit identification kit.

Practical Examination: (35 marks)

1. Identification of Long bones- Femur, Tibia Fibula, Humerus, Radius, ulna.
2. Determination of the side and measurement of Long bones for stature estimation
3. Determination of age from Skull and other bones.
4. Determination of sex from Skull, pelvis and sacrum.

Suggested Readings

1. M.Y. Iscan and S.R. Loth, The scope of forensic anthropology in, Intro- duction to Forensic Sciences, 2nd Ed., W.G. Eckert (Ed.), CRC Press, BocaRaton (1997).
2. D. Ubelaker and H. Scammell, Bones, M. Evans & Co., New York (2000).
3. S.Rhine, Bone Voyage: A Journey in Forensic Anthropology, University ofMexico Press, Mexico (1998).

VI Semester

Core -17- Forensic Toxicology

Course Outcomes:

At the end of the course student should be able to

CO1: Demonstrate the acquisition of comprehensive knowledge and skills related to forensic toxicology

CO2: Demonstrate the acquisition of comprehensive knowledge and skills related to handling of human samples

CO3: Demonstrate the acquisition of comprehensive knowledge and skills related to Narcotics, Drugs and Psychotropic Substances

Contents

Theory

Unit 1: Basics of Toxicology **9 Hrs**

- Significance of toxicological findings. Techniques used in toxicology. Toxicologicalanalysis and chemical intoxication tests. Postmortem Toxicology. Human performance toxicology. Dose-response relationship. Lethal dose 50 and effective dose 50.

Unit 2: Poisons - I **9 Hrs**

- Classification of poisons. Physicochemical characteristics and mode of action of poisons. Accidental, suicidal and homicidal poisonings. Signs and symptoms of common poisoning and their antidotes.

Unit 3: Poisons – II **9 Hrs**

- Collection and preservation of viscera, blood and urine for various poison cases. Identification of biocides and metal salts in body fluids. Metabolism and excretionof poisons. Application of immunoassays in forensic work. Animal poisons. Snake venom. Mode of action. Carbon monoxide poisoning. V

Unit 4: Poisons – III **9 Hrs**

- Vegetable poisons. Poisonous seeds, fruits, roots and mushrooms.
- Beverages. Alcoholic and non-alcoholic illicit liquors. Analysis and identification ofethyl alcohol. Estimation of ethyl alcohol in blood and urine. Proof spirit. Crime scene management in illicit liquor cases.

Unit 5: Narcotics, Drugs and Psychotropic Substances **9 Hrs**

- Nomenclature of narcotics, drugs and psychotropic substances. Broad classification – Narcotics, stimulants, depressants and hallucinogens. General characteristics andcommon example of each classification. Natural, synthetic and semi-synthetic narcotics, drugs and psychotropic substances.
- Designer drugs. Tolerance, addiction and withdrawal symptoms of narcotics, drugs and psychotropic substances Crime scene search for narcotics, drugs and psycho- tropic substances – searching a suspect, searching a dwelling, searching a vehicle. Clandestine drug laboratories. Collection and preservation of drug evidence. Testing of narcotics, drugs and psychotropic substances. Isolation techniques for purifying narcotics, drugs and

psychotropic substances – thin layer chromatography, gas-liquid chromatography and high performance liquid chromatography. Presumptive and screening tests for narcotics, drugs and psychotropic substances.Microcrystalline testing of drugs of abuse.

- Analysis of narcotics, drugs and psychotropic substances in breast milk, saliva, urine, hair and antemortem blood. Drugs and driving. Dope tests.
- Analysis of narcotics, drugs and psychotropic substances in postmortem blood. Postmortem changes affecting the analysis of narcotics, drugs and psychotropic substances.

Practicals

- To identify biocides.
- To identify metallic poisons.
- To identify organic poisons.
- To identify ethyl alcohol.
- To identify methyl alcohol.
- To carry out quantitative estimation of ethyl alcohol.
- To prepare iodoform.
- To identify drugs of abuse by spot tests.
- To perform color tests for barbiturates.
- To separate drugs of abuse by thin layer chromatography.

Practical examination (35 marks)

1. Color tests for drugs (15 marks)
2. spot tests (10 marks)
3. TLC (10 marks)

Suggested Readings

1. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
2. F.G. Hofmann, A Handbook on Drug and Alcohol Abuse, 2nd Edition, Ox-ford University Press, New York (1983).
3. S.B. Karch, The Pathology of Drug Abuse, CRC Press, Boca Raton (1996).
4. A. Poklis, Forensic toxicology in, Introduction to Forensic Sciences, 2ndEdition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
5. A.W. Jones, Enforcement of drink-driving laws by use of per se legal alco-hol limits: Blood and/or breath concentration as evidence of impairment, Alcohol, Drug and Driving, 4, 99 (1988).
6. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

VI Semester

Core-18 – Forensic Ballistics

Course outcomes:

At the end of the course the student should be able to

CO1: Demonstrate the acquisition of comprehensive knowledge and skills related to the firearms

CO2: Demonstrate the acquisition of comprehensive knowledge and skills about the ammunition and firearm evidences

CO3: Demonstrate the acquisition of comprehensive knowledge and skills about the nature of firearm injuries and gunshot residue.

Theory

Unit 1: Firearms **9 Hrs**

- History and development of firearms. Classification of firearms. Weapon types and their operation. Firing mechanisms of different firearms.

Unit 2: Ballistics **9 Hrs**

- Internal ballistics – Definition, ignition of propellants, shape and size of propellants, manner of burning, and various factors affecting the internal ballistics: locktime, ignition time, barrel time, erosion, corrosion and gas cutting.
- External Ballistics – Vacuum trajectory, effect of air resistance on trajectory, basedrag, drop, drift, yaw, shape of projectile and stability, trajectory computation, ballistics coefficient and limiting velocity, Measurements of trajectory parameters,introduction to automated system of trajectory computation and automated management of ballistic data.
- Terminal Ballistics – Effect of projectile on hitting the target: function of bullet shape, striking velocity, striking angle and nature of target, tumbling of bullets, effect of instability of bullet, effect of intermediate targets, influence of range. Ricochet and its effects, stopping power.

Unit 3: Ammunition **9 Hrs**

- Types of ammunition. Constructional features and characteristics of different types of cartridges and bullets. Primers and priming compounds. Projectiles. Headstampmarkings on ammunitions. Different types of marks produced during firing processon cartridge – firing pin marks, breech face marks, chamber marks, extractor andejector marks.

Unit 4: Firearm Evidence – I **9 Hrs**

- Matching of bullets and cartridge cases in regular firearms. Identification of bullets, pellets and wads fired from improvised, country made firearms. Automated method of bullet and cartridge case comparison. Determination of range of fire andtime of fire.

Unit 5: Firearm Evidence – II **9 Hrs**

- Mechanisms of formation of gunshot residues. Methods of analysis of gunshot residues from shooting hands and targets, with special reference to clothings.
- Identification and nature of firearms injuries. Reconstruction with respect to accident, suicide, murder and self defense.

Practicals

- To describe, with the aid of diagrams, the firing mechanisms of differenttypes of firearms.
- To correlate the velocity of bullet with the impact it produces on the tar-get.
- To correlate the striking angle of the bullet with the impact on the target.
- To estimate the range of fired bullets.
- To carry out the comparison of fired bullets.
- To carry out the comparison of fired cartridge cases.
- To identify gunshot residue.
- To correlate the nature of injuries with distance from which the bullet was fired.
- To differentiate, with the aid of diagram, contact wounds, close range wounds and distant wounds.

Practical Examination (35 marks)

1. Test Firing System (10 marks)
2. GSR analysis (20 marks)
3. Wound ballistics (10 marks)

Suggested Readings

1. B.J. Heard, Handbook of Firearms and Ballistics, Wiley and Sons, Chiches-ter (1997).
2. W.F. Rowe, Firearms identification, Forensic Science Handbook, Vol. 2, R. Saferstein (Ed.), Prentice Hall, New Jersey (1988).
3. A.J. Schwoeble and D.L. Exline, Current Methods in Forensic Gunshot Resi-due Analysis, CRC Press, Boca Raton (2000).
4. E. Elaad in Encyclopedia of Forensic Science, Volume 2, J.A. Siegel, P.J.Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

VI Semester
Elective 2-DNA typing

Learning Outcomes: After studying this paper the students will know –

- The basic principle of DNA analysis.
- The forensic significance of DNA typing.
- The importance of short tandem repeats and restriction fragment length polymorphism in DNA technique.
- Role of DNA typing in parentage testing.

Unit 1: Basic Principles

- DNA as biological blueprint of life. Extraction of DNA for analysis. Quantitation of DNA – yield gel quantitation and slot blot quantitation. Mitochondrial DNA – sequence analysis.

Unit 2: Forensic DNA Typing

- Collection of specimens. Polymerase chain reaction – historical perspective, sequence polymorphisms, individualization of evidence.
- Short tandem repeats (STR) – role of fluorescent dyes, nature of STR loci. Restriction fragment length polymorphism (RFLP) – genetic markers used in RFLP,typing procedure and interpretation of results.
- Touch DNA.

Unit 3: Parentage Testing

- Principles of heredity. Genetics of paternity. DNA testing in disputed paternity.
- Mandelian laws of parentage testing. Mathematical basis of parentage identification.
- Missing body cases. Reference populations and databases.
- Report Writing: Role of DNA typing in identifying unrecognizable bodies.
- Allele frequency determination. Hardy-Weinberg law. Probability determination in
- a population database.

Suggested Readings

1. J.M. Butler, Forensic DNA Typing, Elsevier, Burlington (2005).
2. K. Inman and N. Rudin, An Introduction to Forensic DNA Analysis, CRCPress, Boca Raton (1997).
3. H. Coleman and E. Swenson, DNA in the Courtroom: A Trial Watcher's Guide, GeneLex Corporation, Washington (1994).
4. W.J. Tilstone, M.L. Hastrup and C. Hald, Fisher's, Techniques of Crime Scene Investigation, CRC Press, Boca Raton (2013).

SEMESTER-VI

Allied 6 - Digital Forensics

Learning Objective: After studying this paper the students will know –

- The basics of digital forensics.
- The cases which fall under the purview of digital crimes.
- The types of digital crimes.
- The elements involved in investigation of digital crimes.

Theory Contents

Unit 1: Fundamentals and Concepts

- Fundamentals of computers Hardware and accessories – development of hard disk, physical construction, CHS and LBA addressing, encoding methods and formats. Memory and processor. Methods of storing data. Operating system. Software.
- Introduction to network, LAN, WAN and MAN.

Unit 2: Computer Crimes

- Definition and types of computer crimes. Distinction between computer crimes and conventional crimes. Reasons for commission of computer crimes. Breaching security and operation of digital systems. Computer virus, and computer worm – Trojan horse, trap door, super zapping, logic bombs.
- Types of computer crimes – computer stalking, pornography, hacking, crimes related to intellectual property rights, computer terrorism, hate speech, private and national security in cyber space.
- An overview of hacking, spamming, phishing and stalking.

Unit 3: Computer Forensics Investigations

- Seizure of suspected computer. Preparation required prior to seizure.
- Protocol to be taken at the scene. Extraction of information from the hard disk. Treatment of exhibits. Creating bitstream of the original media. Collection and seizure of magnetic media. Legal and privacy issues. Examining forensically sterile media. Restoration of deleted files. Password cracking and E-mail tracking. Encryp tion and decryption methods. Tracking users.

Suggested Readings

1. R.K. Tiwari, P.K. Sastry and K.V. Ravikumar, Computer Crimes and Computer Forensics, Select Publishers, New Delhi (2003).
2. C.B. Leshin, Internet Investigations in Criminal Justice, Prentice Hall,New Jersey (1997).
3. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).
4. E. Casey, Digital Evidence and Computer Crime, Academic Press, London(2000)