

SRI BALAJI VIDYAPEETH

(Deemed to be University Declared u/s 3 of UGC act 1956)

Accredited by NAAC with A' Grade

Pondicherry - 607 402.

www.sbv.ac.in

**MAHATMA GANDHI MEDICAL COLLEGE & RESEARCH
INSTITUTE, PONDICHERRY**



FACULTY OF ALLIED HEALTH SCIENCES

B.Sc. BLOOD BANKING TECHNOLOGY

2019 -2020 ONWARDS

FIRST, SECOND & THIRD YEAR SYLLABUS AND REGULATIONS

CHOICE BASED CREDIT SYSTEM (CBCS) PATTERN SYLLABUS

(As approved in the Academic Council at the meeting held on 22-05-2019)

Revisit of the syllabus and Examination pattern

(As approved in the Academic Council at the meeting held on 28-09-2020)

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FOREWORD

In recent years, several innovative and need based undergraduate courses in the realms of Faculty of Allied Health Sciences have been promulgated. These courses are primarily oriented towards augmenting the Core academic courses in the Health Care sector.

Although, Allied Health Science courses are in place at several institutes county wide, mention must be made of the fact that only a few Health Science Universities offer courses in Allied Health Sciences under a holistic umbrella. It is in the fitness of things that Allied Health Science courses are being offered in Nodal and Thrust areas at Sri Balaji Vidyapeeth starting from Certificate programme through Doctoral studies.

The Undergraduate programme of Allied Health Science courses leading to B.Sc degree has been very carefully planned taking all the three components into due consideration, namely academics, patient care and research. Competency assumes great importance as the graduates coming out of these programmes would either directly or indirectly assist the Clinicians in day to day activities.

With this in view, the thrust has been laid on a common syllabus for all B.Sc programmes during the first year of study. These subjects offered in the first year are oriented Basic Medical Sciences, besides English as a mode of communication which is vital for affording Global Placements to our successful candidates. Furthermore all programmes are designed in Choice Based Credit System (CBCS) made to suit the convenience of the students. The proficiency and competence of the Undergraduates is fortified by the promulgation of a unique internship cum research programme.

I wish all students success in their studies and career.

Prof. N. Ananthakrishnan

Dean - Faculty, SBV

POLICY ON COURSES OFFERED UNDER FACULTY OF ALLIED HEALTH SCIENCES

PREAMBLE

Sri Balaji Vidyapeeth, Deemed to be University, established under Section 3 of UGC Act, 1956, Accredited by NAAC with A Grade offers various courses under the Faculty of Medicine, Faculty of Dentistry, Faculty of Nursing Sciences and Faculty of Allied Health Sciences.

"Allied Health Professions are a distinct group of health professionals who apply their expertise to prevent disease transmission, diagnose, treat and rehabilitate people of all ages and all specialties. Together with a range of technical and support staff they may deliver direct patient care, rehabilitation, treatment, diagnostics and health improvement interventions to restore and maintain optimal physical, sensory, psychological, cognitive and social functions." - Organization of International Chief Health Professions Officers (ICHPO).

In March 2011, the Ministry of Health and Family Welfare nominated the Public Health Foundation of India (PHFI) as its technical partner and constituted the National Initiative for Allied Health Sciences (NIAHS) secretariat with a mandate to develop a framework to improve allied health training, education and regulation in the country. (Yet to be notified by Government of India).

Sri Balaji Vidyapeeth has introduced several innovative need based courses under the Faculty of Allied Health Sciences at Undergraduate and Postgraduate levels keeping in mind the initiative of Ministry of Health & Family Welfare, Government of India. In an era marked by expanding global job opportunities, these courses are bound to create an awareness among the students to suit themselves in the Health Care Team. Curricula have been designed in an objective manner and are aimed at cognitive, affective and psychomotor domains of learning. Furthermore all courses are designed in Choice Based Credit System (CBCS) made to suit the convenience of the students.

The Undergraduate courses mainly concentrate in creating professionals who form the part of the Health Care Team. The role of these professional is to ably assist the doctor in treatment as well as prognosis and in many a times form the core professional of the team. The proficiency and competence of the Undergraduates is fortified by the promulgation of a unique internship cum research programme.

The Postgraduate courses mainly aim at shaping a graduate into a full professional. Also these postgraduate courses help the graduates as well as the postgraduates to acquire specific skills on various adjunct therapies and techniques.

SUPPLY AND DEMAND

The starting of the new courses will entirely depend on

- a. Demand for the course as seen by the enrolment at other institutes.
- b. Employability after the qualification.

At present, the shortage of quality human resources is one of the major challenges faced by the public health domain in India. To redress the imbalance in human resources, the Working Group on Medical Education Training and Manpower Training of the Planning Commission (1984) prioritized training of para-professional and auxiliary personnel as follows:

- Training and development of auxiliary health professionals
- Training and development of para-health professionals
- Basic and pre-service/induction training in health care and health management
- Continuing education in health profession education.

Many new health occupations (Physician's Assistant, Optometrists, Medical Imaging Technologists, and Laboratory Technologists etc) have access over several common features in Allied Health Sciences including Basic Medical Sciences which are being effectively addressed. These processes have received support from administrators who are constantly searching for economic qualified and quality labor.

Service users are becoming more empowered through the consumerism of health, which has resulted in better access to information and user-consultation in service development and delivery. Each of these factors has the potential to influence the roles of existing professional groups and presents a challenge to workforce planners. In India, students are not aware of all the allied health courses available in the medical education system. Their career choices are generally influenced by their parents and peer groups, who themselves are unaware of the prospects in this area. By understanding that an entry-level position is just a first step, youth can realistically plan for their future and have a better understanding of what is needed for long-term success. This approach also benefits employers who need a steady inflow of workers at all levels of their organization.

POLICY ON ELIGIBILITY, ADMISSION, & COURSE DURATION OF UG DEGREE COURSES

At Sri Balaji Vidyapeeth, we empower the departments of all the constituent colleges to contribute to the development of innovative, need, value based and job oriented courses taking into considerations the interests of the stakeholders.

The Undergraduate Degree courses (B.Sc.) are presently being offered under the Choice Based Credit System (CBCS) mode as per the Guidelines of UGC. The duration of the course will be Three years with a compulsory internship of 1 year (Non Stipendiary) in any of the tertiary health care institute of the University/ Trust. The proficiency and competence of the Undergraduates is fortified by the promulgation mandatory for appearing at the University Examinations. The maximum time limit for completion of the course will be Six years. However, the Dean / Principal, AHS has the discretionary powers to extend the course duration on valid grounds (Health, Maternity, Natural Disaster, etc.).

The First year of B.Sc. (AHS) courses will be common for all the disciplines. Though the disciplines will be provisionally allotted at the time of admission itself, upon

successful completion of the First year the candidates may opt for a change in the discipline or the college which will be permitted depending on the vacancy and on merit based on the First year marks.

Fourth year - Internship Programme

One-year compulsory internship in various intensive care units, outpatient departments, research center under Sri Balaji Vidyapeeth during which the students get to hone the skills and knowledge acquired in the three years of study. This year ensures their readiness to approach a patient in any setting. The students should also complete a short duration project (in their areas of interest) and also maintain and submit a log book. The degree will be awarded only upon the successful completion of the course including the internship period. The one-year compulsory internship includes postings at the respective department.

Eligibility for Admission

A candidate seeking admission in the B.Sc. Allied Health Sciences courses shall be completing the age of 17 years as on December of the admission year. The candidate shall have passed the Higher Secondary Examinations conducted by the State Board or the Central Board or its equivalent. The candidate should have studied English as one of the papers and passed the same. The candidate should have had Biology, Physics & Chemistry and have passed the same in their qualifying Examinations. Mathematics as a subject is mandatory for B.Sc. Optometry, Medical Imaging Technology and Clinical Research.

The candidate should have secured 50 percent as aggregate in the subjects of English, Biology, Physics and Chemistry at the Higher Secondary Examinations. A relaxation of 5 percent in the minimum required (50%) shall be awarded to the candidates belonging to SC/ ST communities and physically challenged candidates (Disability more than 40%). The candidates seeking relaxation should necessarily submit the relevant certificates issued by the concerned Government authorities while applying for the course and mention about the same in their application.

Lateral Entry

Candidates who have Diploma of Two years in the concerned subject from a recognized University can seek Lateral Entry to the second year of the concerned courses provided that they have studied Anatomy, Biochemistry, Physiology, Microbiology and Pathology as individual papers during their Diploma Course.

Note: The candidates who have completed their Diploma Course through Distance Education modes are not eligible to seek admission through Lateral Entry mode.

Shorter intrinsic training programmes of duration few weeks to a month or so will be conducted by the departments under the Supervision of the concerned HOD / Dean / Principal.

POLICY ON CHANGE OF NAME/DATE OF BIRTH

The name and date of birth of candidates will be registered in the records of the University as given in their H.S.C. Mark Statement/Transfer Certificate only. No request will be considered later, to correct the spelling of the name of the candidates.

The parents and candidates are requested to verify and confirm these entries in the H.S.C. Mark Statement / Transfer Certificate at the time of receipt of the same. Once admitted to a course of study in the University, date of birth as furnished in the HSC/School record of student and submitted to the University at the time of admission, shall be taken as final proof and no subsequent request for change of date of birth will be entertained by the University at any time under any circumstance, either during the course of study or after the completion of such study. The student should take utmost care while entering their details in SBV GARUDA portal at the time of their registration. They are responsible for any data mismatch at later stage.

Every student shall give an undertaking to this effect duly countersigned by his/her parent or guardian at the time of admission.

PAYMENT OF TUITION AND OTHERFEES

Every student shall pay tuition fee and other fee, as prescribed by the University, within the due date notified. The fees are subject to revision as per rules of the University. All fees, once paid to the University, will not be refunded or adjusted for any other purpose under any circumstance.

RULES FOR DISCONTINUANCE FROM COURSE OF STUDY

Where any student applies for discontinuance, or without any application discontinues on his/her own, from the course to which he/she has been admitted to, for any reason, either after the cut-off date prescribed by the statutory authorities/ University for admission to the first year of the course concerned or where the seat is rendered vacant without having any chance of being filled up with any other candidate from waiting list etc., such students will have to remit the tuition fee and other applicable fees for the '**Entire/Remaining Course Period**'. Unless and until payment of all the prescribed fees for the entire/remaining course period is made to the University account, such student shall not be entitled to any certificate including transfer certificate, mark sheets etc., to be issued by the College/ University and to get back his/her original certificates deposited with the University at the time of admission. All students and parent will be required to furnish a declaration agreeing to the above said conditions at the time of admission.

POLICY ON RAGGING

Ragging is strictly prohibited in the University Campus. Sri Balaji Vidyapeeth strictly enforces anti-ragging measures and the campus is free from any form of ragging. Any violation will be dealt with according to the law in force and as per directives of the Supreme Court of India. The University has adopted the –Medical Council of India (Prevention and Prohibition of ragging in Medical College / Institutions) Regulations, 2009 and –UGC Regulations on curbing the menace of Ragging in Higher Educational

Institutions, 2009II and these Regulations shall be applicable to all students. These Regulations are available in the University Website.

IMPORTANT NOTE

All admissions are subject to fulfillment of all the prescribed eligibility conditions by the candidate. If it is found either at the time of admission or at a later stage, that the candidate has given false information/forged certificates or concealed material information, his/her admission shall be cancelled and the student shall be dismissed from the college immediately.

The University reserves the right to change the curriculum, course structure and the rules relating to admission, examinations, fee structure, refunds, etc.

All disputes arising in the interpretation and implementation of the provisions will be referred to the Vice-Chancellor of Sri Balaji Vidyapeeth and Vice-Chancellor's decision shall be final and binding.

In respect of matters relating to or arising out of this prospectus the jurisdiction shall lie in Puducherry alone.

FUTURE PLANS

It is planned to conduct an informal market survey and start AHS Certificate & M.Sc courses.

OUTLINE OF THE CHOICE BASED CREDIT SYSTEM (CBCS) FOR UNDERGRADUATE DEGREE PROGRAMME

Credit System Credit System (CBCS): The CBCS provides choice for students to select from the prescribed courses (core, elective or minor or soft skill courses). This is to enhance the quality and mobility of the students within and between the Universities in the country and abroad.

Credit hours

16 Theory classes = 1 credit

32 Practical/Tutorial/Clinical training/Research project = 1 credit

Subjects	Credits
Each core subjects	6 Credits
Ability Enhancement Compulsory course (AECC)	2 Credits
Skill Enhancement course (SEC)	2 Credits
Generic Elective course (GE)	4 Credits
Discipline Electives (DE)	4 Credits

Core course: A Hard core course may be a Theory, Practical (lab), clinical rotation/field work or Research Project Work which are compulsory component studied by candidate to complete the requirement of their programme.

Discipline Elective (DE) Course: An elective course which is supportive or related to the discipline/subject (i.e. supportive to core course) is called a Discipline Elective (DSE) Course.

Generic Elective (GE) Course: An elective course which is unrelated to the discipline/subject (i.e. unrelated to core course) to expand their knowledge chosen by a candidate is called a Generic Elective.

Skill Enhancement Courses (SEC): This course chosen by candidate which provides additional value-based and skill-based knowledge to increase their employability.

NPTEL/ SWAYAM / MOOC/ Other value-added online courses

COLLEGES	PROGRAMMES WHICH INVOLVE CREDIT TRANSFER
Mahatma Gandhi Medical College and Research Institute & Shri Sathya Sai Medical College and Research Institute	B. Sc. (AHS)

Each Undergraduate student of B.Sc (AHS) is recommended to earn a minimum of **EIGHT credits** from the online courses offered through SWAYAM - NPTEL - MOOCs platform during their Course period. It is to be noted that the student earns the credit prior to the starting of their internship.

PROGRAMME	DESIRABLE CREDITS	NUMBER OF COURSES
B.Sc. (AHS)	Minimum - 8 credits	Minimum - 4 Maximum - 6

It is required of the Undergraduate students (B.Sc - AHS) that in addition to their curricular requirement of the programme, it is recommended for enhancing job opportunities for the student to earn minimum of prescribed credits from the online courses offered through SWAYAN - NPTEL - MOOCs platform that will be transferred into the students' Statement of Marks, issued during the final year of their study. This has to be completed prior to the starting of their internship programme and students have to be informed that **those who do not earn the minimum credits prescribed by SBV, it will be mentioned NIL for the details on credits transferred from ONLINE courses in their FINAL year statement of marks issued by SBV.**

Credit points during Internship

For the 16 UG Internship programmes, there is a Minimum of 40 Credit points to a maximum of 45 Credit points which the students have to obtain. Credit points will be assessed based on the student's satisfactory attendance, performance in the Clinical /Camp postings / Seminars /Presentation of the logbook & Research project.

CRITERIA FOR UNIVERSITY EXAMINATIONS

Eligibility / Maximum Duration for the Award of the Degree

- a) The candidates shall be eligible for the bachelor degree when they have undergone the prescribed course of study for a period of not less than four years (3 Years + 1 Year Internship) in an institution approved by the university and have passed the prescribed examination in all subjects.
- b) A student who does not meet the minimum attendance requirement in a year must compensate the inadequacies before appearing examination.

To reaffirm the passing minimum in the University Examinations for all the Undergraduate courses offered under the Faculty of Allied Health Sciences.

- A candidate shall secure a minimum of 50% aggregate in University Core theory/ Elective theory Exams and Internal Assessment put together.
- A candidate shall secure a minimum of 50% aggregate in University Practical and Internal Assessment put together.
- For Skill based electives, a candidate shall secure a minimum of 50% aggregate in University Practical cum Viva Exams and Internal Assessment put together.

Retotaling / Revaluation and Grace Mark

There is no provision for **Retotaling / Revaluation for AHS programme.**

Grace marks up to a maximum of five marks may be awarded at the discretion of the university to a student who has failed and shall be distributed among the failed subjects.

SCHEME OF EXAMINATION

- 1) **Attendance Requirements:** 80% hours of learning in each Core Subjects / Electives / Practical's / Postings for appearing for the university exams.
- 2) **Minimum marks required to be eligible for University Examination:** 35% marks in the internal assessment (Theory / Practical) are required for the candidate to be eligible to appear in the University Examinations.
- 3) **Passing Minimum:** 50% aggregate both in theory and practical's including internal assessment marks is required for a candidate to pass in the University Examinations.
- 4) **Submission of Record Note Books for practical examinations**
Candidates appearing for practical examinations should submit bonafide Record Note Books prescribed for practical examinations, otherwise the candidates shall not be permitted to appear for the practical examinations.

GRADING

Marks obtained by candidate	Equivalent grade letter	Grade descriptor	Grade point
85 % & above	O	Outstanding	10
75-84	A+	Excellent	9
65-74	A	Very good	8
60-64	B+	Good	7
55-59	B	Above average	6
50-54	C	Average pass	5
49 & below	F	Reappear	0
	AB	Absent	0

A student obtaining **Grade F** shall be considered failed and will be required to reappear in the examination.

Conversion formula for Percentage to CGPA

Percentage divided by 9.5 = CGPA

Award of Class

Class division will be based on CGPA grade

- ≥ 7.8 grade point = Distinction Division
- ≥ 6.8 and < 7.7 grade point = First class Division
- ≥ 6.3 and < 6.7 grade point = Second class Division
- ≥ 5.2 and < 6.2 grade point = Third class Division
- < 5.2 and below - Fail

Computation of SGPA and CGPA will be in accordance with the UGC Guidelines & Recommendations. It is a measure of overall cumulative performance of a student over all exams. The CGPA is the ratio of total credit points secured by a student in various courses in all exams and the sum of the total credits of all courses in all the University exams. It is expressed up to two decimal places.

Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all exams. The CGPA is the ratio of total credit points secured by a student in various courses in all exams and the sum of the total credits of all courses in all the University exams. It is expressed up to two decimal places.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Transcript: Based on the credits earned, a transcript shall be issued to all the registered students after the completion of the program indicating the hours of study and structure of the curriculum delivery as prescribed in his/her curriculum and completed by the student. The transcript will display the course details, including course code, title, and number of credits, hours and type of contact hours in a semester.

INTERNAL ASSESSMENT

1. Continuous Internal Assessment (CIA) for all AHS programs with a minimum of 4 Assessments per year.
2. Internal Assessment will be done in each subject according to the scheme of examinations. The IA marks will be on the basis of performance in the assignment, class tests and practical test in the clinical areas.

Evaluation of Clinical Rotation

Lab, Clinical cum Community postings - To conduct practical's or viva based on the Heads of the concerned department's decision and the total 100 marks to be sent to COE through proper channel to find a place in the transcript.

Question Paper Pattern

The following question paper patterns shall be followed for CBCS pattern syllabi for the candidates admitted from the academic year 2019-20 onwards.

CORE SUBJECTS

For **UG NON-SEMESTER COURSES** - Each Core Subjects University Exam carries -100 marks of 80(Theory) + 20 (IA marks) which consists of

Theory - 80 marks			
I	Essay-type questions of either / or type -(like 1.a (or) 1.b)	2 (of either / or type)	2 x 10=20
II	Short answer questions	6 (*1 choice)	5 x 6=30
II	Very Short answer questions	12 (*2 choice)	10 x 3=30

The University duration of 80 marks - 3 Hours For courses having Section A & Section B Subjects

For **Section A & Section B Subjects** University Exam carries - 50 marks for each Section consisting of 40 (Theory marks) + 10 (IA marks)

Theory - 40 marks			
I	Essay-type questions of either / or type -(like 1.a (or) 1.b)	1 (of either / or type)	1 x 10 = 10
II	Short answer questions	5 (*2 choice)	3 x 6= 18
II	Very Short answer questions	5 (*1 choice)	4 x 3 = 12

ELECTIVE SUBJECTS

For all UG NON SEMESTER **COMPULSORY, GENERIC & DISCIPLINE** Elective University Exam papers carries- 50 marks of 40 (Theory)+10 (IA marks) which consists of

Theory - 40 marks			
I	Short answer questions	5 (*3 choice)	5 x 6=30
II	Very Short answer questions	5 (*2 choice)	5 x 2=10

* Number of choices given

- For **SKILL BASED ELECTIVES** from 2019-20 batch onwards all UG AHS courses will have 40 marks as university Practical cum Viva examination & 10 marks as Internal Assessment = 50 marks.
- 50 marks of the **COMPULSORY, GENERIC, DISCIPLINE & SKILL BASED ELECTIVES** which will be converted to 100 marks in the transcript.

CONDONATION FOR SHORTAGE OF ATTENDANCE

Condonation of shortage of attendance in aggregate up to 10% in each Year may be granted by the college Academic Committee and as per regulations of university.

PROGRAM OUTCOME (PO) - B.SC BLOOD BANKING TECHNOLOGY

At the end of the 3 year of training under graduates of Blood Bank Technologist Should be able to

BBT -PO1: Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E- library.

BBT -PO2: To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.

BBT -PO3: Understanding the structure and functions of different organs in normal human body.

BBT -PO4: To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.

BBT -PO5: Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.

BBT -PO6: Understanding of blood bank department and organization in a hospital

BBT -PO7: To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.

BBT -PO8: To Learns the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion- transmission infections

BBT PO9: Understand the basic concepts of hematology and blood components in detail

BBT -PO10: Understand the immune hematological tests

BBT -PO11: To learn the transfusion therapy and newly advanced blood bank equipment's require for process

BBT -PO12: Understand Quality control, Quality policy, quality manual, Internal and external audit and process control

BBT PO13: Understand stem cell preparation, recent advances in blood banking and apheresis

BBTPO14: To identify various life style disorders and with due counseling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy

I YEAR

FACULTY OF ALLIED HEALTH SCIENCES

SRI BALAJI VIDYAPEETH

(Deemed to be University)

Accredited by NAAC with 'A' Grade

COMMON SYLLABUS FOR ALL FIRST YEAR B.Sc. ALLIED HEALTH SCIENCES

CORE SUBJECTS

1. Anatomy
2. Physiology
3. Biochemistry
4. Pathology & Microbiology

ELECTIVES

Ability Enhancement compulsory course (AECC)

1. English

Skill enhancement course (SEC) - Choose any TWO

1. Culinary Skills for optimal nutrition
2. Enhancing soft skill & personality
3. Basics of Yoga & Practice
4. Speaking effectively

Generic Elective Course (GEC) - Choose any ONE

1. Basics of Hospital Administration
2. Counseling and Guidance
3. Lifestyle Disorders

SCHEME OF CREDIT BASED ACADEMIC CURRICULUM

Faculty Code	Category	Course Title	Hours					Credits				
			Theory	Practical	Tutorials	Lab training	Total hours	Lecture (L)	Practical	Tutorials	Lab training	Credits
AHS	Core theory CCT	Subjects										
AHS	CCT-1	Anatomy	80		32			5		1		6
AHS	CCT-2	Physiology	80		32			5		1		6
AHS	CCT-3	Biochemistry	80		32			5		1		6
AHS	CCT-4	Pathology	40		16			5		1		6
AHS		Microbiology	40		16							
AHS	Lab training CCT 1 to 4					192					6	6
AHS	AECC	English	16	34				1	1			2
AHS	SEC - 1-3	Student's choice	16	32				1	1			2
AHS	SEC - 1-3	Student's choice	16	32				1	1			2
AHS	GEC 1-3	Student's choice	64					4				4
			432	98	128	192	850	27	3	4	6	40

SCHEME OF EXAMINATION AHS - I YEAR BASIC SCIENCES

Papers	Subject	Theory		Practical		Theory	Practical	Grand Total (900)	Min marks to pass % (450)
		UE	IA	UE	IA	UIA*	UIA*		
CCT-1	Anatomy	80	20					100	50
CCT-2	Physiology	80	20					100	50
CCT-3	Biochemistry	80	20					100	50
CCT-4	Pathology	40	10					100	50
	Microbiology	40	10						
CCT -LT	Lab training Core 1 to 4						100	100	50
AECC	Ability enhancement Compulsory Course- English	80	20					100	50
SEC	Skill enhancement Course	80	20					100	50
SEC	Skill enhancement Course	80	20					100	50
GEC	Generic elective	80	20					100	50

***UIA - University Internal Assessment only for Lab Trainings (No Final University Examination).**

Passing criteria -50 % aggregate both in theory and practical's including internal assessment marks

For all elective course, 40 marks for university theory and Practical cum Viva examination & 10 marks as Internal Assessment = 50 marks which will be converted to 100 marks in the transcript

ANATOMY

SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES - ANATOMY

NAME OF THE SUBJECT PAPER	: ANATOMY
DURATION OF THEORY CLASSES	: 80 Hrs
DURATION OF TUTORIAL SESSIONS	: 32 Hrs
DURATION OF LAB TRAINING	: 40 Hrs
EXAMINATION	: 100 Marks (80 U + 20IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 3 Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of the normal structure of human body and its functions. To ensure that the students understand the alteration in anatomical structure and function in disease in the practice of accident and emergency care technology.

OBJECTIVES

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

1. Describe the anatomical terms, organization of human body and structure of cell, tissue, membranes and glands.
2. Describe the structure and functions of bones and joints.
3. Describe the structure and functions of systems in body. Have knowledge about Applied Anatomy

COURSE OUTCOMES FOR ANATOMY

At the end of the course, students will be able to...

AN-AHS-CO1: Explains the Gross and Microscopic structure of human body.

AN-AHS-CO2: Explains the normal structure and integration of the functions of the organs and systems on basis of the structure of Human body.

AN-AHS-CO3: Explains the clinical correlation of the organs and structures involved and interprets the anatomical basis of the disease presentations.

AN-AHS-CO4: Knows about the General development of human body.

AN-AHS-CO5: Outlines the knowing of the hard & soft structures of the body.

UNIT	TITLE	THEORY + TUTORIALS (80 + 32)HOURS
I	<p>(a) INTRODUCTION TO HUMAN BODY AS AWHOLE</p> <ul style="list-style-type: none"> • Terms of location, positions and planes • Cell and its organelles • Epithelium - Definition, classification, description with examples and functions. • Glands-Classification, description of Serous and Mucous glands with examples. • Basic tissues - Classification with examples. <p>(b) LOCOMOTION AND SUPPORT</p> <ul style="list-style-type: none"> • Cartilage - Different types with examples and Histology. • Bone - Classification, Names of bone cells, parts of Long bone, Microscopy of Compact bone, Names of all bones, Vertebral column, Intervertebral disc, Fontanelles of Fetal Skull. • Joints-Classification of Joints with examples, Synovial Joints (in detail for Medical Imaging Technology students) • Muscular system: Classification of Muscular tissue and histology. • Names of the muscles of the body. 	20 + 8
II	<p>UNIT (a) CARDIO VASCULAR SYSTEM</p> <ul style="list-style-type: none"> • Heart Size, Location, Chambers - Exterior & Interior - conducting System and Valves • Blood supply of heart • Systemic & Pulmonary circulation • Branches of Aorta, Common Carotid artery, Subclavian artery, Axillary artery, Brachial artery, Superficial Palmar arch, Femoral artery and Internal Iliac artery. • Peripheral pulse • Inferior Venacava, Portal vein and Porto systemic anastomosis. • Great Saphenous vein • Dural Venous Sinuses • Lymphatic System - Cisterna Chyli and Thoracic duct. • Names of regionallymphatics, axillary and inguina lymph nodes in brief. <p>(b) RESPIRATORY SYSTEM</p> <ul style="list-style-type: none"> • Parts of Respiratory System, Nose, Nasal Cavity, Larynx, Trachea, Lungs, Broncho pulmonary segments • Histology of Trachea, Lung and Pleura • Names of Para nasal air sinuses 	20 + 5
III	<p>(a) GASTRO- INTESTINAL SYSTEM - (10 +5hrs)</p> <ul style="list-style-type: none"> • Parts of GIT, Oral cavity (Tongue, Tonsil, Dentition, Pharynx, Salivary glands, Waldeyer's ring) • Oesophagus, Stomach, Small & Large Intestine, Liver, Gall Bladder, Pancreas <p>(b) URINARY SYSTEM - - (5hrs)</p> <ul style="list-style-type: none"> • Kidney, Ureter, Urinary bladder, Male & Female Urethra 	10 + 5

IV	<p>(a) REPRODUCTIVE SYSTEM - (10 +2hrs)</p> <ul style="list-style-type: none"> • Parts of Male Reproductive system, Testis, Vas deferens, Epididymis, Prostate • Parts of Female Reproductive System, Uterus, Fallopian tubes, Ovary • Mammary gland <p>(b) ENDOCRINE GLANDS - (5hrs)</p> <ul style="list-style-type: none"> • Names of all Endocrine glands in detail on Pituitary Gland, Thyroid Gland, Parathyroid gland and Suprarenal Gland. 	10 + 5
V	<p>NERVOUS SYSTEM - (15 +2 hrs)</p> <ul style="list-style-type: none"> • Cerebrum, Cerebellum, Mid brain, Pons, Medulla Oblongata, Spinal cord with spinal nerve • Meninges, Ventricles and Cerebrospinal fluid • Names of Basal nuclei • Blood Supply of Brain • Cranial Nerves 	10 + 5
VI	<p>(a) EMBRYOLOGY</p> <ul style="list-style-type: none"> • Spermatogenesis and Oogenesis • Ovulation, Fertilization • Fetal Circulation • Placenta <p>(b) COURSE SPECIFIC TOPICS</p> <ul style="list-style-type: none"> • Skin • Eye • Arterial System and Venous Drainage System in detail 	10 + 4

LAB TRAINING (40 hrs)

- Histology of Types of Epithelium
- Histology of Serous, Mucous and Mixed Salivary gland
- Histology of the types of Cartilage
- Demo of all bones showing parts, radiographs of normal bones & Joints
- Histology of Skeletal (TS & LS), Smooth and Cardiac muscle
- Demonstration of Heart and Vessels of the body
- Histology of Large artery, Medium sized artery and vein, Large Vein
- Microscopic appearance of Large and Medium sized Artery and Vein, Large Vein
- Demonstration of all muscles of the body
- Pericardium
- Histology of Lymph node, Spleen, Tonsil and Thymus
- Demonstration of parts of Respiratory system
- Normal Chest radiograph showing Heart shadows
- Histology of Lung and Trachea
- Normal Angiograms
- Histology of Lymphatic tissues
- Radiographs of Abdomen - IVP, Retrograde cystogram
- Demonstration of parts of the Urinary system and Histology of Kidney, Ureter and Urinary bladder

- Demonstration of Male and Female Pelvis with organs in situ.
- Histology of Male and Female Reproductive organs
- Histology of Pituitary, Thyroid, parathyroid and Suprarenal glands
- Histology of peripheral nerve and optic nerve.
- Demo of all parts of brain

METHODS OF TEACHING

- Lecture cum discussion
- Demonstration
- Lab visit
- Practical work record

METHODS OF EVALUATION

- Written Test
- Laboratory observation Book
- Assignments
- Oral Presentations

REFERENCE BOOKS

- Cohen, Memmler: Structure & Function of Human Body, Lippincott Williams & Wilkins; Tenth edition(2012)
- Waugh: Ross & Wilson Anatomy & Physiology in health and illness Penguin Books Ltd(2010)
- Tortora: Anatomy & Physiology, John Wiley & Sons(2012)

B.Sc. ALLIED HEALTH SCIENCES - ANATOMY - BLUE PRINT

Unit No.	Unit	Weightage	Marks Allotted	Knowledge / Recall			Understanding			Application		
				LAQ	SAQ	VSAQ	LAQ	SAQ	VSAQ	LAQ	SAQ	VSAQ
1	I	14 %	12	...	1	1	---	---	1	---	---	---
2	II	20 %	16	1		1	1*		----	---	---	1
3	III	20 %	15	1*	1	1	--	1	----	---	---	1*
4	IV	20 %	16	--	--	1	1	1*	1*	---	----	1
5	V	14 %	12	---	1	---	---	--	1	---	---	1
6	VI	12 %	9	---	1	---	---	--	1	---	---	--

LONG ANSWER QUESTIONS

S.No	Unit wise	Type of Question	Question has to ask
1	CVS / Respiratory System / GIT	Knowledge / Understanding	2
2	Urinary system / Reproductive system / Endocrine system	Knowledge / Understanding	2

SHORT ANSWER QUESTIONS

S. No	Unit wise	Type of Question	Question has to ask
1	Unit - I	Recall	1
2	Unit - II	Understanding	-
3	Unit - III	Understanding + Recall	2
4	Unit - IV	Understanding / Recall	1
5	Unit - V	Understanding	1
6	Unit - VI	Understanding / Recall	1

VERY SHORT ANSWER QUESTIONS

S.No	Unit wise	Type of Question	Question has to ask
1	Unit - I	Understanding / Recall	2
2	Unit - II	Understanding + Recall	2
3	Unit - III	Understanding + Recall + Application	2
4	Unit - IV	Understanding + Recall + Application	3
5	Unit - V	Understanding + Application	2
6	Unit - VI	Understanding / Application	1

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100 marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions : 10 X 3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100marks

MODEL QUESTION PAPER
FIRST YEAR B.Sc. ALLIED HEALTH SCIENCES
ANATOMY

Time:3 Hours

Maximum Marks:80

Illustrate your answers with suitable diagrams where ever necessary.

LONG ANSWER QUESTIONS - (Write any Two) (2 X 10 =20)

1. (A) Explain the Gross features of Right atrium. (OR)
(B) Explain the Gross features of Stomach.
2. (A) Explain the Gross features of Kidney. (OR)
(B) Explain the Gross features of Thyroid gland.

SHORT ANSWER QUESTIONS - (Write any Five) (5 x 6=30)

1. Discuss the Classification of joints with its examples.
2. Discuss the boundaries and contents of superior Mediastinum.
3. Discuss the gross features of Right lung.
4. Discuss the external & internal features of 2nd part of Duodenum.
5. Discuss the location, external features of urinary bladder.
6. Discuss the supports of uterus.

VERY SHORT ANSWER QUESTIONS - (Write any Ten) (10 x3 =30)

1. Write a note on Sesamoid bone.
2. Trace the conducting system of Heart.
3. List out the paranasal air sinuses.
4. Write a note on Pancreatic duct.
5. List out the parts & functions of extra hepatic biliary apparatus.
6. Write a note on Trigone of urinary bladder.
7. Enumerate the Ovarian follicles.
8. Enumerate the hormones of Adrenal gland.
9. Enumerate the layers of Scrotum.
10. List out the meningeal layers & its modifications.
11. Structure of thin skin.
12. Write a note on Fertilization

PHYSIOLOGY

**SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES - PHYSIOLOGY**

NAME OF THE SUBJECT PAPER	: PHYSIOLOGY
DURATION OF THEORY CLASSES	: 80 Hrs
DURATION OF TUTORIAL SESSIONS	: 32 Hrs
DURATION OF LAB TRAINING	: 38 Hrs
THEORY EXAMINATION	: 100 Marks (80 U + 20IA)
UNIVERSITY PRACTICAL EXAMINATION	: NIL
DURATION OF THEORY EXAMINATION	: 3 Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire the knowledge of the normal physiology of various human body systems and understand the alteration in physiology in disease and practice of accident and emergency care technology

COURSE OBJECTIVES

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

- Describe the physiology of cell, tissues, membranes and glands.
- Describe the physiology of blood and functions of heart.
- Demonstrate blood cell count, coagulation, grouping, Hb; BP and Pulse monitoring
- Describe the physiology and mechanism of respiration.
- Demonstrate Spirometry
- Describe the physiology of Excretory system

COURSE OUTCOMES FOR PHYSIOLOGY

At the end of the course, students will be able to...

PHY-AHS-CO1: Understand normal structure and functioning of the organs and organ systems of the body

PHY-AHS-CO2: Understand the regulatory mechanisms in normal and physiological variations.

PHY-AHS-CO3: Understand age-related physiological changes in the organ functions that reflect normal growth and development.

PHY-AHS-CO 4: Understand the physiological basis of diseases.

PHY-AHS- CO 5: Interpret laboratory data pertaining to normal function of organ and organ system.

UNIT	TITLE	THEORY + TUTORIALS (80+32) HOURS
I	<p>a. General physiology (5 + 2hrs)</p> <ul style="list-style-type: none"> • Structure and functions of cell and cell organelles • Transport across cell membrane • Homeostasis: definition and feedback mechanisms <p>b. Hematology (10 + 2hrs)</p> <ul style="list-style-type: none"> • Composition and function of blood and body fluids • Plasma proteins and their functions • RBC: morphology, production, functions and fate • Anemia: etiological & morphological classification • Immunity : Types, mechanism of immune response • Hemostasis and anticoagulants • Blood groups: Types, cross matching and clinical importance 	15 + 4
II	<p>Cardiovascular physiology (10 + 5 hrs)</p> <ul style="list-style-type: none"> • Functional anatomy • Conductive system of heart: origin, spread of cardiac impulse • Properties of cardiac muscle • ECG: leads, principles of normal recording. Normal waves and interpretations • Cardiac cycle • Heart sounds, Physiological basis of murmur • Cardiac output: definition, factors affecting, factors regulating and its measurement • Blood pressure: total pressure, lateral pressure, importance of different pressure, measurements, factors controlling BP • Shock: definition & types. 	10 + 5
III	<p>Respiratory physiology (10 + 5 hrs)</p> <ul style="list-style-type: none"> • Functional anatomy • Mechanism of respiration • Lung volumes and capacities: definition, normal values, measurements and clinical importance • Transport of gases: oxygen and carbon dioxide • Control of respiration: neural and chemical regulation. • Dyspnoea, Asphyxia, cyanosis, periodic breathing • Hypoxia : definition and types 	10 + 5
IV	<p>a. Gastro-intestinal physiology (5 hrs)</p> <ul style="list-style-type: none"> • GI secretions: saliva, gastric juice, pancreatic juice, liver & gallbladder • GI motility: deglutition, gastric motility and emptying, 	15 + 3

	<p>intestinal motility</p> <ul style="list-style-type: none"> • GI hormones: Gastrin, Secretin, CCK - PZ, motilin, Inhibin <p>b. Renal physiology (10 + 3 hrs)</p> <ul style="list-style-type: none"> • Nephrons: structure, types and functions • Juxta glomerular apparatus • RBF: definition, normal values, factor affecting • GFR: definition, normal values factor affecting and factors regulating, measurement. • Renal handlings of solutes : Na⁺ , Cl⁻ ,Glucose, water (diuretics, diuresis), H⁺, ammonia • Renin-angiotensin- aldosterone mechanism • Concentration of urine - countercurrent multiplier and countercurrent exchanger. • Micturition • Renal dialysis 	
V	<p>a. Endocrine physiology (10 + 3hrs)</p> <ul style="list-style-type: none"> • Pituitary gland: hormones secreted and their functions, applied: dwarfism, gigantism, Diabetes Insipidus. • Thyroid gland: hormones secreted and their functions, applied: hypothyroidism, hyperthyroidism • Parathyroid gland: hormones secreted and their functions • Adrenal gland: hormones secreted and their functions • Pancreas: hormones secreted and their functions, applied: Diabetes Mellitus <p>b. Reproductive physiology (5 + 2hrs)</p> <ul style="list-style-type: none"> • Male reproductive system: spermatogenesis ,endocrine functions of testis • Female reproductive system: oogenesis, ovulation, functions of estrogen and progesterone. • Menstrual cycle: ovarian cycle, uterine cycle, hormonal changes, abnormalities of menstruation • Contraception 	15 + 5
VI	<p>a. Nerve-Muscle physiology (5 + 5 hrs)</p> <ul style="list-style-type: none"> • Neurons: structure, types, properties, degeneration and regeneration • Neuromuscular junction: transmission of impulse and its clinical applications • Skeletal muscle: structure , muscle proteins, contraction& relaxation, types of contraction <p>b. Central nervous system (5 + 3hrs)</p> <ul style="list-style-type: none"> • Organization of nervous system • Synapse: types, functions • CSF :functions • Cerebral cortex: Broca`s area and their functions • Cerebellum: lobes &function • Basal ganglia: nucleus & functions, Parkinsonism 	15 + 10

	<ul style="list-style-type: none"> • Hypothalamus: functions <p>c. Special senses (5 + 2 hrs)</p> <ul style="list-style-type: none"> • Vision: Errors of refraction, visual pathway and effects of lesion • Hearing: functions of middle ear, Conductive deafness and nerve deafness. • Smell and taste: receptors and pathways 	
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LAB TRAINING (38 hrs)

- Hemoglobinometry
- White Blood Cell Count
- Red Blood Cell Count
- Determination of Blood Groups
- Leishman's Staining and Differential WBC Count
- Determination of Packed Cell Volume
- Erythrocyte Sedimentation Rate(ESR)
- Determination of Clotting Time, Bleeding Time
- Recording of Blood pressure
- Auscultation for Heart sounds
- Artificial Respiration
- Determination of Vital capacity.

METHODS OF TEACHING

- Lecture cum discussion
- Demonstration
- Lab visit
- Practical work record

METHODS OF EVALUATION

- Written Test
- Laboratory observation Book
- Assignments
- Oral Presentations

REFERENCE BOOKS

1. Basics of Medical Physiology D.Venkatesh /H.H.Sudhakar Wolters Kluwer Third Edition.
2. Waugh: Ross & Wilson Anatomy & Physiology in health and illness Penguin Books Ltd (2010).
3. Principles of Physiology, Singh (H).

PHYSIOLOGY - BLUEPRINT

Unit	Systems	Marks	Weightage (%)	Question type		
				LAQ (2 out of 4)	SAQ (5 out of 6)	VSAQ (10 out of 12)
I	General physiology	15	19%			2+1*
	Hematology			1*	1	1
II	Cardiovascular physiology	16	20%	1	1	
III	Respiratory physiology	16	20%	1	1	
IV	Gastro-intestinal physiology	12	15%		1	1+1*
	Renal physiology			1*		1
V	Endocrine physiology	12	15%		1	1
	Reproductive physiology					1
VI	Nerve-Muscle physiology	09	11%			1
	Central nervous system				1*	1
	Special senses					1

Note: * represents question of choice

- The duration of Examination (University) is Three (3) hours.
- The total marks for the University Examination will be 100marks.
 - Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)
 - Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)
 - Very Short Answer Questions : 10 X 3 = 30 marks (Choice 10 out of 12)
 - TOTAL = Theory 80 + IA 20 = 100mark

MODEL QUESTION PAPER
FIRST YEAR B.Sc. ALLIED HEALTH SCIENCES
PHYSIOLOGY

Total marks: 80

Duration: 3hours

LONG QUESTION ANSWER

(2 X 10 =20)

1. a) Define Erythropoiesis? Describe its stages. Mention the factors influencing it. (OR)
b) Define blood pressure. Write its normal range. Briefly explain short term regulation mechanism of blood pressure.
2. a) Explain how oxygen is transported in blood. Explain oxygen dissociation curve. List the factors shifting this curve to right&left.(OR)
b) Define Glomerular filtration rate (GFR). Write its normal value. Explain the factors affecting it.

SHORT QUESTION ANSWER - Answer any 5

(5 X 6 =30)

1. Define hemostasis. Briefly explain blood clotting mechanism.
2. Define cardiac output. Give its normal value. Describe the factors regulating it
3. Draw normal spirogram indicating static lung volumes and capacities.
4. Briefly explain the mechanism of HCl secretion in stomach.
5. Name the anterior pituitary hormones. Briefly explain functions of growth hormones.
6. Briefly describe stages of Spermatogenesis.

VERY SHORT ANSWER - Answer any 10

(10 X 3=30)

1. Write the functions of Golgi apparatus
2. Briefly explain osmosis
3. Briefly describe the function of Na⁺ K⁺ ATPase pump
4. What are anticoagulants? Name any two.
5. Write any 3 functions of saliva
6. Name any two GI hormones. Write any one function of them.
7. Name the cells of Juxta glomerular apparatus & mention their function
8. List the 3 functions of thyroid hormone
9. Name natural contraceptive methods
10. Classify muscle proteins
11. Classify glial cell. Write any two functions of it.
12. What is myopia? How it is corrected

BIOCHEMISTRY

SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES - BIOCHEMISTRY

NAME OF THE SUBJECT PAPER	: BIOCHEMISTRY
DURATION OF THEORY CLASSES	: 80hrs
DURATION OF TUTORIAL SESSIONS	: 32hrs
DURATION OF LAB TRAINING	: 38Hrs
THEORY EXAMINATION	: 100 marks (80 U + 20IA)
UNIVERSITY PRACTICAL EXAMINATION	: Nil
DURATION OF THEORY EXAMINATION	: 3 hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire the knowledge of the normal biochemical functioning of human body and alterations.

OBJECTIVES

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

1. Identify the basic principles of biochemistry.
2. Synthesize the knowledge of these principles in various situations.

COURSE OUTCOMES FOR BIOCHEMISTRY

At the end of the course, students will be able to...

BIO-AHS-CO1: Correlate the integration of various aspects of biomolecules and its lab diagnosis

BIO-AHS-CO2: Explain biochemical basis and rationale of clinical laboratory tests for inborn errors of metabolism, and interpret the results.

BIO-AHS-CO3: Correlate the results of these investigations with the primary disorders of each human body system.

BIO-AHS-CO4: Follow good clinical laboratory practice as well as to handle the biological samples collected

BIO-AHS-CO5: Learn how to collect the samples and to process it for diagnostic purposes

UNIT	TITLE	THEORY + TUTORIALS (80 +32) HOURS
I	<p>(i) INTRODUCTION TO BIOCHEMISTRY</p> <ul style="list-style-type: none"> • Biophysical aspects of Biochemistry: Theory of acids and bases, Ionization of acids, Dissociation of water, Hydrogen ion concentration and concept of pH, Dissociation of acids and bases, Basic concepts in Acidosis and Alkalosis (Respiratory and Metabolic) • Concept of buffering, Definition of buffers and Buffering Capacity, Chemical and Physiological buffers, Henderson Hassel Balch equation and pH - pK relationship, • Glass electrode and determination of pH, Acid Base titration. <p>ii) PROTEINS</p> <ul style="list-style-type: none"> • Proteins: Chemistry, Classification, properties and biomedical importance of Proteins. • Hydrolytic products of proteins • Classification of Amino acids and important properties <p>iii) ENZYMES</p> <ul style="list-style-type: none"> • Definitions of Catalyst, Enzymes, Apo enzyme, Coenzyme, Holoenzyme, Cofactors and prosthetic group • Active site • Systematic classification of Enzymes • Factors influencing Enzyme kinetics • Enzyme units 	18 + 6
II	<p>i) CARBOHYDRATES</p> <ul style="list-style-type: none"> • Carbohydrates: Chemistry, Classification, properties and biomedical importance of carbohydrates. <p>ii) NUCLEOPROTEINS</p> <ul style="list-style-type: none"> • Purine and Pyrimidine bases • Ribose and Deoxy Ribose • Definition of Nucleosides and Nucleotides • Structure of DNA • Types of RNA • Biologically significant Nucleotides 	15 + 5
III	<p>LIPIDS</p> <ul style="list-style-type: none"> • Definition of Fats and Oils • Classification of Lipids • Saturated and Unsaturated Fatty acids • Properties of Lipids • Biomedical importance of Lipids with special reference to Phospho Lipids, Glycolipids and Cholesterol. 	15 + 7
IV	<p>ENERGY METABOLISM AND NUTRITIONAL BIOCHEMISTRY</p> <ul style="list-style-type: none"> • Calorific value, Respiratory Quotient, Resting Metabolic expenditure, Specific dynamic action • Energy requirements • Complex Carbohydrates and Role of Dietary fiber • Essential Fatty acids • Essential amino acids 	20 + 6

	<ul style="list-style-type: none"> • Positive and Negative Nitrogen balance • Protein Energy Malnutrition • Biochemical functions of Vitamins • Biochemical functions of major and trace elements 	
V	<p>(i) CLINICAL CHEMISTRY</p> <ul style="list-style-type: none"> • Serum Osmolality: Significance and measurement • Electrophoresis: Principles, Methodology and Diagnostic significance • Principles and applications of Paper Chromatography • Simple tests to identify Carbohydrates, Lipids and Proteins in biological fluids • Qualitative estimation of Glucose, Proteins, Cholesterol, Urea, Creatinine and Uric acid and their diagnostic significance <p>(ii) ENVIRONMENTAL CHEMISTRY</p> <ul style="list-style-type: none"> • Definition of Pollutants • Impact of Terrestrial, Water and air pollutants • Bio pesticides Chemistry, Metabolic Transformation in the living system and role in Chemical Pathology • Influence of Non-Biodegradable domestic utility items and its role in metabolic disorders • Carcinogens and mutagens: qualitative and molecular pathology involved in mutagenesis and carcinogenesis • Plastics and its impacts on Society • Biomedical Waste and its management 	12 + 8

LAB TRAINING (38 hrs)

- Simple Color reactions of Carbohydrates and Proteins
- Qualitative estimations of Glucose, Urea, Creatinine, Total Protein and Cholesterol
- Normal constituents of Urine
- Abnormal (pathological) Urine
- Glucose Tolerance Test and its significance
- Demonstration of Electrophoresis and Interpretation of important clinical conditions based on Electrophoresis appearance
- Demonstration of Paper Chromatography and its utility in the diagnosis of inborn errors of metabolism

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

REFERENCE BOOK

1. Essential of Biochemistry for B.Sc. Nursing Students Harbanslal, first edition.
2. Biochemistry U.Sathya Narayana, U.Chakrapani, fifth edition

B.Sc. ALLIED HEALTH SCIENCES - BIOCHEMISTRY (I Year) BLUE PRINT

Unit No.	Weight age	Marks Allotted	Knowledge/ Recall			Understanding			Application		
			LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
I	30 %	25		1	1	1	1				
II	20%	19	1		2			1			
III	15%	12	1*	1	2						
IV	15 %	9	1*	1*	2			1			
V	20%	15		1	1 + 1*		1	1*			

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 80 marks.

Long Answer Questions : 2X 10 marks = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5X 6 marks = 30 marks (Choice 5 out of 6)

Very Short Answer Questions : 10 X 3 marks = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100marks

MODEL QUESTION PAPER
FIRST YEAR B.Sc. ALLIED HEALTH SCIENCES
BIOCHEMISTRY

TIME: 3 HOURS

MAXIMUM MARKS:80

A. Long answer question (2 X10=20)

1. a) Write in detail about the Hetero polysaccharides and mention its importance.

(Or)

b) How is acid base balance maintained in the body?

2. a) Define and classify Lipids with suitable examples.

(Or)

b) Write in detail about the RDA, dietary sources, and biochemical role and deficiency manifestations of folic acid.

B. Short answer questions -Answer any 5 questions (5X 6=30)

1. Mention dietary sources and functions of cholesterol
2. Define Chromatography & write any 4 applications
3. Classify Carbohydrates with a suitable example
4. Classify Enzymes systematically by providing one example under each class.
5. Define carcinogen and name any three agents that cause carcinogenesis.
6. List down the sources, regulation and functions of Calcium

C. Very Short answer questions -Answer any10 questions (10 x 3=30)

1. Define Respiratory quotient
2. Define buffer
3. List any two functions of trace elements.
4. List any two impacts of plastics on society
5. Mention the essential fatty acids and its importance
6. List any 2 functions of phospholipids
7. Name one test to identify plasma proteins and urea.
8. Define osmolality
9. Mention any one cardiac glycoside with its function
10. Draw a neat labeled diagram of DNA
11. Define mutarotation
12. List any two functions of Fat soluble vitamin

GENERAL MICROBIOLOGY

SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES - GENERAL MICROBIOLOGY

NAME OF THE SUBJECT PAPER	: GENERAL MICROBIOLOGY
DURATION OF THEORY CLASSES	: 40 hrs
DURATION OF TUTORIAL SESSIONS	: 16 hrs
DURATION OF LAB TRAINING	: 38 Hrs
EXAMINATION	: 50 marks (40 U+10 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire understanding of fundamentals of microbiology and identification of microorganisms. It also provides opportunities for practicing infection control measures in hospital setting.

COURSE OBJECTIVES

At the end of the course, the student will be able to:

1. Identify common disease producing microorganisms
2. Explain the basic principles of microbiology and their significance in health and disease. Demonstrate skill in handling specimens.
3. Explain various methods of disinfection and sterilization
4. Identify the role of the nurse in hospital infection control system.

COURSE OUTCOMES FOR GENERAL MICROBIOLOGY

At the end of the course, students will be able to...

MIC-AHS-CO1: Sterilize the articles with physical and chemical methods

MIC-AHS-CO2: Perform with suitable culture media, methods for growth of the bacteria and perform staining techniques for identification of bacteria

MIC-AHS-CO3: Learn the structure, function of immune system and immunity by its antigen-antibody reactions

MIC-AHS-CO4: Learn the how to collect & process the specimen for the diagnostic purposes

MIC-AHS-CO5: Learn about the identification of fungal infections from clinical specimens and various antifungal agents used for the fungal infections.

MIC-AHS-CO6: Learn the laboratory diagnosis of Parasitic and Viral infections

MIC-AHS-CO7: Learn about the treatment and post exposure prophylaxis (PPE) of viral infections

UNIT	TITLE	THEORY + TUTORIALS (40 +16) HOURS
I	GENERAL BACTERIOLOGY <ul style="list-style-type: none"> □ Historical introduction Classification of Microorganisms based on size, shape and structure □ Anatomy & Physiology of Bacteria : Nutrition, Growth □ Microscopy, staining techniques & Culture media, culture methods □ Sterilization (physical & chemical methods) Infection 	8 + 2
II	IMMUNOLOGY <ul style="list-style-type: none"> □ Immune response □ Immunity □ Hyper sensitivity, Autoimmunity □ Complement □ Antigen antibody reactions 	7 + 2
III	SYSTEMATIC BACTERIOLOGY <ul style="list-style-type: none"> □ Introduction : Collection transport & processing of bacteriological clinical specimen in general □ Pyogenic cocci □ Spore bearing bacilli Clostridium + Bacillus □ Enterobacteriaceae- E.coli, Klebsiella, Salmonella, Shigella □ Vibrio, Pseudomonas MYCOLOGY <ul style="list-style-type: none"> □ Introduction, classification of fungi, laboratory diagnosis in general □ Fungi of medical importance- Opportunistic fungi 	8 + 3
IV	BASICS OF PARASITOLOGY <ul style="list-style-type: none"> □ Introduction to Parasitology, Classification, Protozoa-I - Entamoeba histolytica □ Protozoa-II, Plasmodium spp. □ Cestodes: general, T.solium & T.saginata, E.granulosus □ Nematodes: Introduction & Classification <ul style="list-style-type: none"> - Intestinal -Ascaris, Ancylostoma, Strongyloides - Tissue-W.bancrofti 	7 + 3
V	VIROLOGY <ul style="list-style-type: none"> □ Classification & General properties of Viruses, Virus Host interactions & Lab diagnosis in general □ DNA Viruses : Pox viruses & Adenoviruses, Herpes viruses □ Hepatitis virus, HIV □ Rabies , Polio, Arbo viruses common in India - Dengue, Chikungunya , Japanese encephalitis, KFD 	6 + 4
VI	HOSPITAL INFECTION AND CONTROL <ul style="list-style-type: none"> □ Causative agents and methods of transmission □ Systematic investigation of hospital infection □ Prevention and control of Hospital infections □ Environmental Hazards resulting from biomedical waste and preventive measures. 	4 + 2

LAB TRAINING (38 hrs)

- Introduction & visit to microbiology lab + Morphology of bacteria + Identification of bacteria (Culture plates & Basic biochemical reactions)
- Gram stain, Acid fast Stain
- Spotters , Instruments, Culture media inoculated & un inoculated
- Applied Immunology(Bacterial)
- Serological tests - CRP, ASO, RPR, Widal Applied Immunology (Virology) Serological tests: HIV, HBsAg(Rapid Tests)
- Stool Examination for eggs + Parasitology specimens

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory Observation Book
3. Assignments
4. Oral Presentations

REFERENCE BOOKS

1. Ananthnarayan R: Textbook of Microbiology.(2017)
2. Pommerville J. C: Fundamentals of Microbiology. Jones and Bartlett learning(2013)
3. ApurbaSastry, SandhyaBhat. Essentials of Microbiology.
4. Text book of Concise Microbiology by C.P.Baveja, Latest edition

BLUE PRINT - B.Sc ALLIED HEALTH SCIENCES -GENERAL MICROBIOLOGY (I Year)

Unit No.	Unit	Weightage (%)	Marks Allotted	Knowledge/ Recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
I	GENERAL BACTERIOLOGY	8	3	1*								1
II	BASICS OF IMMUNOLOGY	15	6			1*		1				
III	SYSTEMATIC BACTERIOLOGY	25	10				1				1*	
IV	BASICS OF PARASITOLOGY& MYCOLOGY	22	9					1				1
V	VIROLOGY	22	9		1							1
VI	HOSPITAL INFECTION AND CONTROL	8	3		1*				1			
	TOTAL	100	40									

The duration of Examination (University) is One and Half (1 ½) hours.

The total marks for the University Examination will be 40marks.

Long Answer Questions : 1X10mark = 10 marks (Choice 1 out of2)

Short Answer Questions : 3X6marks = 18 marks (Choice 3 outof5)

Very Short Answer Questions : 4 X3 marks = 12marks (Choice 4 out of5)

TOTAL = 40 marks

MODEL QUESTION PAPER
FIRST YEAR B.Sc. ALLIED HEALTH SCIENCES
GENERAL MICROBIOLOGY

Time: 1½Hours

Maximum Marks: 40

Illustrate your answers with suitable diagrams wherever necessary.

(A) Long answer questions **(1 X 10=10)**

1. Describe the commonly used chemical disinfectants and their applications in the hospital.

(OR)

2. Classify Mycobacterium. Give an account on pathogenesis and laboratory diagnosis of pulmonary tuberculosis. Add a note on BCG vaccine.

(B) Short answer questions -Answer any 3 questions marks **(3 X6=18)**

1. Define immunity. Describe acquired immunity.

2. Types of HAI & mention the causative agents.

3. Name the UTI cause bacteria. How to collect urine & laboratory diagnosis of *E.coli*.

4. Life cycle of malaria parasite in human.

5. Write about Modes of transmission of HIV.

(C) Very Short answer questions -Answer any 4 questions **(4 x3 =12)**

1. Mention different color coded bags for biological waste management used in hospital with the viruses.

2. Prophylaxis of hepatitis B.

3. List FOUR bacteria causing wound infection.

4. Name the opportunistic fungi.

5. Name four arbo viral diseases common in India.

GENERAL PATHOLOGY

SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES - GENERAL PATHOLOGY

NAME OF THE SUBJECT PAPER	: GENERAL PATHOLOGY
DURATION OF THEORY CLASSES	: 40hrs
DURATION OF TUTORIAL SESSIONS	: 16hrs
DURATION OF LAB TRAINING	: 38Hrs
EXAMINATION	: 50 marks (40 U + 10 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE DESCRIPTION

To make the student to understand pathology laboratory reports, the normal ranges of investigations, severity and specificity of disease conditions which will help him perform International Classification of diseases to clinical pertinence.

COURSE OBJECTIVES

On completion of this subject, the student will be able to:

- Differentiate between symptoms and diseases
- Understand the needs of mandatory diagnostic procedures
- Demonstrate an understanding of the pathology of common diseases
- Understand various pathology laboratory reports
- Know about the possibilities and consequences of nosocomial infections, needle prick injuries etc., in a health care facility

COURSE OUTCOMES FOR GENERAL PATHOLOGY

At the end of the course, students will be able to...

PAT-AHS-CO1: Learns the pathophysiology of disease and its causes and progression

PAT-AHS-CO2: Learns the etiologies, the pathogenesis, and the host response specific to a particular organ system

PAT-AHS-CO3: Learn about lab investigations and techniques in Hematology.

PAT-AHS-CO4: Learns to perform cross matching, coombs test, blood grouping and TTI

PAT-AHS-CO5: Learns the diagnosis of disease based on the laboratory analysis of bodily fluids

UNIT	TITLE	THEORY + TUTORIALS (40 +16) HOURS
I	GENERAL PATHOLOGY (12 +3 HOURS) Basic Concepts in Cellular Adaptions <ul style="list-style-type: none"> • Cell injury and Cell death • Over view of Cellular adaption Basic Principles in Inflammatory Process <ul style="list-style-type: none"> • General features of acute and Chronic inflammation repair. • NEOPLASIA • Definition of Neoplasia • Differences between Benign and Malignant tumors • Nomenclature 	10 + 5
II	HAEMATOLOGY Structure and functions of Blood cells <ul style="list-style-type: none"> • Objective use of anticoagulants • Mechanisms of Haemostasis • Tests to monitor Coagulation • Blood Grouping and Blood Bank (Basic aspects on Blood Components) • Basic concepts in Anemia • Basic Concepts of Leukemia 	10 + 3
III	BIOMEDICAL WASTE MANAGEMENT AND ENVIRONMENTAL PATHOLOGY <ul style="list-style-type: none"> • Biomedical waste management from perspectives of Pathology • Environment and Disease - Smoking hazards, Asbestosis and Silicosis Occupational Exposure 	5 + 2
IV	CLINICAL PATHOLOGY <ul style="list-style-type: none"> • Collection, transport, preservation and processing of Clinical Specimen • Clinical Pathology of specialized Body Fluids(CSF), Synovial fluid, Pleural Fluid • Urine Examination(Urinalysis) 	5 + 2
V	OVERVIEW OF SYSTEMIC PATHOLOGY <ul style="list-style-type: none"> • Rheumatic Heart Disease ineffective endocarditic, atherosclerosis, IHD - Basic Concepts. • Lungs : Pneumonia, COPD, Asthma, ARDS - Basic Concepts • Gastrointestinal tract - Peptic Ulcer, Carcinoma Stomach, Carcinoma Colon -Basic Concepts. • Liver: Hepatitis, Cirrhosis, Gall Bladder -basic 	10 + 4

	<p>Concepts.</p> <ul style="list-style-type: none"> • Brain Tumor. • Kidney - Renal Calculi, Hydronephrosis, renal Tumor - Basic Concepts. • FGT - Leiomyoma, Endometrial hyperplasia, Endometrial Cancer, Cervical Cancer -Basic Concepts. • FGT - Ovarian Tumor classifications - Basic Concepts. • Breast - Benign and Malignant tumors - Basic Concepts • Bone Tumors - Basic Concepts 	
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LAB TRAINING (38 hrs)

1. Blood Grouping and Rh typing
2. Urine Routine
3. Hb, TLC,DLC
4. Gross Specimens
5. Slides

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

REFERENCE BOOK

1. Culling Histopathology techniques
2. Bancroft Histopathology techniques
3. Todd & Sanford Clinical Diagnosis by laboratory method
4. Dacie & Lewis - Practical Haematology
5. Ramanicood, Laboratory Technology (Methods and interpretation) 4thEd.

B.Sc. ALLIED HEALTH SCIENCES - PATHOLOGY (I Year)-BLUE PRINT

Unit No.	Unit	Weightage	Marks Allotted	Knowledge/ Recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
I	a) BASIC CONCEPTS IN CELLULARADAPTIONS b) BASIC PRINCIPLES IN INFLAMATORY PROCESS c) NEOPLASIA	37.5%	15	1*	2	1	-	1*	1*	-	-	-
II	HAEMATOLOGY	22.5%	9	-	1	1	-	-	-	-	-	-
III	BIOMEDICAL WASTE MANAGEMENT AND ENVIRONMENTAL PATHOLOGY	7.5%	3	-	-	-	-	-	1	-	-	-
IV	CLINICAL PATHOLOGY	7.5%	3	-	1*	1	-	-	-	-	-	-
V	OVERVIEW OF SYSTEMIC PATHOLOGY	25%	10	1	-	-	-	-	-	-	-	-

The Duration of Examination (University) is One and Half hours (1 ½) hours.

The total marks for the University Examination will be 40 marks.

Lon Answer Questions : 10X1marks = 10 marks (Choice 1 out of 2)

Short Answer Questions : 3 X6marks = 18 marks (Choice 3 out of5)

Very Short Answer Questions : 4 X3marks = 12 marks (Choice 4 out of5)

TOTAL = 40 marks

**MODEL QUESTION PAPER
FIRST YEAR B.Sc. ALLIED HEALTH SCIENCES
GENERAL PATHOLOGY**

Time: 1½Hour

Maximum Marks: 40

Illustrate your answers with suitable diagrams wherever necessary.

(A) Long Answer Questions

(1X10=10)

1. Mention the types of necrosis with examples

(Or)

2. Describe about Myocardial infarction

(B) Short Answer Question

(3X6=18)

Answer any THREE of the following

1. Tabulate the difference between Benign and Malignant tumors

2. Define anemia. Mention types of anemia, on the basis of Etiology.

3. Explain the mode of spread of tumors in brief.

4. Explain granulomatous inflammation with a neat labeled diagram

5. Describe the method of collection, transport and preservation of CSF

(C) Very Short Answer Questions

(4X3=12)

Answer any FOUR of the following

1. Define Apoptosis.

2. Enumerate two colors coding for various biomedical waste disposal with examples.

3. Define cross matching

4. Mention two types of Necrosis.

5. Define Pneumonia.

I YEAR ELECTIVE COURSES

**SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC) - ENGLISH**

NAME OF THE SUBJECT PAPER	: ENGLISH
DURATION OF THEORY CLASSES	: 16hrs
DURATION OF PRACTICAL SESSIONS	: 34hrs
EXAMINATION	: 100 marks (80 U + 20 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE OUTCOMES FOR ENGLISH

ENG-CO1: Speak and write grammatically correct sentences in English

ENG-CO2: Develop effective writing skills needed for clinical task

ENG-CO3: Build fluency in English needed for clinical tasks

**SYLLABUS
(THEORY& PRACTICALS = 16 +34 Hours)**

COURSE DESCRIPTION

This course is designed to build spoken and written English competency of the students needed to function effectively in academic setup.

OBJECTIVES

On completion of this subject, the student will be able to:

1. Speak and write grammatically correct sentences in English.
2. Develop effective writing skills.
3. Build fluency in English

UNIT: I GRAMMAR

1. Remedial Grammar : Parts of speech; Types of sentences, question tags
2. Modal verbs;
3. Tenses
4. Concordance

UNIT: II VOCABULARY

1. Word formation - prefixes and suffixes
2. Medical terminology
3. Words often misused or confused
4. Idioms and phrases

UNIT: III WRITING SKILLS

1. Letter writing - permission, leave and other official letters
2. Note making methods
3. Jumbled sentences -cohesion
4. Paragraph Writing

UNIT: IV SPOKEN COMMUNICATION

1. Pronunciation of commonly mispronounced words
2. Day today conversation
3. Telephonic conversations
4. Group Discussions

UNIT: V LISTENING AND READING SKILLS

1. General Listening and reading comprehension

Textbook Recommended

1. Effective English Communication by Krishna Mohan and Meenakshi Raman, Tata McGraw - Hill Publishing Company Limited, New Delhi.
2. English for Colleges and Competitive Exams by Dr. R. Dyvadatham, Emerald Publishers.

**SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES
SKILL BASED ELECTIVE COURSE (SBEC) - CULINARY SKILLS FOR
OPTIMAL NUTRITION**

NAME OF THE SUBJECT PAPER	: CULINARY SKILLS FOR OPTIMAL NUTRITION
DURATION OF THEORY CLASSES	: 16 Hrs
DURATION OF PRACTICAL SESSIONS	: 32Hrs
PRACTICAL EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY THEORY EXAMINATION	
DURATION OF EXAMINATION	: 1 ½ Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT: I YEAR	

COURSE OUTCOMES

NUTRI-CO1: Understand the basic food groups, their nutrient composition and function for balanced healthy diet for people of all ages & patients on dietary management for healthy life.

THEORY & PRACTICALS (DURATION 16 + 32 Hours)

UNIT-I INTRODUCTION TO FOODS AND NUTRITION

- Food-Definition of foods, nutrition and nutrients characteristics of good health
- Relation of nutrition to good health-optimal nutrition, malnutrition and over nutrition
- Classification of foods based on major nutrient content
- Food selection-factor responsible for food selection

UNIT-II FOODS GROUPS

- Basic four and five food groups-cereals, millets pulses, fruits and vegetables, fats and oils, sugar and jaggery.
- Foods and nutrients, Functions of food- energy yielding, body building and protective foods, balanced diet, vegetarian and non-vegetarian foods
- Functional Foods-Dietary supplements
- Food Adulterations-Common adulterants and method of identification, nutrition labeling and food standards

UNIT-III METHODS OF COOKING, PRESERVATION AND SENSORY EVALUATION

- Principles and techniques of sensory evaluation, Interpretation tools
- Cooking methods-moist heat, dry heat advantages and disadvantages, changes during cooking, nutrient preservation while cooking
- Preservation techniques advantages and disadvantages

UNIT-IV NUTRITIONAL REQUIREMENTS AND MEAL PLANNING

- Basic nutritional requirements through different stages of life cycle, basic principles of meal planning, revisiting concept of balanced diet.

PRACTICALS

- Introduction to cutlery and crockery
- Introduction to weights and measures
- Art of table setting
- Market survey on food labeling
- Preparation of few commonly consumed cereal preparation
- Preparation of few commonly consumed pulse dishes
- Vegetable cooking without nutrient loss
- Preparation and display of fruits salads
- A day's menu for an adult sedentary worker
- A day's menu for an 8-month old infant
- Nutritious snacks for preschooler
- Nutritious lunch for school going boys and girl
- Consistency modified menu for an 80-year-old
- Simple test to identify food adulteration
- Sensory evaluation of prepared items

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

Reference book

1. Srilakshmi.B. : Food science; seventh edition(2012)
2. Jacqueline B .Marcus :Culinary Nutrition: The science and practice of healthy cooking:(2014)

SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES
SKILL BASED ELECTIVE COURSE (SBEC) - ENHANCING SOFT SKILL & PERSONALITY

NAME OF THE SUBJECT PAPER	: Enhancing soft skill & personality
DURATION OF THEORY CLASSES	: 16Hrs
DURATION OF PRACTICAL SESSIONS	: 32Hrs
PRACTICAL EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY THEORY EXAMINATION	
DURATION OF EXAMINATION	: 1 ½ Hrs.
YEAR	: I YEAR

COURSE OUTCOMES

ESSP-CO1: Foster healthy attitude and develop effective inter and intra personal skills to be an effective team worker in both academic and professional setup.

LEARNING OBJECTIVES

This course is designed to equip the students with essential soft skills needed for workplace and improve personality.

SYLLABUS

UNIT: I ASPECTS OF COMMUNICATION

1. Importance of communication, Process, Barriers
2. Nonverbal Communication

UNIT: II SPEAKING

1. Opening and Closing conversations
2. Introductions and Address Systems
3. Expressing Courtesy
4. Giving Compliments and replying to Compliments
5. Presentation Skills
6. Telephonic conversation and telephone etiquette

UNIT - III PRESCRIBED READING

1. White washing the Fence - Episode from Tom Sawyer by Mark Twain
2. Bacon's Essays: - Of Goodness and goodness of nature

UNIT - IV WRITING

1. Letter writing - Letter of Complaints, Inviting and Declining an invitation
2. Memos and Email
3. Editing- Grammar, Spelling & Punctuation, Use of Dictionary & Thesaurus.

UNIT - V SOFT SKILLS

1. Active Listening Skills
2. Assertive Skills
3. Negotiation and Persuasive Skills
4. Interview Skills

Reference Books

1. Communication Skills for Engineers and Scientists by Sangeeta Sharma and Binod Mishra, PHI Learning Private Limited, New Delhi.
2. English and soft skills by S.P. Dhanavel, Orient Black Swan
3. Effective English Communication by Krishna Mohan and Meenakshi Raman, Tata McGraw -Hill Publishing Company Limited.
4. Technical Communication - Principles and Practice, by Meenakshi Raman and Sangeetha Sharma, II edition, Oxford University Press.

Learning Outcome

This course is designed to help the students to

- Foster healthy attitude.
- Develop effective inter and intra personal skills to be an effective team worker.
- Communicate effectively in both academic and professional setup

SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES
SKILL BASED ELECTIVE COURSE (SBEC) - SPEAKING EFFECTIVELY

NAME OF THE SUBJECT PAPER : SPEAKING EFFECTIVELY

DURATION OF THEORY CLASSES : 16Hrs

DURATION OF PRACTICAL SESSIONS : 32Hrs

PRACTICAL EXAMINATION : 50 Marks (40 U + 10 IA)

NO UNIVERSITY THEORY EXAMINATION

DURATION OF EXAMINATION : 1 ½ Hrs.

YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT: I YEAR

COURSE OUTCOMES

SPEAK-CO1: Speak and write grammatically correct sentences in English and Build fluency in English needed for clinical tasks.

LEARNING OBJECTIVES

- Advance the students intellectual curiosity, competency and skills in preparation for employment
- Develop critical thinking, creativity and effective communication

SYLLABUS

1. Communication Skills

- Importance of Communication skills in Public health; Communication process; Methods of communication; Types of communication: Verbal and Non-verbal; Impediments to effective communication; Feedback

2. Oral Presentation Skills

- Preparation and planning; Structure; Audio-visual aids; Creating interest and establishing a relationship with the audience; Body language; Voice and pronunciation; Review

3. Writing skills

- Writing a scientific paper; Writing a proposal; Structure of an article; References and literature review; Peer-review process-Publication bias; International guidelines for publication in journals; Professional Ethics

4. Leadership in Public health

- Leadership styles and trait; Motivation skills; Interpersonal communication skills; Problem solving skills; Decision making skills; Management skills; Communication Skills

5. Manuscript writing

- Writing introduction, objectives, methodologies, major finding, discussion, conclusion and recommendation

6. Seminar presentations

- Use of computers present data and information on recent topics

LEARNING OUTCOMES

At the completion of the course, the students will-

- Develop good written and oral communication abilities
- Develop an understanding of team building and leadership skills
- Develop knowledge regarding capacities needed to work independently within diverse work environments

TEXT BOOKS

1. Professional Writing Skills, A self-paced training Programme by Janis Fisher Chan and Diane Lutovich.
2. Speaking Your Mind: Oral Presentation and Seminar Skills By Rebecca Stott, Tory Young, Cordelia Bryan Contributor Rebecca Stott, Tory Young, Cordelia Bryan.

**SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES
SKILL BASED ELECTIVE COURSE (SBEC) - BASICS OF YOGA AND PRACTICE**

NAME OF THE SUBJECT PAPER	: BASICS OF YOGA AND PRACTICE
DURATION OF THEORY CLASSES	: 16Hrs
DURATION OF PRACTICAL SESSIONS	: 32Hrs
PRACTICAL EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY THEORY EXAMINATION	
DURATION OF EXAMINATION	: 1 ½ Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

SYLLABUS & COURSE OUTCOMES FOR BASICS OF YOGA & PRACTICE (YOGA)

YOGA CO1: Understand the respiratory system, types of breathing and benefits of meditation.

Unit	TIME(HRS)	CONTENT
1	1	Introduction to Yoga philosophy, psychology and lifestyle
2	1	A brief outline of the history of Yoga.
3	1	Cultivation of correct psychological attitudes
4	1	Asanas : Definition, Types, scope and limitations of Asanas
5	1	Pranayamas and their significance in Yogic curriculum, Types & phases of Pranayama.
6	1	Dharna and Dhyana as the keys to unlocking human potential.
7	1	Study of various aspects of Yoga: Kriyas, Bandhas, Mudras
8	1	Yoga defined as –Integration and –Harmony
9	1	Meaning of the term –Positive Health
10	1	Yoga, a tool to restore homeostasis
11	1	Integration of Yoga into Health Professions Education
12	1	Order of teaching the Yogic practices; Do's and Dont's of specific Yoga techniques.
13	2	Applied aspects of Yoga in various human activities like therapeutics, education and sports
14	2	Introduction to yogic concept of health and disease

Unit 15: Introduction to Yogic techniques: Methods and practices (32 hours)

Asanas (26 hrs):

- Aruna Surya Namaskar
- Ardha - Padmasana/Padmasana
- ArdhakatiChakrasana
- PadaHasta
- PavanaMuktasana
- Trikona
- Navasana
- Ardha -Shalabhasana
- Shalabhasana
- Makarasana
- Bhujangasana
- Dhanurasana
- Vakrasana
- Vrikshasana
- Ushtrasana
- Gomukasana
- Yoga Mudra.
- Natarajasana
- Chakra sana
- Sarvangasana
- Matsyasana
- Halasana
- Shavasana

Pranayama (6 hrs)

- Vibhaga Pranayama
- Pranava Pranayama
- Savitri Pranayama
- Chandra and SuryaNadi Pranayama
- Nadi-Shuddhi
- Sheetali and Sitkari

TEXT BOOKS

- Dayanidy G and Bhavanani AB. CYTER Practical Book. Pondicherry, India: Dhivyananda Creations;2016.
- A primer of Yoga Theory - Dr Ananda Balayogi Bhavanani, Dhivyananda Creations,Pondicherry-13
- Fundamentals of Yoga History- Compilation by Meena Ramanathan
- Basic Hatha Yoga lessons (Tamil) - Dr Ananda Balayogi and Meena Ramanathan, Puducherry

BOOKS RECOMMENDED FOR STUDIES AND REFERENCE

1. A yogic approach to stress-Dr Ananda Balayogi Bhavanani, Ananda Ashram, Pondicherry
2. Asana, Pranayama, Mudra and Bandha. Swami Satyananda, Bihar School of Yoga,Monger
3. ASANAS : WHY? AND HOW? - byShri. O.P. Tiwari.Kaivalyadhama,Lonavla.
4. Hatha Yoga practices of the Gitananda tradition by Dr Ananda Balayogi Bhavanani
5. Ramanathan Meena. Applied Yoga: Applications of Yoga in Different Fields of Human Activities. 3rdEd; Pondicherry, India: Sri BalajiVidyapeeth;2018
6. PRANAYAMA - by Swami Kunalayananda. Kaivalyadhama, Lonavla.
7. Yoga and sports- Swami Gitananda and Meenakshi Devi, Ananda Ashram, Pondicherry.

SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES
GENERIC ELECTIVE COURSE (GEC) - BASICS OF HOSPITAL ADMINISTRATION

NAME OF THE SUBJECT PAPER	: BASICS OF HOSPITAL ADMINISTRATION
DURATION OF THEORY CLASSES	: 64Hrs
THEORY EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ HRS
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE OUTCOMES

HSM CO1: To familiarizes students with the basics concepts, policies of hospital management regarding the occupational safety, organizational behavior & quality management.

COURSE OBJECTIVES

- To provide orientation about the hospital functions
- To familiarize students with the basics concepts of hospital management

THEORY (DURATION 64 Hours)

UNIT: I ORGANISATION OF A HOSPITAL AND ITS DEPARTMENTS

1. Organogram
2. Vision, Mission & Values, Logo
3. Patient Service Points - Clinical & Non-Clinical (OPD's, A&E, MHC, Wards, ICU's, OT's, etc.)
4. Scope of Services (Medical & Supportive Services)

UNIT: II HOSPITAL POLICIES & PROCEDURES

1. Registration Process
2. OP/IP Billing
3. Admission Process
4. Discharge Process
5. Financial counseling
6. Visitors Policy
7. Feedback forms.

UNIT: III MEDICAL RECORDS MANAGEMENT/LEGAL ASPECTS

1. Types of Medico legal cases
2. SOP's for handling MLC

3. Medical Records -Forms, consents, registers used in hospitals

UNIT: IV QUALITY MANAGEMENT

1. Quality - Brief Introduction
2. Code of Conduct for health care professionals
3. Patient rights & responsibilities
4. Incident Reporting
5. Quality indicators
6. List of Licenses to be obtained to run a Hospital College
7. Accreditation-ISO/NABH/JCI

UNIT: VOCCUPATIONAL SAFETY

1. Biomedical Waste Management
2. Hospital Spill Management
3. Usage of PPE
4. Emergency Codes
5. Fire Safety Management
6. Hospital Infection Control

UNIT: VI ORGANISATIONAL BEHAVIOUR

1. Communication with patients/health care professionals
2. Grooming standards
3. Time Management
4. Grievance Handling, Interdisciplinary Committee
5. Leadership

LEARNING OUTCOMES

Students will have an overview of hospital functions, processes and patient management.

SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES
GENERIC ELECTIVE COURSE (GEC) - COUNSELING AND GUIDANCE

NAME OF THE SUBJECT PAPER	: COUNSELING AND GUIDANCE
DURATION OF THEORY CLASSES	: 64Hrs.
EXAMINATION	: 50 Marks (40 U +10IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ Hrs.
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE OUTCOMES

CG CO1: To assess a person's needs and understand their personal characteristics that will help in personal growth, wellbeing and improving their relationships with others.

LEARNING OBJECTIVES

- To understand theoretical foundations of counseling psychology
- To examine briefly the major perspectives of Counselling and to apply based on the client's needs
- To assess ones own needs and motivations and personal characteristics that will help in personal growth and wellbeing.
- To understand basic counseling skills as practiced by an effective counsellor.
- To discuss special settings and populations where Counselling could be effectively used.
- To explore ethical and legal issues for the practice of counseling profession.

SYLLABUS

UNIT I:

Introduction and definition of Counselling and Guidance, Counsellor Preparation, Qualifications, Qualities, Legal and Professional ethics

UNIT- II:

Different approaches to counselling, goals in counselling, role and functions of the counsellor.

UNIT- III:

Micro skills in Counselling- relationship building strategies and methods: Opening techniques, attending skills- verbal and non-verbal communication, Listening skills:

Open questions and closed questions, Encouragement, Paraphrasing, Reflection, Summarization, influencing skills-Reframing, genuineness and Self-disclosure.

UNIT-IV:

Macro skills in Counselling, empathy, advanced empathy, Confrontation & challenging, Resistance, transference and counter-transference

UNIT-V:

Counselling situations and Counselling across life-span.

Learning Outcome

At the end of this course, the students will be able to:

Demonstrate basic knowledge in counseling (concepts, theories, ethical issues, basic skills, etc.)

**SYLLABUS FOR I YEAR
B.Sc. ALLIED HEALTH SCIENCES
GENERIC ELECTIVE COURSE (GEC) - LIFESTYLE DISORDERS**

NAME OF THE SUBJECT PAPER	: LIFESTYLE DISORDERS
DURATION OF THEORY CLASSES	: 64Hrs
EXAMINATION	: 50 Marks (40 U +10IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ Hrs.
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: I YEAR

COURSE OUTCOMES

LD CO1: To understand the relevance, significance and implications of lifestyle disorders for the betterment of human life quality.

THEORY (64 Hours)

UNIT I Modern Life style disorders

Desk bound and sleeping habits, junk food, anxiety. Food poisoning, Acidity.

UNIT II Dietary disorders

Food groups and concept of a balanced diet, obesity, metabolic syndrome, hypertension- their causes and prevention through dietary and lifestyle modifications

UNIT III Social health problems

Smoking, alcoholism, drug dependence and Acquired Immune Deficiency Syndrome (AIDS).

UNIT IV Gastrointestinal disorders

Stomach disorders-Gastritis, Ulcer, Amoebiasis, Constipation, piles
Common ailment- cold, cough, fevers, diarrhea, constipation- their causes and dietary

LEARNING OUTCOMES

To understand the relevance, significance and implications of lifestyle disorders for the betterment of human life quality

Text Books

1. Text book of Clinical Biochemistry-Carl.A. Burtis and EdwardR.Ashwood
2. Text Book of Medical Biochemistry-Dr.M.N.Chatterjee and Rane Shinde

Reference Books

1. P. Singh MD. Textbook of Nutrition and Health; First Ed; 2008; Academic Excellence
Biochemistry with Clinical Correlation- Thomas M.Devl

II YEAR

**B.Sc - BLOOD BANKING TECHNOLOGY
FACULTY OF ALLIED HEALTH SCIENCES
SRI BALAJI VIDYAPEETH
(Deemed to be University)
Accredited by NAAC with A'Grade**

II-YEAR

CORE SUBJECTS

1. Introduction to Blood Banking and Blood Banking Organization
2. Blood Donation and Donor Management
3. Basic - IH (Immunohematology) & TTI (Transfusion Transmitted Infection) Serology
4. Basic Hematology & Blood Components

ELECTIVES

Ability Enhancement compulsory course (AECC)

1. Environmental studies

Skill enhancement course (SEC) - Choose any TWO

1. Good Clinical Laboratory practice
2. Computer Applications
3. Library and E-resource
4. Public Health and Hygiene

Generic Elective Course (GEC) - Choose any ONE

1. Basic Psychology
2. Sociology
3. Entrepreneurship essentials

AHS Course Content Second year B.Sc. Blood Banking Technology (AT)

Faculty code	Category	Course title	Hours					Credits				
	Core theory BBT	Subjects	Theory	Practical	Tutorials	Clinical training	Total hours	Lecture	Practical	Tutorials	Clinical training	Total credits
AHS	BBT -5	Introduction to Blood Banking and Blood Banking Organization	80		32			5		1		6
AHS	BBT -6	Blood Donation and Donor Management	80		32			5		1		6
AHS	BBT -7	Basic - IH (Immuno hematology) & TTI (Transfusion Transmitted Infection) Serology	64	64				4	2			6
AHS	BBT -8	Basic Haematology & Blood Components	80		32			5		1		6
AHS	BBTCT 1	Clinical Training BBT 5 to 8				192					6	6
AHS	AECC	Environmental Science	16	32				1	1			2
AHS	SEC - 1-3	Student's choice	16	32				1	1			2
AHS	SEC - 1-3	Student's choice	16	32				1	1			2
AHS	GEC - 1-3	Student's choice	64					4				4
			416	160	96	192	864	26	5	3	6	40

SCHEME OF EXAMINATION

Papers	Subject	Theory		Practical		Theory	Practical	Grand Total (800)	Min marks to pass % (400)
		UE	IA	UE	IA	UIA*	UIA*		
BBT -5	Introduction to Blood Banking and Blood Banking Organization	80	20					100	50
BBT -6	Blood Donation and Donor Management	80	20					100	50
BBT -7	Basic - IH (Immunohematology) & TTI (Transfusion Transmitted Infection) Serology	80	20	80	20			200	100
BBT -8	Basic Hematology & Blood Components	80	20					100	50
BBT-CT1	Clinical Training BBT 5 to 8						100	100	50
AECC	Ability enhancement Compulsory Course - Environmental Science	80	20					100	50
SEC	Skill enhancement Course	80	20					100	50
SEC	Skill enhancement Course	80	20					100	50
GEC	Generic elective	80	20					100	50

For all elective course, 40 marks for university theory and Practical cum Viva examination & 10 marks as Internal Assessment = 50 marks which will be converted to 100 marks in the transcript.

INTRODUCTION TO BLOOD BANKING AND BLOOD BANKING ORGANIZATION

PAPER-BBT-5 HEMATOLOGY & CLINICAL PATHOLOGY

NAME OF THE SUBJECT PAPER	: HEMATOLOGY & CLINICAL PATHOLOGY
DURATION OF THEORY CLASSES	: 80 HRS
DURATION OF TUTORIAL SESSIONS	: 32 HRS
UNIVERSITY THEORY EXAMINATION	: 100 MARKS (80 U + 20 IA)
UNIVERSITY PRACTICAL EXAMINATION	: NIL
DURATION OF THEORY EXAMINATION	: 3 HRS
YEAR IN WHICH SUBJECT PAPER IS TAUGHT	: II YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of blood-forming organs and blood disorders and malignancies and also knows about the basic and advanced hematology testing.

OBJECTIVES

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

- Understand the basic concepts of hematology.
- Identify different type of anti-coagulants
- Understand the complete structure and components of a hemogram.
- Analyze different methods of hemoglobin screening.
- Understand blood and collection of blood sample in detail
- Understand blood components in detail
- Understand Haemostasis & Coagulation Mechanism and testing in detail

PROGRAM OUTCOMES

BBT -PO1: Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E- library.

BBT -PO2: To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.

BBT -PO3: Understanding the structure and functions of different organs in normal human body.

BBT -PO4: To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.

BBT -PO5: Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.

BBT -PO6: Understanding of blood bank department and organization in a hospital

BBT -PO7: To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.

BBT -PO8: To Learns the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion-transmission infections

BBT PO9: Understand the basic concepts of hematology and blood components in detail

BBT -PO10: Understand the immune hematological tests

BBT -PO11: To learn the transfusion therapy and newly advanced blood bank equipment's require for process

BBT -PO12: Understand Quality control, Quality policy, quality manual, Internal and external audit and process control

BBT PO13: Understand stem cell preparation, recent advances in blood banking and apheresis

BBTPO14: To identify various life style disorders and with due counselling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy.

COURSE OUTCOMES

At the end of the course, students will be able to...

HEMAT-CO1: Understand the basic concepts of hematology.

HEMAT-CO2: Identify different type of anti-coagulants

HEMAT-CO3: Understand the complete structure and components of a blood.

HEMAT-CO4: Understand blood and collection of blood sample in detail

HEMAT-CO5: Understand blood components in detail

HEMAT-CO6: Various kinds of blood components, methods of preparation, composition of components, storage and cross matching requirements, component modification, special component.

COURSE CONTENT

UNIT	TITLE	THEORY + TUTORIALS(80+32) HOURS
I	General aspects of Hematology <ul style="list-style-type: none"> • Origin, development, morphology, maturation and function of blood cells • Fate and nomenclature of blood cell 	9+5
II	RBC, WBC and Platelets Parameters <ul style="list-style-type: none"> • Principles of counting chambers used in hematology • Different methods of evaluation of Total RBC count including preparation, advantages and disadvantages of various diluting fluids for RBC count. • Hemoglobinometry: Principles and methods of quantitating Hb. Concentration of blood including knowledge of errors and quality control in various method. • Abnormal hemoglobin and its investigation. • Principles and methods of determining PCV calculation and interpretation of red cell indices • ESR: Introduction, factors affecting ESR, principles and methods of determining ESR, conditions increasing and decreasing of ESR. • Micro ESR • Introduction, development of WBC • Various method of estimation of total WBC count • Preparation of various diluting fluids and its mechanism of action • Advantages and disadvantages of various WBC diluting fluids • Absolute Neutrophil count (Arrneth count) 	12+6

	<ul style="list-style-type: none"> • Absolute eosinophil count • Introduction , development of platelets • Various method of estimation of total platelet count • Preparation of various diluting fluids and its mechanism of action • Advantages and disadvantages of various platelet diluting fluids 	
III	<p>Peripheral smear - Preparation, Staining, Counting and Interpretation</p> <ul style="list-style-type: none"> • Preparation of peripheral smear, thin smear, thick smear, • Buffy coat smear and wet preparation • Bone marrow smear- imprint and crush preparation • Principle and methods of staining of blood smears and bone marrows mears. • Supravital stains and Perl's iron staining of bone marrow • Romanowsky stains - Preparation, advantages and disadvantages. • Trouble shooting in smears and stains • Description of morphology of normal and abnormal RBC • Calculation of platelet and Total WBC count from PS • Blood differential WBC counting both normal and abnormal counts • Identification of RBC, WBC, Platelet disorders from PS • Identification of various RBC inclusion bodies • Identification of blood Parasites • Advantages and disadvantages, uses and mechanism of cell counting, • Quality control in manual cell counts • Errors in sampling, mixing, diluting and counting • Bone marrow aspiration indication, methods, procedure • Bone marrow smear - Imprint and crush preparation 	13+6
IV	<p>RBC, WBC and Platelet disorders</p> <ul style="list-style-type: none"> • Anaemia - definition, etiology classification and laboratory diagnosis. • Nutritional anemia workup • Other RBC disorders • Hemolytic anemia workup • Hemolytic anaemia: Definition, causatives, laboratory investigations. Autohemolysis, acid hemolysis • Methods of identification of abnormal hemoglobin including spectroscopy, Hb Electrophoresis, Principles of Alkali denaturation Test, Sickle cell 	13+6

	<p>preparation, Fetal Hb identification, Nile blue sulphate test, Osmotic fragility test</p> <ul style="list-style-type: none"> • Various benign leucocyte reaction - Leukocytosis. Neutrophilia, Eosinophilia, Lymphocytosis, monocytosis, basophilia and leucopenias • Leukemoid reaction • Leukemias - definition, causes, classification, detection of leukemia. Total leucocyte count in leukemias. Multiple myeloma. • Cytochemical stains in Leukaemia • Blood Coagulation and disorders of hemostasis. Principles and methods of assessment of coagulation. BT, CT, Prothrombin time, partial thromboplastin time, • Thromboplastin regeneration time • Thrombocytopenia, thrombocythemia, platelet function test, platelet count. Clot retraction test. Platelet factor III Test. 	
V	<p>Va : Automation, Special Procedures</p> <ul style="list-style-type: none"> • Principles of autoanalyser • Interpretation of both normal and abnormal values in analyser • Cleaning and maintenance of analyser • Preparing reagent and cleaning of spillover of samples, chemicals and reagents • Critical value alert • Interpretation of flagging in analyser • LE cell - definition, morphology causative agents. Various methods of demonstrating LE cells • Introduction to Immuno phenotyping • Principles, samples and procedures of Flow cytometry • Principles, samples and procedures of PCR <p>Vb: Urine, Semen and Other Body fluids Examination</p> <ul style="list-style-type: none"> • Collection, types of samples, preservatives and labeling • Physical and chemical tests including strip test • Urine sediment preparation and microscopy examination - principles, interpretation and troubleshooting • Receiving Various Types of Fluids • Labeling and Different Methods of Fixation • Gross Examination • Wet Preparation - Indication, Methods and Cell counts • Centrifugation Technique Both Conventional and Cytocentrifugation 	33+9

	<ul style="list-style-type: none"> • Semen collecting Procedures • Counseling, collection of sample • Physical, chemical, Microscopic examination • Special procedure • Counts <p>VC: Quality control in hematology</p> <ul style="list-style-type: none"> • Quality control samples and its interpretation • EQAS programme in hematology • Documentation and audit • Hospital accreditation System • Discarding of both infected and expired samples • Quality control check • Documentation and maintenance of records • Biomedical waste disposable 	
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LIST OF PRACTICAL EXERCISES (32 Hours)

1. Collection of blood - finger prick, venous blood.
2. Hb estimation
3. RBC count, Total WBC count and absolute eosinophil count, Platelet count by various methods
4. Preparation of Leishman stain , staining of blood smears and Differential count of WBC
5. Estimation of Erythrocyte sedimentation rate and packed cell volume by various methods.
6. Preparation of Hemolysate & Osmotic fragility of RBC.
7. Clot retraction test and reticulocyte count.
8. Preparation of reagents of coagulation studies.
9. Preparation of bone marrow smears.
10. Preparation of LE cell smears.
11. Supervision of cleaning of glass wares and entry in register.
12. Screening of donors.
13. Preparation of anticoagulant fluids
14. Refrigerated centrifuge operation, various programs for preparing of blood components
15. Preparation of packed red cells, FFP, Cryoprecipitate and Cryo depleted plasma
16. Leuko-depletion of red cells & platelets
17. Learning blood component separation-Buffy Coat Method
18. Quality control of Components

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

TEXT BOOK RECOMMENDED

1. Essentials of Hematology by Hoffbrand.
2. Practical in Hematology by J.V.Dacie.
3. Wintrobe's clinical Hematology
4. McKenzie Clinical Hematology manual.
5. Transfusion Medicine technical manual-DGHS, Ministry of Health and Family Welfare, Govt. of India, Second edition, 2003
6. Standards for blood banks and blood transfusion services, NACO, Ministry of Health and Family Welfare, Govt. of India, New Delhi 2007.

PAPER-BBT-5 HEMATOLOGY AND CLINICAL PATHOLOGY - BLUE PRINT

Unit No	Unit	Weightage	Marks Allotted	Knowledge/ recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VS AQ (3)	LAQ (10)	SAQ (6)	VSA Q (3)	LAQ (10)	SAQ (6)	VS AQ (3)
I	General aspects of hematology	15%	12	1*	1	1						1
II	RBC parameters WBC parameters Platelet parameters	15%	12			2		1				1*
III	Peripheral smear preparation, Staining, counting and interpretation	15%	12	1*	1	1			1			
IV	RBC disorders WBC disorders Platelet disorders	15%	12			1		1				1
V	a) Automation, Special procedures	16.25%	13		1*		1		1			
	b) Urine examination, Semen analysis and other body fluids c) Quality control in hematology	23.75%	19	1		1		1				1*

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100 marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions: 10 X 3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100 marks

**B.Sc. BLOOD BANK AND TRANSFUSION TECHNOLOGY - II YEAR SUBJECTS
PAPER (BBT-5) HEMATOLOGY AND CLINICAL PATHOLOGY
MODEL QUESTION PAPER**

TIME: 3 HOURS

MAXIMUM MARKS:80

Illustrate your answers with suitable diagrams wherever necessary.

(a) Long Answer Question - Answer any ONE of the following. (2x10=20)

1. a) Explain in detail the principle and procedure of Leishman's stain. Add a note on problems encountered during staining with their corrective actions.

(Or)

b) Describe in brief principles of automated analyzer used in hematology lab for cell counts

2. a) Define hematopoiesis. Describe the various stages of Erythropoiesis

(Or)

b) Describe the procedure and interpretation of urine Microscopy

(b) Short Answer Question - Answer any FIVE of the following. (5x6=30)

1. Write about etiological classification of anemia

2. Describe in brief principles of Hemoglobinometry and discuss merits and demerits of various methods?

3. Describe in brief about Buffy coat preparation and its specific uses

4. Write Short notes on Biomedical Waste management

5. Write about the causes of iron deficiency anemia

6. Write about the collection processing of body fluids.

Very Short answer question. Answer any TEN of the following (10x3 =30)

1. Mention the significance and normal value of Clot retraction time

2. List the components separated from one unit of blood

3. What is supravital Staining

4. Write the causes of neutrophilia.

5. Write the normal range of RBC & WBC in manual cell counting

6. Enumerate causes of Thrombocytopenia

7. Give an example of RBC diluting fluid and mention its merits and demerits

8. Mention different sites of Bone marrow aspiration LE cell preparation

9. Mention different methods of bleeding time and its normal values

10. Mention the procedure and interpretation of sperm motility

11. Mention two urine preservatives their indication, merits and demerit

BLOOD BANK AND BLOOD BANK ORGANISATION

PAPER BBT-6 BLOOD BANK AND BLOOD BANK ORGANISATION

NAME OF THE SUBJECT PAPER	: BLOOD BANK AND BLOOD BANK ORGANISATION
DURATION OF THEORY CLASSES	: 80HRS
DURATION OF TUTORIAL SESSIONS	: 32HRS
UNIVERSITY THEORY EXAMINATION	: 100 MARKS (80 U + 20 IA)
UNIVERSITY PRACTICAL EXAMINATION	: NO
DURATION OF THEORY EXAMINATION	: 3 HRS
YEAR IN WHICH SUBJECT PAPER IS TAUGHT	: II YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of location and design of Blood bank, reception room, donation room, donor rest/ refreshment room, screening unit, the laboratory, preservation and Storage, blood bank records and haemovigilance.

OBJECTIVES

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

- Develop understanding of blood bank department in a hospital
- Acquaint with the structure of a blood bank collection room, room equipment, their principles and use, emergency exits &c.
- Identify the various areas of work for a blood bank technician.
- Identify himself as a professional and distinguish with other laboratory personnel.
- Understand the roles & responsibilities of blood bank technician
- Identify laboratory maintenance needs to be taken care by blood bank technician
- Maintain & ensure patient comfort and safety

PROGRAM OUTCOMES

BBT -PO1: Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E-library.

BBT-PO2: To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.

BBT -PO3: Understanding the structure and functions of different organs in normal human body.

BBT -PO4: To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.

BBT -PO5: Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.

BBT -PO6: Understanding of blood bank department and organization in a hospital

BBT -PO7: To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.

BBT -PO8: To Learn the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion- transmission infections

BBT PO9: Understand the basic concepts of hematology and blood components in detail

BBT -PO10: Understand the immune hematological tests

BBT -PO11: To learn the transfusion therapy and newly advanced blood bank equipment's require for process

BBT -PO12: Understand Quality control, Quality policy, quality manual, Internal and external audit and process control

BBT PO13: Understand stem cell preparation, recent advances in blood banking and apheresis

BBTPO14: To identify various life style disorders and with due counselling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy.

COURSE OUTCOMES

At the end of the course, students will be able to...

BBO-CO1: Develop understanding of blood bank department in a hospital

BBO-CO2: Acquaint with the structure of a blood bank collection room, room equipment, their principles and use, emergency exits.

BBO-CO3: Identify the various areas of work for a blood bank technician.

BBO-CO4: Identify himself as a professional and distinguish with other laboratory personnel.

BBO-CO5: Understand the roles& responsibilities of blood bank technician

BBO-CO6: Identify laboratory maintenance needs to be taken care by blood bank technician

COURSE CONTENT

UNIT	TITLE	THEORY + TUTORIALS (80+32) HOURS
I	<p>a) Introduction to blood bank</p> <ul style="list-style-type: none"> • Overview History of Transfusion Medicine • Identify and relate the important features of the history of transfusion medicine • Outline the scientific benchmarks in the evolution of transfusion medicine • Explain how specific innovations affected transfusion medicine practice • Recent trends in the practice of transfusion medicine • History of development Transfusion Medicine in India <p>b) Organization of blood bank services</p> <ul style="list-style-type: none"> • Regional blood transfusion centre • Blood banks and blood storage centers, Blood Bank premises and infrastructure • Mandatory Technical Staffing pattern of blood bank and role, functions and responsibility of each Technical staff. • Technical requirements: Accommodation and environmental conditions • Blood bank management system • Regulations for blood bank operation, Drugs and cosmetics Law • National blood policy, standards in Blood Banking, licensing procedures, ethical aspects of blood transfusion 	8+5
II	<p>a) Statutory regulators of Blood banking in India</p> <ul style="list-style-type: none"> • Drug controller of India, State, Director General Health services & NACO and other government bodies. • Indian Drugs and cosmetic act and rules 1945 pertaining to Blood bank • Indian & other Pharmacopeia pertaining to blood products • Licensing norms, Inspections and Compliance • Terminologies used in blood banking including blood donation. • Legal aspects related to blood bank and role of NGO <p>b) Instruments, equipment's and Record maintenance in blood bank</p> <ul style="list-style-type: none"> • List of instruments and their uses , general care and protocol of use, quality control • General care of instruments (Weights, Volume. Specific gravity, Conversion of weight to volume, Volume dilutions, Weight dilutions etc) 	16+6

	<ul style="list-style-type: none"> • Principles of general care of instruments, methodology of cleaning of glassware • Various records in blood bank , method of record maintenance • Spill management • Work flow in blood bank : Criteria for blood donation • Procedure of blood donation • Blood collection and its storage • Component separation and its storage • Blood serological testing • Issuing of blood components • Transfusion reactions and its lab investigations • Preservation& storage of blood for transfusion and storage effects • Different blood components- their method of preparation, temperature of storage and shelf life. • Reporting Formats and statistics 	
III	<p>a) Introduction, Basic Blood collection and anticoagulants</p> <ul style="list-style-type: none"> • Preparation of donor, screening and collection of blood. • Various methods of blood collection • Types of blood samples • Methods of collection in various age groups • Precaution to be followed in collecting blood samples • Methods of disposing both expiry, infected samples and sharps used • Different vacutainers with color codes • Advantages of Vacutainers • Anticoagulants used in blood bank • Various anticoagulants used in hematology tests • Universal anticoagulants in hematology lab • Mechanism and uses of various anticoagulants <p>b) Blood bank techniques</p> <ul style="list-style-type: none"> • Principals involved in Blood grouping. ABO system and the methods used. Factors influencing the results of blood grouping, Rh system. • Rh antigen. Principles and methods used • Other blood grouping systems • Interpretation of blood grouping by various methods • Cross matching- Principles involved and the methods used • Compatibility test - Principles involved and the methods used • Direct and indirect Coomb's test - Principles involved and the methods used. <p>C) Serological screening and transfusion reaction</p> <ul style="list-style-type: none"> • Screening of transfusion transmitted infection 	20+6

	<ul style="list-style-type: none"> • Discarding of samples • Knowledge about types of blood transfusion reactions 	
IV	<p>a) Basic steps in Blood components preparation & labeling.</p> <ul style="list-style-type: none"> • Different types of blood components • Composition- volume, cellular, plasma and clotting factor content • Storage of individual blood components. • Equipments used for component preparation. • Care and precautions to be taken during whole blood collection and before component preparation. • Programming for component preparation. • PRP & Buffy coat methods. • Other methods of component preparation. <p>b) Preparation of Components</p> <ul style="list-style-type: none"> • Preparation of red cell concentrate • Fresh Frozen plasma • Other plasma products, platelet concentrates • Cryoprecipitate, washed red cells • Plasma Fractionation: Principles, manufacturing of different plasma derivatives <p>c) Storage conditions for components and –Storage lesions</p> <ul style="list-style-type: none"> • Metabolic changes in blood components during storage • Release of cytokine during storage. • Component Testing, Labeling, Transportation and storage of blood components. • Inventory management and maintenance of bloodstock • Storage lesions. <p>d) Modified blood components:</p> <ul style="list-style-type: none"> • Preparation of leuko-reduced blood products, Leukocyte filters, Irradiated blood components • Blood substitutes, Washed / plasma reduced blood components, frozen red cells. • Specialized blood components -CMV free and HLA matched & Blood substitutes • Recombinant clotting & hematopoietic growth factor 	20+6
V	<p>a) Quality control of whole blood and components</p> <p>Quality control procedures, measures, sterility tests and recording for</p> <ul style="list-style-type: none"> • Whole blood • PRBC • Modified PRBC 	16+6

	<ul style="list-style-type: none"> • FFP and Plasma products • Platelet components • Plasma fractionation products & Pathogen inactivation method <p>b) Laboratory Management and Planning</p> <ul style="list-style-type: none"> • Reception and recording of specimen, cataloguing and indexing maintenance of laboratory records • working and maintenance of the following Incubators, Refrigerators, Water baths, Ovens, Steamers, Autoclaves, Inspissator, Centrifuges, Vacuum Pumps, Water Steel. • Cleaning and sterilization of syringes and needles and glassware's • Care and use of microscope. Dark ground illumination, inverted phase microscope and fluorescence microscopy • General principles of Hematology techniques collection, fixation, processing & routine staining. • Estimation of Haemoglobin, TLC, DLC, Peripherals mear • Automatic cell counter • General principles of Blood Bank techniques, antigen, antibody, ABO & Rh system • Maintenance and medico legal importance of records and specimens 	
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LIST OF PRACTICAL EXERCISES (32 HOURS)

1. Cleaning and care of general laboratory glassware and equipment
2. Collection of samples in various laboratories
3. Sterilization
4. Hematology techniques collection, fixation, processing & routine staining
5. Hemoglobin, TLC, DLC, Peripheral smear
6. Blood Bank techniques antigen, antibody, ABO & Rh system
7. Work flow in blood bank

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

REFERENCE BOOKS

1. Modern Blood Banking and Transfusion practices by Denise M Harmening, 5th edition.
2. Transfusion Medicine technical manual-DGHS, Mini Compendium of transfusion medicine, RN Makroo Voluntary blood donation program NACO, Ministry of Health and Family Welfare, Govt. of stry of Health and Family Welfare, Govt. of India, Second edition, 2003.
3. Indian Drugs and cosmetic act and rules 1945 pertaining to Blood bank Technical Manual, 17th ed, AABB India, New Delhi, 2007.
4. National guide book in blood donor motivation. NACO, Ministry of Health and Family Welfare, Govt. of India.
5. Standards for blood banks and blood transfusion services, NACO, Ministry of Health and Family Welfare, Govt. of India, New Delhi 2007.
6. Indian & other Pharmacopeia pertaining to blood products.
7. Indian Drugs and cosmetic act 1945 and Rules 1945 chapter related to Blood Banking.

PAPER- BBT-6 Blood Bank and Blood Bank Organization - BLUE PRINT

Unit No	Unit	Weightage	Marks Allotted	Knowledge/ recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
I	a)Introduction to blood bank b)Organization of blood bank services	18.75%	15		1	1			1			1
II	a)Statutory regulators of Blood banking in India b) Instruments, equipments and Record maintenance in blood bank	15%	12	1*		1		1				1
III	a) Introduction, Basic Blood collection and anticoagulants b) Blood bank techniques c) Serological screening and transfusion reaction	23.75%	19		1	1	1	1*	1*			
IV	a) Basic steps in Blood components preparation & labelling b) Preparation of Components c) Storage conditions	27.5%	22	1	1	1			1*			1

	for components and –Storage lesions d) Modified blood components											
V	a) Quality control of whole blood and components b) Laboratory Management and Planning	15%	12		1	1	1*		1			

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100 marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions: 10 X 3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100 marks

**PAPER (BBT-6) BLOOD BANK AND BLOOD BANK ORGANIZATION
MODEL QUESTION PAPER**

TIME: 3 HOURS

MAXIMUM MARKS: 80

Illustrate your answers with suitable diagrams wherever necessary.

(a) Long Answer Question (2x10=20)

1. a) Discuss Mandatory technical staffing pattern with education & experience as per Indian drugs & cosmetic act & rules.

(or)

b) What precautions should a blood bank technician take while working in blood bank?

2. a) Elaborate the coding system of biomedical waste management system in blood bank.

(or)

b) Describe the methods of discarding the blood bags

(b) Short Answer Question (Answer any 5) (5x6=30)

1. Role of Regional blood transfusion center

2. Prof Karl Landsteiner

3. Explain the physical methods of hemoglobin estimation in blood camps.

4. Four important Historical aspects in transfusion medicine

5. Explain criteria of Platelet concentrate as per USP- 4marks

6. Thermograph

(c) Very Short Answer Question (Any Ten) (10x3=30)

1. What is minimum area required for whole blood collection and component processing?

2. Mention different blood group systems

3. Name four equipments in blood bank which have to calibrated daily

4. Two advantages of pure voluntary blood collection.

5. Rule 122 G (2) of the Drugs & Cosmetics Act, 1940

6. Mention two scientists with their discoveries in Transfusion Medicine

7. Name the serological test done for TTI

8. Mention the advantages and disadvantages of Colorimetry

9. Mention the types of anticoagulants used in blood bags

10. Mention four permanent deferral criteria

11. Enumerate the criteria for renewal of blood bank license

12. Name all the mandatory rooms required for whole blood collection.

BLOOD DONATION & DONOR MANAGEMENT

PAPER - BBT-7 BLOOD DONATION & DONOR MANAGEMENT

NAME OF THE SUBJECT PAPER	: BLOOD DONATION & DONOR MANAGEMENT
DURATION OF THEORY CLASSES	: 80 HRS
DURATION OF TUTORIAL SESSIONS	: 32 HRS
UNIVERSITY THEORY EXAMINATION	: 100 MARKS (80 U + 20IA)
UNIVERSITY PRACTICAL EXAMINATION	: NO
DURATION OF THEORY EXAMINATION	: 3 HRS
YEAR IN WHICH SUBJECT PAPER IS TAUGHT	: II YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of Donor Management System, to monitor Blood Bank data, Blood cells, Blood stock, Blood Group information, Blood supply, Donor List. And also knows to manage all the Blood Bank, Donor, and Blood stock data.

OBJECTIVES

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

- Acquaint with the format of the taking history of the patient.
- Ascertain the patient's age for blood donation.
- Interview the potential blood donors and collect relevant information about their medical history such as, whether the individual ever had heart, lung, blood diseases or any other medical conditions, pregnancy etc.; previous blood donation done and any history of allergy or vertigo
- Obtain the medical history esp. history of any previous blood donation, tattoo, needle stick injury etc.
- Accurately communicate whether the individual is suitable to donate blood
- Defer or reject donor based on the current vitals and medical history example if the donor has taken some unacceptable medicines, vaccinations, or has suffered from some diseases like Hepatitis / jaundice, Heart Disease / surgery, Kidney, liver, lung disease, Abnormal bleeding tendencies, I V Drug use, Cancer, AIDS, or persons involved in high-risk activities or groups etc.

PROGRAM OUTCOMES

- BBT -PO1:** Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E-library.
- BBT -PO2:** To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.
- BBT -PO3:** Understanding the structure and functions of different organs in normal human body.
- BBT -PO4:** To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.
- BBT -PO5:** Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.
- BBT -PO6:** Understanding of blood bank department and organization in a hospital
- BBT -PO7:** To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.
- BBT -PO8:** To Learn the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion-transmission infections
- BBT PO9:** Understand the basic concepts of hematology and blood components in detail
- BBT -PO10:** Understand the immune hematological tests
- BBT -PO11:** To learn the transfusion therapy and newly advanced blood bank equipment's require for process
- BBT -PO12:** Understand Quality control, Quality policy, quality manual, Internal and external audit and process control
- BBT PO13:** Understand stem cell preparation, recent advances in blood banking and apheresis
- BBTPO14:** To identify various life style disorders and with due counselling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy.

COURSE OUTCOMES

At the end of the course, students will be able to...

- BDDM -CO1:** Acquaint with the format of the taking history of the patient.
- BDDM -CO2:** Obtain blood donor's personal detail to select a suitable donor whose blood will be safe for a recipient such as name, father's name, age, address, telephone no., etc. and the questionnaire to access their present and past health status.
- BDDM -CO3:** Obtain the medical history esp. history of any previous blood donation, tattoo, needle stick injury etc.
- BDDM -CO4:** Check blood donor's hemoglobin level to ensure that he/she is not suffering from anemia and can safely donate a unit of blood.
- BDDM -CO5:** Ascertain the medical history and record Donor's weight, blood pressure, pulse and temperature before accepting them as blood donor.
- BDDM -CO6:** Defer or reject donor based on the current vitals and medical history example if the donor has taken some unacceptable medicines, vaccinations, or has suffered from some

diseases like Hepatitis / jaundice, Heart Disease / surgery, Kidney, liver, lung disease, Abnormal bleeding tendencies, I V Drug use, Cancer, AIDS, or persons involved in high-risk activities or groups etc.

COURSE CONTENT

UNIT	TITLE	THEORY + TUTORIALS (80+32) HOURS
I	Donor Motivation <ul style="list-style-type: none"> • Donor Motivation, Motivational Techniques, Social Marketing, Preparation of IEC Materials. • Motivating factors for donation • Types of blood donors, Donor selection, Donor questionnaire and interview: Eligibility and deferral criteria, medical interview and medical examination • Pre donation Investigations -hemoglobin estimation & Blood grouping, Equipment's & Reagents used in screening, investigations. • Managing rejected blood donors, technique for conversion of first time donor into regular voluntary donor, donor felicitation. Donor recruitment & Retention. • Pre donation & Post donation donor counselling. • Medico-legal Aspects, NACO & DGHS guidelines. • Right to information, Donor Consent, reports, Leave letters, certificates 	30+8
II	Blood Donation requisites: <ul style="list-style-type: none"> • Blood collection room equipment, their principles, and use • Emergency medicines, Pre-donation counselling, Solutions & Method for Preparing Phlebotomy Site • Test Tube Samples: Method of accurately relating product to donor sample, post donation care. • Mandatory emergency medicines to be made available and their uses. • Donor reactions and their management. • Screening of blood units for mandatory tests, discarding infected units, post donation counselling. 	20+8
III	Blood Donation drive: <ul style="list-style-type: none"> • Awareness programs prior to blood donation drive, Camp site, staff requirement, management of camp, screening of donors • Transportation of blood units from camp site to blood bank. 	10+8
IV	Types of blood bags available, collection, storage and labeling <ul style="list-style-type: none"> • Different types of Blood Collection including Autologous blood donation and Therapeutic Phlebotomy • Preservation of donated blood, blood preservation solutions and 	20+8

	<p>Additive solutions.</p> <ul style="list-style-type: none"> • Blood donation and Bloods salvaging • Criteria for Autologous blood donation • Autologous blood donation advantages &disadvantages • Different types of Autologous blood donation. • Indications and procedure of therapeutic phlebotomy 	
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LIST OF PRACTICAL EXERCISES (32 HOURS)

1. Preparation of phlebotomy site.
2. Operation of blood collection monitor, tube sealer and needle burner.
3. Donor Room Protocol, Donor Screening
4. Qualifying Test for Blood Donation- Laboratory investigations
5. Donor Suitability /Selection
6. Selection of Bags for Collection of Blood
7. Blood Collection - Solutions & Method for Preparing Phlebotomy Site
8. Test Tube Samples - arrangement and requirement
9. Blood Collection - Method of Accurately Relating Product to Donor
10. Blood Collection Procedure
11. Post Blood Donation Care
12. Post donation instructions
13. Management Of adverse reaction in the donor
14. Study of Blood Collection- Collection of Autologous Blood from the Donor
15. Study of Outdoor Camps - Organization - Identifying needs
16. Study of Corporate camps -Management
17. Study of Social camps-Management
18. Study of College camps-Management

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

PAPER (BBT-7) - BLOOD DONATION AND BLOOD DONOR MANAGEMENT BLUE PRINT

Title of paper (Unit)	Module	Weightage	Marks allotted	Knowledge/ recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
PAPER-II (BBT-6) Blood Donation & Donor Management	i. Donor Motivation, Motivational	15%	12	1*	1	2						
	ii. Blood collection room equipment, & principles	43%	34	1	1	2		1	2			1*
	iii. Blood Donation drive	15%	12			1	1*	1				1
	iv. Types of blood bags available, collection, storage and labeling	28%	22	1	1	2		1*				1*

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100 marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions: 10 X 3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100 marks

PAPER (BBT-7) BLOOD DONATION AND DONOR MANAGEMENT
MODEL QUESTION PAPER

TIME: 3 HOURS

MAXIMUM MARKS:80

Illustrate your answers with suitable diagrams wherever necessary.

(a) Long answer question (answer any one)

(10x2=20)

1. a) Enumerate the conditions for deferring donor during questionnaire and briefly explain why First degree relative's blood is not transfused to patient?

(or)

b) Enumerate the diseases(Transfusion transmitted infection)against which mandatory screening is done on blood units with a mention of specific tests.

2. a) Classify adverse donor reaction as per cause and add a note on Vasovagal reaction

(or)

b) Describe the prerequisites for organizing a camp in an educational institute

(b) Short answer (Answer any 5)

(5x6=30)

1. SAGM.

2. Donor consent.

3. Types of Blood donors.

4. Preparation of phlebotomy site.

5. Types of Autologous blood donation.

6. Define Therapeutic phlebotomy.

(c) Very short answer (Answer any Ten)

(10x3=30)

1. Mention 2 anticoagulants used in blood bank

2. What results you get in forward blood grouping and Rh typing of B Negative individual

3. Define Donor recruitment

4. Educative materials used for increasing voluntary blood donation

5. Name 4 emergency medicines to be taken to blood donation camps

6. Types of Coombs (AHG)reagent

7. Donor data base registry

8. Name four disinfectants used in blood bank

9. Name four identifiers for identifying blood bag to donor

10. Management of localized hematoma in phlebotomy site.

11. Mention any 2 criteria for autologous blood donation

12. Mention any 2 additive solutions

**BASIC -IH
(IMMUNOHAEMATOLOGY)
& TRANSFUSION TRANSMITTED
INFECTION- SEROLOGY**

PAPER-BBT-8 BASIC -IH (IMMUNOHAEMATOLOGY) & TRANSFUSION TRANSMITTED INFECTION- SEROLOGY

NAME OF THE SUBJECT PAPER	: Basic - IH (Immunohematology) & TT Infection Serology
DURATION OF THEORY CLASSES	: 64 Hrs
DURATION OF PRACTICAL SESSIONS	: 64 Hrs
UNIVERSITY THEORY EXAMINATION	: 100 Marks (80 U + 20IA)
UNIVERSITY PRACTICAL EXAMINATION	: 100 Marks (80 U + 20IA)
DURATION OF THEORY EXAMINATION	: 3 Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of how to do screening test of all the whole blood and apheresis donations screened for evidence of infection prior to the release of blood and blood components for clinical or manufacturing use.

OBJECTIVES

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

- Acquire broad understanding about immunology and serology & Immuno- hematology in detail
- Understand the concept of antibodies to ABO system, Anti AB'and Anti H'antibody.
- Understand methodology to identify blood groups
- Understand different aspects of blood transfusion techniques & Investigation of transfusion reaction.
- Select blood bags for component preparation and prepare red cell concentrate, fresh frozen plasma, platelet concentrate etc. Transport and store blood components
- Acquire understanding of importance of proper and safe disposal of bio-medical waste &treatment
- Demonstrate best practices about disposal of bio-medical waste - color coding types of containers, transportation of waste, etc.
- Support the role of an infection control team
- Should be able to understand blood screening principles and disposal of reactive units.
- Should be able to validate ELISA, maintain QC

PROGRAM OUTCOMES

BBT -PO1: Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E-library.

BBT -PO2: To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.

BBT -PO3: Understanding the structure and functions of different organs in normal human body.

BBT -PO4: To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.

BBT -PO5: Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.

BBT -PO6: Understanding of blood bank department and organization in a hospital

BBT -PO7: To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.

BBT -PO8: To Learn the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion- transmission infections

BBT PO9: Understand the basic concepts of hematology and blood components in detail

BBT -PO10: Understand the immune hematological tests

BBT -PO11: To learn the transfusion therapy and newly advanced blood bank equipment's require for process

BBT -PO12: Understand Quality control, Quality policy, quality manual, Internal and external audit and process control

BBT PO13: Understand stem cell preparation, recent advances in blood banking and apheresis

BBTPO14: To identify various life style disorders and with due counseling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy.

COURSE OUTCOMES

At the end of the course, students will be able to...

IHT-CO1: Acquire broad understanding about immuno- hematology and serology

IHT-CO2: Acquaint with cardinal rules of blood grouping ABO, RH and other system of grouping, subgroup A, Bombay blood group and their antibodies.

IHT-CO3: Understand different aspects of blood transfusion techniques and Investigation of transfusion reaction

IHT-CO4: knows to perform compatible test like cross matching and also coombs test

IHT-CO5: Should be able to validate ELISA

IHT-CO6: Able to perform serological test - transfusion transmitted infection

COURSE CONTENT

UNIT	TITLE	THEORY + TUTORIALS 64 HOURS
I	<p>Introduction to Immunology</p> <ul style="list-style-type: none"> • Cells of immune system and their role: Phagocytic cells, Antigen presenting cells, T cells, T cell subsets, B cells, CD Markers. • Antigens: Immunogen, allo-antigen, soluble antigen, Red cell antigen, Epitopes immunoglobulins, characteristics of immunoglobulins, • Complement System, HLA system. <p>Antibodies:</p> <ul style="list-style-type: none"> • Polyclonal anti bodies, development of antibodies, structure of Monoclonal antibodies • Hybridoma technology, • Human monoclonal antibodies. • Antigen antibody reaction: Antigen concentration, antibody concentration, enhancing media, other factors influencing antigen antibody reaction. 	10
II	<p>Basic Principles of Immuno-hematology</p> <ul style="list-style-type: none"> • Application of Blood groups: -Population Genetics, Forensic medicine, Transfusion medicine • ABO Blood of Group Systems: History, Genetics, ABH antigens • Biochemical Synthesis of blood group antigens • Antigenic sites, weaker variants, Bombay Phenotype, ABO antibodies • Red cell serology techniques, their advantages and disadvantages • Cell and serum grouping, detection of weak A and B antigens • Secretor status. • Trouble shooting in red cell serology. • ABO incompatibility. 	10
III	<p>Rh Blood Group System:</p> <ul style="list-style-type: none"> • History, Genetics, Molecular Genetics, Nature of Rh antigens • Partial D, Weak D, other variants of Rh, RhNull • Rh antibodies factors influencing Rh 	10

	<p>immunization, Functional role of Rh antigens</p> <ul style="list-style-type: none"> • Other Blood Group Systems: Lewis, P, Ii, MNSs, Kell, Duffy, Celano, In • Private antigens, Public antigens • Principles of Direct and indirect antiglobulin test technique • Weak Rh D Typing • Antenatal Serology, Hemolytic disease of the newborn due to ABO and Rh In compatibility 	
IV	<p>Introduction to pretransfusion testing</p> <ul style="list-style-type: none"> • Pre transfusion testing - Patient specimen labelling requirements, Patient / component identification requirements • Different methods of cross matching, Saline Cross match, Saline replacement for rouleaux, enzyme technique, albumins technique • Anti-globul in cross-matching • Cross matching in special circumstances, emergency cross matching, electronic cross matching • Abbreviation of compatibility testing in emergency • Advanced technique including Micro plate and Gelcard techniques 	10
V	<p><u>Transfusion Transmitted Diseases and Bio hazardous Waste Management -Theory</u> Objective</p> <p>To teach students the pathology, epidemiology of blood transfusion transmitted infections and to train students in laboratory diagnosis and quality assurance in screening for diseases transmitted through blood transfusion. To teach basic principles proper disposal of biomedical waste generated in the blood bank laboratory. Study of major transfusion transmitted infection.</p> <p>Epidemiology and pathogenesis of Hepatitis B,C Human immunodeficiency viruses 1 and 2, HTLV viruses I and II West Nile virus(WNV).</p> <p>Implication of the other viral diseases for blood transfusions: Emerging infections like Epstein-Barr virus, cytomegalovirus (CMV), parvovirus B19 and Creutzfeldt-Jakob disease.</p> <p>Transfusion associated infectious organisms Malaria & others. Syphilis and other pathogens.</p>	24

Lab diagnosis of Malaria and syphilis by various methods and principles of each test.
Interpretation of non-Treponemal and Treponemal antibody tests used to diagnose syphilis.
Transfusion associated infections with other bacterial / fungal / protozoal infections.

ELISA test

Various types of ELISA

Laboratory screening tests for TTI, Spot tests, Limitation of various tests

Quarantine and recipient tracing, procedures for look-back and recipient follow-up

Compare & contrast various methodologies such as ELISA, rapid & Chemiluminescence used in screening of transfusion transmitted infections.

National policy on TTI testing of blood donors.

Automation in Blood donor screening

Chemiluminescence, NAT, Western Blot

Automation in blood donor TTI screening.

Confirmatory tests for TTI testing.

Demonstrate proficiency in the preparation and use of internal control in transfusion transmitted infection screening.

Quality control and documentation.

Proficiency testing - IQAS & EQAS, Pathogen reduction, Cellular components and plasma components.

Biomedical Waste management

Discard of Blood & components - infected and expired.

Documentation of records.

Universal precautions - Bio waste management.

Disposal of Reactive Bags and samples.

Demonstrate proficiency in proper disposal of bio hazardous material as per recommended standards.

Post exposure prophylaxis

PRACTICAL - BASIC IMMUNO-HEMATOLOGY (32 HOURS)

1. Determination of ABO & Rh Blood Group -slide method
2. Preparation of 3% Red Cell Suspensions
3. Determination of ABO & Rh Blood Group -tube method - cell group & Serum group
4. Determination of ABO group of red cells and serum - Microplate and Gel card test
5. Reading, Grading and Recording Results.
6. Performing Direct Anti-globulin Test.
7. Performing Indirect Antiglobulin Test.
8. Saline crossmatch.
9. Performing Anti-globulin Cross-Match.
10. Anti A and anti B titer estimation.
11. Weak D testing.
12. Identification of antisera.

PRACTICAL - TRANSFUSION TRANSMITTED DISEASES & BIOHAZARD WASTE MANAGEMENT (32 HOURS)

1. ELISA for HBsAg detection.
2. Rapid tests for HBsAg detection.
3. HCV antibody detection by ELISA.
4. HCV antibody detection by Rapid tests.
5. HIV (1+2) antibody detection by ELISA.
6. HIV (1+2) antibody detection by Rapid Tests.
7. Rapid test for Syphilis.
8. RPR test for Syphilis.
9. Malaria Parasite detection: Peripheral smear, QBC & Rapid Method.
10. Interpretation of ELISA charts.
11. Other tests.
12. Writing flow chart for testing HIV 1 & 2 and hepatitis testing.
13. Biomedical waste management exercises

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

TEXT BOOK RECOMMENDED

1. Modern Blood Banking and Transfusion practices by Denise M Harmening, 5th edition
2. Transfusion Medicine technical manual-DGHS, Ministry of Health and Family Welfare, Govt. of India, Second edition,2003
3. Blood transfusion in clinical medicine by PL Mollison
4. AABB Technical Manual, 17th ed,AABB
5. Compendium of transfusion medicine, RN Makroo
6. Practical Hematology, J A Dacie and S MLewis
7. Basic Immunology, A K Abbas and A H Lichtman. Second ed, Saunders Elsevier.
8. Essential Immunology. I Roitt, 8th ed, Blackwell scientific publications
9. Basic molecular and cell biology. David Latchman. BMJ Publishing group,1997.
10. Voluntary blood donation program NACO, Ministry of Health and Family Welfare, Govt.of India, New Delhi,2007.
11. National guide book in blood donor motivation. NACO, Ministry of Health and Family Welfare, Govt. of India.

PAPER (BBT-8) BASIC -IH (IMMUNO HAEMATOLOGY) & TRANSFUSION TRANSMITTED INFECTION- SEROLOGY - BLUE PRINT

Title of paper (Unit)	Module	Weightage	Marks Allotted	Knowledge/ Recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
PAPER-V Basic -IH (Immuno haematology)& Transfusion Transmitted Infection- Serology	i. Introduction to Immunology Antibodies	15%	12		1	2						1*
	ii. Basic Principles of Immuno- hematology	18.75%	15	1*	1	2		1	1			
	iii. RH Blood Group System:	24%	19			1	1	1	1*			
	iv. Introduction to pre transfusion testing	11.25%	9		1		1*		1			
Transfusion Transmitted Diseases and Biohazardous Waste Management	v. a) Major transfusion transmitted infection b) Transfusion associated infectious organisms c) ELISA test d) Automation in Blood donor screening e) Biomedical waste management	31.25%	25	1	1	2			1			

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100 marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions: 10 X 3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100 marks

**PAPER - (BBT-8) BASIC - IH (IMMUNOHEMATOLOGY) & TTI
(TRANSFUSION TRANSMITTED INFECTION) SEROLOGY
MODEL QUESTION PAPER**

TIME: 3 HOURS

MAXIMUM MARKS : 80

Illustrate your answers with suitable diagrams wherever necessary.

Long Question answer. Choose Any One of the Following (2X10=20)

1. a) Describe ABO system in relation to genetics, biochemistry, antigens and antibodies
(or)
b) Haemolytic disease of newborn
2. a) Describe Rh system in relation to genetics, biochemistry, antigens and antibodies.
(or)
b) Primary and secondary immune response

Short Answers. Choose Any 5 of the Following (5X6=30)

1. Procedure of discarding blood bags
2. Classical complement pathway
3. Antigen-antibody reactions
4. Hepatitis B virus
5. Types of ELISA
6. Post exposure prophylaxis

Very Short Answer. Choose Any 10 of the Following (10 X 3=30)

1. Monoclonal antibodies
2. Rhnull
3. Subgroups of A
4. Enumerate different types of immunoglobulins
5. Indications for Direct Coombs test
6. Name any 2 blood group systems apart from ABO and Rh
7. IgG immunoglobulin
8. Mixed field agglutination
9. External Quality Assurance Scheme
10. RPR method for syphilis
11. Hand washing steps
12. Preparation of Rh positive sensitized cells

II YEAR ELECTIVE COURSES

**II YEAR ELECTIVE COURSE CONTENT
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC)
ENVIRONMENTAL STUDIES**

NAME OF THE SUBJECT PAPER	: ENVIRONMENTAL STUDIES
DURATION OF THEORY CLASSES	: 16 hrs
DURATION OF PRACTICAL SESSIONS	: 32 hrs
EXAMINATION	: 100 marks (80 U + 20 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ hrs YEAR
IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

SYLLABUS

UNIT-I (Renewable and Non – renewable resources)

The multidisciplinary nature of environmental studies – Definition, scope and importance – Need for public awareness.

- 1 Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.
- 2 Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- 3 Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- 4 Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- 5 Energy resources: Growing energy needs, renewable and non-renewable energy resources, use of alternate energy sources, case studies.
- 6 Land resources: Land as a resource, land degradation, man induced Landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT-II (Ecosystems)

Concept of an ecosystem - Structure and function of an ecosystem Producers, consumers and decomposers – Energy flow in the ecosystem-Ecological succession- Food chains, food webs and ecological pyramids –Introduction, types, characteristic features, structure and function of the following ecosystem:

- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (Ponds, streams, lakes, rivers, ocean estuaries)

UNIT-III (Biodiversity and its conservation)

Introduction – Definition: genetics, species and ecosystem diversity

- Biogeographically classification of India
- Value of Biodiversity: Consumptive use, productive use, social, ethical aesthetic and option values

- Biodiversity at global, national and local levels
- India as a mega- diversity nation
- Hot-spots of biodiversity-Threats to biodiversity: habitat loss, poaching of wildlife, man wildlife conflicts
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT-IV (Environmental Pollution)

Definition- causes, effects and control measures of:

- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear pollution
- Solid waste Management: causes, effects and control measures of urban and industrial wastes – role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT-V

Social Issues and the Environment: From unsustainable to sustainable development – Urban problems and related to energy – Water conservation, rain water harvesting, watershed management –Resettlement and rehabilitation of people; its problems and concerns. Case studies - Environmental ethics: issues and possible solutions climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

- Wasteland reclamation – Consumerism and waste products –Environmental Protection Act – Air (Prevention and Control of Pollution) Act – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act - Issues involved in enforcement environmental legislation – Public awareness
- Human Population and the Environment: Population growth, variation among nations – Population explosion – Family welfare Programmes –Environment and human health- Human Rights - Value Education- HIV/ AIDS - Women and Child Welfare- Role of Information Technology in Environment and Human Health – Case Studies.

FIELD WORK

1. Visit to local area to document environmental assets- river/ forest/ grassland / hill / mountain
2. Visit to a local polluted site - Urban / Rural / Industrial / Agricultural
3. Study of common plants, insects, birds
4. Study of simple ecosystems- pond, river, hill slopes, etc.

TEXT BOOKS RECOMMENDED

1. Agarwal, K.C. Environmental Science, Nidi Publishers.
2. BharuchaErach, The Biodiversity of India, Mapin Publication.
3. Brunner RC, Hazardous waste incineration, McGraw Hill Publishers.
4. Iaclhav H, Environmental Protection and Laws, Himalaya Publication.
5. Odum EP, fundamentals of Ecology, WB Sannders Publication.

TEACHING LEARNING ACTIVITIES

The course content in Environmental Studies will be covered by:

1. Interactive Lectures
2. Group Discussions
3. Field Visits

SKILL- BASED ELECTIVE COURSES - II YEAR
GOOD CLINICAL LABORATORY PRACTICE

NAME OF THE SUBJECT PAPER	: Good Clinical Laboratory practice
DURATION OF THEORY CLASSES	: 16 Hrs
DURATION OF PRACTICAL SESSIONS	: 32 Hrs
PRACTICAL EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY THEORY EXAMINATION	
DURATION OF EXAMINATION	: 1 ½ Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

THEORY & PRACTICALS (DURATION 16 + 32 Hours)

Learning Objective

- To understand the relevance, importance and basic concepts of good laboratory practices
- To apply the knowledge to become familiar with the basic laboratory skills

UNIT I: INTRODUCTION

Introduction to Bioethics and Biosafety. Biosafety Guidelines and Regulations. Legal and Socio-economic Impacts of Biotechnology. Use of Genetically Modified Organisms and their Release in the Environment. Hazardous Materials used in Biotechnology their Handling and Disposal.

UNIT II: GOOD LABORATORY PRACTICE PRINCIPLE

Test Facility Organization and Personnel: Management responsibility, Study directors responsibility, safety measures and personal responsibility. Quality assurance program. Facilities: Test System Facilities, Facilities for Handling test and Reference Substances. Archive Facilities. Waste Disposal, Animal Care Facilities, Animal Supply Facilities.

UNIT III: STANDARDIZED OPERATING PROCEDURES

Definition, Initiation of SOP, Preparation of SOP, Administration, Distribution and Implementation. Maintenance of laboratory records. Formatting SOP, Reagent/materials certification, Certification of analysts, Certification of laboratory facilities, Documentation and maintenance of record.

UNIT IV: DATA REPORTING AND STORAGE

Performance of study, Study plan, Conduct of study, reporting of results. Archival storage of records and reports.

Learning Outcome

- To understand the implications of good laboratory practices

**SKILL- BASED ELECTIVE COURSES - II YEAR
COMPUTER APPLICATIONS**

NAME OF THE SUBJECT PAPER	: COMPUTER APPLICATIONS
DURATION OF THEORY CLASSES	: 16 Hrs
DURATION OF PRACTICAL SESSIONS	: 32 Hrs
PRACTICAL EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY THEORY EXAMINATION	
DURATION OF EXAMINATION	: 1 ½ Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

THEORY & PRACTICALS (DURATION 16 + 32 Hours)

UNIT - I - Introduction to Computers

- Concepts of Computers
- Hardware and software trends and technology
- Classification of computers
- Application of computers in Laboratories

UNIT - II - Operating System

- Introduction
- Types of operating systems
- Windows

UNIT - III -Multimedia

- Types and uses
- Computer aided teaching and testing

UNIT – IV -Internet

- Introduction to Internet
- Use of Internet and e- mail
- Statistical packages

LIST OF PRACTICAL EXERCISES

1. Computer operating systems like MS-DOS and WINDOWS
2. Study of software packages like Chem Draw, Tinker and Microsoft package. Unit - Typing text in MS word- manipulating text- formatting the text - using different font sizes, bold, italics, Bullets and numbering - pictures, file insertion - aligning the text and justify - choosing paper size - adjusting margins- header and footer, inserting page numbers in a document - printing a file with options - using spell check and grammar - find and replace mail merge - inserting tables in a document.

Creating table in MS - Excel - cell editing - using formulas and functions - manipulating data with excel - using sort function to sort numbers and alphabets - drawing graphs and charts using data in excel - auto formatting - inserting data from other worksheets Preparing new slides using MS- POWER POINT - inserting slides - slide transition and animation - using templates - different text and font sizes - slides with sounds - inserting clip arts, pictures, tables and graphs - presentation using wizards.

Internet- using search engine - Google search - Exploring the text Explorer and Navigator - uploading and downloading of files and images E mail ID creation - sending messages - attaching files in E- mail

TEACHING LEARNING ACTIVITIES

The course content in Computer Applications will be covered by:

1. Interactive Lectures
2. Lab

SKILL- BASED ELECTIVE COURSES - II YEAR
Library and E-resource

NAME OF THE SUBJECT PAPER	: Library and E-resource
DURATION OF THEORY CLASSES	: 16 Hrs
DURATION OF PRACTICAL SESSIONS	: 32 Hrs
PRACTICAL EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY THEORY EXAMINATION	
DURATION OF EXAMINATION	: 1 ½ Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

THEORY & PRACTICALS (DURATION 16 + 32 HOURS)

Course Objectives

- To enable the students to understand at different levels of information systems in the society
- and their functions.
- To enable the students apply their knowledge in various library practice.
- To enable the students to understand the basic concepts of the Health Sciences.

UNIT: 1

Evolution, growth and development of LIS in India-current trends.

Type of libraries: Academic, Public and special Libraries (Health Science Libraries).

UNIT: 2

Library concepts & Legislation: Five laws of Library science, Professional ethics of librarian, Delivery of books and newspaper act/Intellectual Property/Plagiarism.

UNIT: 3

Library Association and International Bodies: Library Association -ILA, IASCIC, ALA, IFLA and UNESCO, SALIS, MLAI (Medical Library Association of India).

UNIT: 4

Library Rules & Regulation, Stock Verification, Annual Reports, Budgets, Library buildings, furniture, equipment's.

SKILL- BASED ELECTIVE COURSES - II YEAR PUBLIC HEALTH AND HYGIENE

NAME OF THE SUBJECT PAPER	: Public Health and Hygiene
DURATION OF THEORY CLASSES	: 16 Hrs
DURATION OF PRACTICAL SESSIONS	: 32 Hrs
EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

THEORY & PRACTICALS (DURATION 16 + 32 Hours)

Learning objectives

- To understand the concepts, significance and relevance of public health and hygiene
- To understand the health hazards as associated with public health and hygiene

I Introduction

Definition and Concept of Public Health, historical aspects, public health system in India and in the rest of world

II Aspects of health

Indicators of health, Determinants of Health, (Social, Economic, Cultural, Environmental, Education, Genetics, Food and Nutrition). Burden and prevention of disease. Environmental health- sanitation, air, water pollution, waste management. Mental health.

III Epidemiology

Introduction, principles and concepts, study design, analysis methods, presentation and interpretation of epidemiological data

IV Hygiene concepts

Definition, importance, personal hygiene, medical hygiene, food hygiene, industrial hygiene.

Learning outcomes

- To understand public health and hygiene issues, their relevance and significance as can be practiced in real-life situations.

Text Books

1. Introduction to Public Health, Raymond L. Goldsteen, Karen Goldsteen, David G. Graham, 2011, Springer publishing company
2. Introduction To Community Health Nursing, KasturiSundarRao, 4th edition, Bi Publications Pvt Ltd
3. Concepts of Epidemiology, Raj S Bhopal, 2002, Oxford University press

Reference Books

1. A Treatise On Hygiene And Public Health, BirendraNathGhosh, 9th edition, Calcutta Scientific Publishing Co
2. An Introduction to Public Health, Caryl Thomas, 1949, John Wright and SonsLtd.,

GENERIC ELECTIVE COURSES - II YEAR BASIC PSYCHOLOGY

NAME OF THE SUBJECT PAPER	: Basic Psychology
DURATION OF THEORY CLASSES	: 64 Hrs
EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

THEORY (64 Hours)

LEARNING OBJECTIVES

After completing the course the student can able to

- To identify the emerging specialties
- To understand the behavior and mental processes
- How the theories and principles of psychology may be applied to individual, societal and global issue
- Explain the application of psychology in Allied Health Sciences

Unit I: Introduction

Introduction to applied Psychology, Scientific methods in Psychology, Application of Psychology: Psychology in Industry, community, family, education, health, self-development, Human relations. Scope of psychology with special relevance to Allied Health Sciences.

Unit II: various cognitive processes and their application

Factors affecting learning, Importance of studying Psychology of learning in relation to Allied Health Sciences

Memory and forgetting, Kinds of remembering, the nature of forgetting, Improving memory, relevance to Allied Health Sciences

Intelligence, Normal distribution of intelligence levels, Intelligence Testing, Intelligence tests, Uses and abuses of intelligence tests, relevance of intelligence and aptitude for Allied Health Sciences

Unit-III: Life style, Health, Stress and Coping Behavior

Cultural evolution, Life style choices and consequences, Healthy and Unhealthy life styles. Nutrition, Physical fitness, Smoking and Drinking. Stress and Health, The biological basis of stress, Stress and Physical functioning, Coping with stress, Adjustment a lifelong process. Cognitive appraisal and Stress, Stressful life styles,

Coping with everyday stress, Sources of stress, Coping styles and Strategies, Stress inoculation training.

Unit IV : Psychology of Vulnerable Individuals

Psychology of the challenged, types of disability, effects of disability, psychology of women, women and health, dealing with alcoholics and their families, post-traumatic stress disorder, psychology of the sick and ill, how patients react to chronic illness, effects of illness and hospitalization

REFERENCE BOOKS

1. Clifford T. Morgan, Richard a. King, John R. Weis and John Schopler, –Introduction to Psychologyll - 7th Edition. Tata McGraw Hill Book Co. New Delhi, 1993.
2. Ernest R. Hillgard, Richard C. Atkinson, Rita L. Atkinson, –Introduction to Psychologyll 6th Edition, Oxford IBH publishing Co. Pvt. Ltd., New Delhi, 1975.
3. Baron.A. Robert, Psychology, Pearson Education Vth Ed., 2002
4. Psychology -the science of behavior -fifth edition 1982-Neil Carson-William Bulkist- Allyn and Bacon.

GENERIC ELECTIVE COURSES - II YEAR SOCIOLOGY

NAME OF THE SUBJECT PAPER	: SOCIOLOGY
DURATION OF THEORY CLASSES	: 64 Hrs
EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ Hrs
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

THEORY (64 Hours)

Unit 1: Sociology: Discipline and Perspective

- Thinking Sociologically
- Emergence of Sociology, Sociology as a science; Sociology and Common Sense
- Some Basic Concepts: Association; Aggregates: Community, Categories, Groups and its Forms; Status and Role; Norms and Values.
- Individual and Society; Socialization: Concept and Agencies; Culture -meaning and characteristics; Types of culture - popular, elitist, folk, and consumer cultures; Pluralism and Multiculturalism, Culture and Personality.

Unit 2: Sociology and Other Social Sciences

- Sociology and Social Anthropology
- Sociology & Psychology
- Sociology & History

Unit 3: Human Society

- Social Institutions and Social Processes
 - Social control: meaning, agencies and mechanisms
 - Conformity and Deviance.
 - Social Change, definition, factors, Social Mobility
1. Anthony Giddens : Sociology
 2. G. Rocher: A General Introduction to Sociology
 3. George Ritzer. Encyclopaedia of sociology
 4. Harry M. Johnson Sociology

GENERIC ELECTIVE COURSES - II YEAR ENTREPRENEURSHIP ESSENTIALS

NAME OF THE SUBJECT PAPER	: Entrepreneurship essentials
DURATION OF THEORY CLASSES	: 64 Hrs
EXAMINATION	: 50 Marks (40 U + 10 IA)
NO UNIVERSITY PRACTICAL EXAMINATION	
DURATION OF THEORY EXAMINATION	: 1 ½ Hrs.
YEAR IN WHICH THE SUBJECT PAPER IS TAUGHT	: II YEAR

THEORY (64 Hours)

LEARNING OBJECTIVES

- To understand the fit between you and your entrepreneurial ambitions
- To find a problem worth solving
- To identify your customers
- To develop a solution for your customers' problems and problem solution
- To build and demonstrate an MVP
- To structure a business model around the problem, customer, and solution and present your Business Model Canvas

UNIT - I ORIENTATION

What is entrepreneurship - myths about entrepreneurship - impact of an entrepreneur and social entrepreneurship - wealth building and making an impact

IDEA/PROBLEM

What is a business opportunity and how to identify it - Methods for finding and understanding problems - (Observation, Questioning, DT, Jobs to be done (JTBD) - Introduction to Design Thinking - Process and Examples - Generate ideas that are potential solutions to the problem identified.

UNIT - II

CUSTOMER

The difference between a consumer and a customer (decision maker); Market Types, Segmentation and Targeting, Defining the personas; Understanding Early Adopters and Customer Adoption Patterns - Identify the innovators and early adopters for start-up - Basics of Lean Approach and Canvas; Types of Business Models (b2b; b2c)

UNIT - III

BUSINESS MODEL AND VALIDATION

Introduction to Risks; Identify and document your assumptions (Hypotheses); Identify the riskiest parts of Plan - Develop the Solution Demo - Sizing the Opportunity - Building an MVP (Minimum Viable Product)

UNIT - IV

MONEY AND TEAM

Revenue Streams: Basics of how companies make money - Understand income, costs, gross and net margins - Identify primary and secondary revenue streams - Pricing and Costs - Financing Your New Venture - Team Building: Role of a good team in a venture's success; What to look for in a team; How do you ensure there is a good fit? Defining clear roles and responsibilities

UNIT - V

MARKETING AND SALES

Positioning - channels and strategy - sales planning - Importance of project management to launch and track progress - Understanding time management, workflow, and delegation of tasks- Business regulation: Basics of business regulations of starting and operating a business - Importance of being compliant and keeping proper documentation

LEARNING OUTCOMES

- This course will give the students the foundational experience of the entire cycle of entrepreneurship, through a combination of theory and practice.
- Students will learn what it takes to be an entrepreneur, recognizing business opportunities and the basics to create launch and manage new businesses.
- The participating students will create a campus venture or a "real" venture of their own to practice the concepts taught during the program. The course is built in a modular fashion such that colleges can tailor their offerings to cover either the entire offering (idea to an MVP) or limit to building a business model.

III YEAR

**B.Sc - BLOOD BANKING TECHNOLOGY
FACULTY OF ALLIED HEALTH SCIENCES
SRI BALAJI VIDYAPEETH
(Deemed to be University)
Accredited by NAAC with A'Grade**

III YEAR

CORE SUBJECTS

1. Advanced Immunohematology& Immunology
2. Blood Bank Equipments & Transfusion Therapy
3. Quality Control and Documentation
4. Apheresis and Recent Advances

Discipline Elective Course (DEC) - Choose any TWO

1. Biomedical Waste Management
2. Palliative care
3. Biochemistry & molecular biology
4. Pharmacology

AHS COURSE CONTENT THIRD YEAR B.SC. BLOOD BANKING TECHNOLOGY

Faculty code	Category	Course Title	Hours					Credits				
		Subjects	Theory	Practical	Tutorials	Clinical training	Total hours	Lecture	Practical	Tutorials	Clinical training	Total credits
AHS	BBT -9	Advanced Immunohaematology & Immunology	64	64				4	2			6
AHS	BBT -10	Blood Bank Equipments & Transfusion Therapy	64	64				4	2			6
AHS	BBT -11	Quality Control and Documentation	80		32			5		1		6
AHS	BBT -12	Apheresis and Recent Advances	80		32			5		1		6
AHS		Clinical rotation				256					8	8
AHS	DE 1-8	Student's choice	64					4				4
AHS	DE 1-8	Student's choice	64					4				4
			416	128	64	256	864	26	4	2	8	40

SCHEME OF EXAMINATION

Papers	Subject	Theory		Practical		UIA*	Grand Total (900)	Min Pass Marks (450)
		UE	IA	UE	IA			
BBT -9	Advanced Immuno haematology& Immunology	80	20	80	20		200	100
BBT -10	Blood Bank Equipments & Transfusion Therapy	80	20	80	20		200	100
BBT -11	Quality Control and Documentation	80	20				100	50
BBT -12	Apheresis and Recent Advances	80	20				100	50
BBT -CT2	Clinical Training BBT 9 to 12					100	100	50
DEC	Discipline elective	80	20				100	50
DEC	Discipline elective	80	20				100	50

**ADVANCED
IMMUNOHEMATOLOGY &
IMMUNOLOGY**

PAPER-BBT -9 ADVANCED IMMUNOHAEMATOLOGY & IMMUNOLOGY

NAME OF THE SUBJECT PAPER	: ADVANCED IMMUNO HAEMATOLOGY & IMMUNOLOGY
DURATION OF THEORY CLASSES	: 64 HRS
DURATION OF PRACTICAL SESSIONS	: 64HRS
UNIVERSITY THEORY EXAMINATION	: 100 MARKS (80 U + 20IA)
UNIVERSITY PRACTICAL EXAMINATION	: 100 MARKS (80 U + 20IA)
DURATION OF THEORY EXAMINATION	: 3 HRS
YEAR IN WHICH SUBJECT PAPER IS TAUGHT	: III YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of various advanced technologies such as gel, solid phase, and column agglutination in Immunohematology

OBJECTIVES

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

1. Should be able to interpret immune hematological tests.
2. Should be able to provide consultation to physicians regarding transfusion management

PROGRAM OUTCOMES

BBT -PO1: Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E- library.

BBT -PO2: To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.

BBT -PO3: Understanding the structure and functions of different organs in normal human body.

BBT -PO4: To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.

BBT -PO5: Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.

BBT -PO6: Understanding of blood bank department and organization in a hospital

BBT -PO7: To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.

BBT -PO8: To Learn the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion- transmission infections

BBT PO9: Understand the basic concepts of hematology and blood components in detail

BBT -PO10: Understand the immune hematological tests

BBT -PO11: To learn the transfusion therapy and newly advanced blood bank equipment's require for process

BBT -PO12: Understand Quality control, Quality policy, quality manual, Internal and external audit and process control

BBT PO13: Understand stem cell preparation, recent advances in blood banking and apheresis

BBTPO14: To identify various life style disorders and with due counselling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy.

COURSE OUTCOMES

At the end of the course, students will be able to...

AIHI-CO1: Able to interpret immune hematological tests.

AIHI-CO2: Able to provide consultation to physicians regarding transfusion management

AIHI-CO3: Able to provide opinion for difficult transfusions, incompatibility work up, therapeutic plasma apheresis irradiated blood therapy, stem cell procedures, platelet rich plasma therapies, HLA and cord blood banking.

AIHI-CO4: knowledge of immunohematology and its application to ensure safe transfusion practices

AIHI-CO5: Advanced study of immunological principles in diagnostic testing; problems and Solutions to compatibility testing for blood components

COURSE CONTENT

UNIT	TITLE	THEORY + TUTORIALS 64 HOURS
I	<p>Interpretation of ABO grouping Solving ABO and Rh grouping discrepancies Subgroups of ABO Poly agglutination.</p> <p>Other Blood Group Systems Lewis, P, Ii, MNSs, Kell, Duffy, Celano, In, Private antigens and Public antigens, Antibody identification Use of enzymes in blood banking, potentiators and special reagent in blood grouping and cross matching, Investigation of autoimmune hemolytic anemia.</p>	16
II	<p>Antibody screening Antibody identification- 11 cell & extended cellpanel. Detection of blood group antibodies, identification of their Specificity, Clinical significance of antibody detection, Differentiation between auto and allo-antibodies Gel Technology Antenatal Serology Rh Incompatibility and other allo-antibodies Kleihauertest Erythrocyte resetting test and other tests.</p>	20
III	<p>Preparation Red Cell panels Elution & Adsorption Procedures. Reagents used in advanced immunohematology. Cryopreservation & thawing techniques of cell Panels and Red blood cells</p>	6
IV	<p>Newer techniques Gel technology and Plate technology, Virtual Cross match and Molecular blood grouping Automaton in blood grouping Saliva testing</p>	6

v	<p>Advanced Immunology General principles of Immunology and Complement System HLA SYSTEM HLA antigens HLA antibodies HLA Serology HLA phenotyping and Various Histocompatibility matching procedures-CDC, ELISA, chemiluminescence and Flow cytometry methods Molecular methods Molecular methods in Immunology. Establishment of HLA lab for transplantation of organs</p>	16
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PRACTICAL (64 HOURS)

1. Detecting weak A and B antigens and antibodies by cold temperature enhancement
2. Confirming weak A or weak B subgroup by adsorption and elution
3. Testing saliva for A, B and H antigens
4. Confirming anti-A1 in an A2 or weak A subgroup
5. Testing for weak D
6. Removing autoantibody by saline washes
7. Immediate spin compatibility testing
8. Detecting antibodies to red cell by indirect antiglobulin test
9. Saline indirect antiglobulin test
10. LISS additive indirect antiglobulin test
11. Poly ethylene glycol indirect antiglobulin test
12. Differentiating agglutination from rouleaux - saline replacement
13. Direct antiglobulin test
14. Testing for fetomaternal hemorrhage - Rosette test
15. Modified Kleihauer Betke test for demonstration of fetal cells
16. Antibody screening and detection by using various number of red cell panel.
17. Elution & Adsorption Procedures
18. Preparation red cell panels

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

TEXT BOOKS

1. Modern Blood Banking and Transfusion practices by Denise M Harmening, 5th edition
2. Transfusion Medicine technical manual-DGHS, Ministry of Health and Family Welfare, Govt. of India, Second edition,2003
3. Indian Drugs and cosmetic act and rules 1945 pertaining to Blood bank AABB Technical Manual, 17th ed, AABB
4. Compendium of transfusion medicine, RNMakroo
5. Practical Hematology, J A Dacie and S MLewis
6. Basic Immunology, A K Abbas and A H Lichtman. Second ed, Saunders Elsevier.
7. Essential Immunology. I Roitt, 8th ed, Blackwell scientific publications
8. Basic molecular and cell biology. David Latchman. BMJ Publishing group, 1997.
9. Standards for blood banks and blood transfusion services, NACO, Ministry of Health and Family Welfare, Govt. of India, New Delhi 2007
10. Indian & other Pharmacopeia pertaining to blood products

PAPER (BBT-9) ADVANCED IMMUNOHEMATOLOGY & IMMUNOLOGY BLUE PRINT

Title of paper (Unit)	Module	Weightage	Marks Allotted	Knowledge/ Recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
PAPER - I (BBT-10) Advanced Immunohematology & Immunology	i. Interpretation of ABO grouping: Other Blood Group Systems:	35%	28	11		2		1	2			
	ii. Antibody screening.	15%	12	1*	1	2						1*
	iii. Preparation Red Cell panels	11.25%	9		1	1		1*				
	iv. Newer techniques	11.25%	9		1	1	1*		1*			
	v. Advanced Immunology HLA typing & methods Molecular methods in Immunology	28%	22	1	1	2						

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100 marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions: 10 X 3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100 marks

PAPER - BBT- 9 ADVANCED IMMUNOHAEMATOLOGY & IMMUNOLOGY
MODEL QUESTION PAPER

TIME: 3 HOURS

MAXIMUM MARKS: 80

Illustrate Your Answers with Suitable Examples Diagrams Wherever Necessary.

Long Answer Question

(2X10=20)

1. a) Classify and explain ABO discrepancies

(or)

b) Automation in blood grouping

2. a) Define and classify HLA antigens.

(or)

b) Antibody screening and identification using cell panels

Short Answers. Choose Any 5 of the Following

(5X6=30)

1. Polyagglutination

2. Duffy blood group system

3. Elution and adsorption

4. Testing for fetal haemorrhage

5. Chemilume scences

6. Virtual crossmatch

Very Short Answer. Choose Any 10 of the Following

(10 X 3=30)

1. Polyethyleneglycol

2. Enumerate subgroups of B

3. Thawing

4. Saline replacement technique

5. Anti-gram

6. Name two lectins in blood group serology

7. Name two agents for cryo preservation

8. Factors affecting sensitivity of indirect antiglobul in test

9. Computer cross match.

10. Kleihaur test.

11. HLA Serology.

12. HLA Antibodies

BLOOD BANK EQUIPMENTS & TRANSFUSION THERAPY

PAPER- BBT-10 BLOOD BANK EQUIPMENTS AND TRANSFUSION THERAPY

NAME OF THE SUBJECT PAPER	: BLOOD BANK EQUIPMENTS & TRANSFUSION THERAPY
DURATION OF THEORY CLASSES	: 64 HRS
DURATION OF PRACTICAL SESSIONS	: 64HRS
UNIVERSITY THEORY EXAMINATION	: 100 MARKS (80 U + 20IA)
UNIVERSITY PRACTICAL EXAMINATION	: 100 MARKS (80 U + 20 IA)
DURATION OF THEORY EXAMINATION	: 3 HRS
YEAR IN WHICH SUBJECT PAPER IS TAUGHT	: III YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of all reliable instruments to meet the blood banking needs and also about the transfusion therapy.

OBJECTIVES

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

- Understand the conditions when blood transfusion is required
- Identify the blood requirements of a patient, and the minimum information required to correctly identify the blood product
- Immediately respond to the demand of a blood for transfusion
- Ensure timely collection of correct blood product from the storage area

Check and verify the details of the blood with the patient requirements before issuing out the blood clearly and accurately document all there Levant information

- Safely handle the blood products
- Assist in patient monitoring during blood transfusion, if required

PROGRAM OUTCOMES

BBT -PO1: Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E- library.

BBT -PO2: To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.

BBT -PO3: Understanding the structure and functions of different organs in normal human body.

BBT -PO4: To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.

BBT -PO5: Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.

BBT -PO6: Understanding of blood bank department and organization in a hospital

BBT -PO7: To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.

BBT -PO8: To Learn the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion- transmission infections

BBT PO9: Understand the basic concepts of hematology and blood components in detail

BBT -PO10: Understand the immune hematological tests

BBT -PO11: To learn the transfusion therapy and newly advanced blood bank equipment's require for process

BBT -PO12: Understand Quality control, Quality policy, quality manual, Internal and external audit and process control

BBT PO13: Understand stem cell preparation, recent advances in blood banking and apheresis

BBTPO14: To identify various life style disorders and with due counselling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy.

COURSE OUTCOMES

At the end of the course, students will be able to...

TTBBE -CO1: Understand the conditions when blood transfusion is required

TTBBE -CO2: Identify the blood requirements of a patient, and the minimum information required to correctly identify the blood product

TTBBE -CO3: Immediately respond to the demand of a blood for transfusion

TTBBE -CO4: Ensure timely collection of correct blood product from the storage area

TTBBE -CO5: Check and verify the details of the blood with the patient requirements before issuing out the blood

TTBBE -CO6: Assist in patient monitoring during blood transfusion, if required; Understand the judicious use of blood

COURSE CONTENT

UNIT	TITLE	THEORY + PRACTICALS 64 HOURS
I	Management of Blood Bank Issue Counter <ul style="list-style-type: none"> ▪ Criteria for acceptance of requisition form. ▪ Inspection and selection of blood component. ▪ Plan for transfusion. ▪ Criteria for issue of blood and blood Components. 	5
II	Indications for Transfusion Therapy <ul style="list-style-type: none"> ▪ Use red cell components in of different types of anemia, ▪ Use of blood components in bleeding patient, ▪ Neonatal transfusion. ▪ Transfusion practices in surgery, ▪ Selection of units for cross matching, ▪ Transfusion therapy for oncology and Transplantation patients. ▪ Transfusion indications for Red blood cells, Platelets, Plasma / cryoprecipitate, Granulocytes. ▪ Use of returned unused blood components from different blood bank ▪ Acceptance of blood components from other recognized Blood bank ▪ Pre Transfusion strategies in special cases regarding samples, techniques and protocols in special patients circumstances -Paediatric / neonatal, Obstetric including intra uterine, cardiac surgery with CPB. ▪ Burns & Trauma patients. ▪ MSBOS (maximal surgical blood order schedule) ▪ Immune haemolytic anaemia (warm and cold agglutinins) 	20
III	Complications of Transfusion therapy <ul style="list-style-type: none"> • Blood administration, monitoring, use of transfusion filters, post transfusion care. • Identifying type and grade of transfusion reaction. • Bedside management • Fetal and neonatal thrombocytopenia. • Granulocyte transfusion. • Platelet refractoriness Recognition and evaluation. • Calculation of CCI and platelet recovery 	13
IV	Introduction to Special Transfusion therapies <ul style="list-style-type: none"> • Intrauterine transfusions. • Cardiac surgeries. • Massive transfusion protocols. • Switching ABO / Rtypes. 	10

V	<p>Transfusion reactions- diagnosis and reporting:</p> <ul style="list-style-type: none"> • Classification, Pathophysiology, Investigations, diagnosis and reporting. • Hemovigilance • Haemolytic transfusion reaction - immediate and delayed; • Immune and non-immune reaction patho physiology. • Clinical signs and symptoms and laboratory investigation for HTR, Transfusion reaction works up. • Non- haemolytic transfusion reactions Immediate and delayed • Bacterial contamination, febrile reaction, Allergic reaction, Transfusion related lung injury. • PTP, Allo immunization, Iron overload, Graft versus host disease. • Infectious complications: Bacterial, parasitic, viral, prions. • Current risk & Prevention strategies of transfusion reactions and rational use of blood components <p>BLOOD BANK EQUIPMENTS</p> <ul style="list-style-type: none"> • General Lab equipments • Colorimeters & Elisa readers, washers, Thermometers • Weighing devices • Refrigerators • Platelet agitators & Incubators • Deep freezers • Thawing bath & devices • Plasma expressers • Sterile connecting devices • Apheresis equipment's • Computers • Software & Hardware • Temperature regulating devices (Incubators, Hot air oven) • Autoclaves • Cell washers • HIS • Automation platforms • Blood serology: Various reagents & Kits 	16
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	<p>ordering, specifications & Documentation</p> <ul style="list-style-type: none"> • Ordering, specifications, procuring and documentation of TTI kits and all reagents • Ordering, procuring and documentation of all equipments • Bio safety cabinets • Miscellaneous equipments 	
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PRACTICAL - TRANSFUSION THERAPY (64 HOURS)

1. Labeling and documentation during Issue of blood components
2. Type of component required and no. of units required as per variety of clinical conditions and assessment
3. Post transfusion investigations to study of efficacy of transfused components
4. Sample to be collected in a case of suspected of blood transfusion reaction
5. Visual inspection of serum and plasma for haemolysis and investigations done to demonstrate haemolysis.
6. Investigation of a Transfusion reaction
7. Reporting transfusion reaction workup
8. Transfusion reaction case studies -Charts.

EQUIPMENTS PRACTICAL

1. Calibration of various equipment- Daily and Half yearly
2. Maintenance of equipment
3. HIS entry of all particulars with generation of Inventory, Master register and documentation
4. Working or demonstration of semi-automated and fully automated Platform

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book

3. Assignments
4. Oral Presentations

TEXT BOOKS

1. Modern Blood Banking and Transfusion practices by Denise M Harmening, 5th edition
2. Transfusion Medicine technical manual-DGHS, Ministry of Health and Family Welfare, Govt. of India, Second edition, 2003
3. Indian Drugs and cosmetic act and rules 1945 pertaining to Blood bank AABB Technical Manual, 17th ed, AABB
4. Compendium of transfusion medicine, RNMakroo
5. Standards for blood banks and blood transfusion services, NACO, Ministry of Health and Family Welfare, Govt. of India, New Delhi2007
6. Indian & other Pharmacopeia pertaining to blood products

PAPER-BBT-10 BLOOD BANK EQUIPMENTS AND TRANSFUSION THERAPY BLUE PRINT

Title of paper (Unit)	Module	Weightage	Marks Allotted	Knowledge/ Recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSA Q(3)	LAQ (10)	SAQ (6)	VSA Q(3)	LAQ (10)	SAQ (6)	VSA Q(3)
Paper - II Bbt-10 Blood Bank Equipme nts And Transfus ion Therapy	i. Manageme nt of blood bank counter.	18.75%	15		1	2		1*	1			
	ii. Indicatio ns for Transfusio n Therapy	30%	24	1*	1			2	2			1*
	iii. Complic a tions of Transfusio n therapy:	20%	16	1		1						1
	iv. Introduc t ion to Special Transfusio n therapies	11.25%	9			1	1*	1				
	v. transfusion reactions	20%	16	1		2						

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100 marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions: 10 X 3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100 marks

PAPER-BBT-10 TRANSFUSION THERAPY AND BLOOD BANK EQUIPMENTS
MODEL QUESTION PAPER

TIME: 3 HOURS

MAXIMUM MARKS:80

Illustrate your answers with suitable diagrams wherever necessary.

(a) Long Question **(2X10=10)**

1. a) Define transfusion trigger and various indications for transfusion of packed red cells
(or)
- b) Disseminated intravascular coagulation
2. a) Blood bank refrigerator vs Domestic refrigerator
(or)
- b) Define adverse transfusion reactions and classify them.

(b) Short Answers. Choose Any 5 of the Following **(5X6=30)**

1. Massive transfusion protocol (MTP)
2. Maximum surgical blood ordering schedule
3. Emergency release of blood units
4. Apheresis instruments
5. Autoclave
6. Autologous blood donation

(c) Very Short Answer. Choose Any 10 of the Following **(10 X 3=30)**

1. Name 2 indications for platelet transfusions
2. Steps involved in monitoring transfusions
3. INR
4. Principle of Thrombo elastogram
5. Blood group switching over
6. Postoperative blood salvage
7. Storage of platelet rich plasma
8. Indications for in trauterine transfusions
9. Plateletre fractoriness
10. Calibration of various blood bank equipments
11. Formula for calculating CCI
12. Indications for blood warming

QUALITY CONTROL & DOCUMENTATION

PAPER-BBT-11- QUALITY CONTROL & DOCUMENTATION

NAME OF THE SUBJECT PAPER	: QUALITY CONTROL & DOCUMENTATION
DURATION OF THEORY CLASSES	: 80 HRS
DURATION OF TUTORIAL SESSIONS	: 32HRS
UNIVERSITY THEORY EXAMINATION	: 100 MARKS (80 U + 20IA)
UNIVERSITY PRACTICAL EXAMINATION	: NO
DURATION OF THEORY EXAMINATION	: 3 HRS
YEAR IN WHICH SUBJECT PAPER IS TAUGHT	: III YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of quality systems include Organizational management; Standards; Documentation; Training and Assessment of Blood bank.

OBJECTIVES

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

- Understand the significance of quality, perception & its dimension
- Understand the components of quality system
- Understand the process of quality system, Hospital Information System, Quality Improvement Plan, Total Quality Management
- Understand the importance and method of Observing and reporting while dealing with patients during sample and report collection
- Efficiently handle the blood donations and perform relevant documentations

PROGRAM OUTCOMES

BBT -PO1: Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E- library.

BBT -PO2: To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.

BBT -PO3: Understanding the structure and functions of different organs in normal human body.

- BBT -PO4:** To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.
- BBT -PO5:** Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.
- BBT -PO6:** Understanding of blood bank department and organization in a hospital
- BBT -PO7:** To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.
- BBT -PO8:** To Learn the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion- transmission infections
- BBT PO9:** Understand the basic concepts of hematology and blood components in detail
- BBT -PO10:** Understand the immune hematological tests
- BBT -PO11:** To learn the transfusion therapy and newly advanced blood bank equipment's require for process
- BBT -PO12:** Understand Quality control, Quality policy, quality manual, Internal and external audit and process control
- BBT PO13:** Understand stem cell preparation, recent advances in blood banking and apheresis
- BBTPO14:** To identify various life style disorders and with due counseling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy.

COURSE OUTCOMES

At the end of the course, students will be able to...

- QCD -CO1:** Understand the significance of quality, perception & its dimension
- QCD -CO2:** Understand the significance of attending CME's for technician
- QCD -CO3:** Develop a broad understanding regarding-Hospital Information System, Quality Improvement Plan, Total Quality Management
- QCD -CO4:** Differentiate between quality control and assurance
- QCD -CO5:** Understand the factors which influences quality of care

COURSE CONTENT

UNIT	TITLE	THEORY + TUTORIALS 80 HOURS
I	Quality control System <ul style="list-style-type: none"> • Quality control of empty blood bags. • Quality control of different blood bank Components • Sterility test on component. • Quality control of blood bags • Quality Assurance Hb & PCV • Quality control of blood group ingreagents • QC of anti-human globulin reagent, bovine albumin, Normal saline, Antisera etc. • QC of TTI test kits - Elisa &Rapid 	20
II	Equipment's <ul style="list-style-type: none"> • Quality control of all equipment's, • Calibration, validation and maintenance of blood bank equipment. • QC of blood bank techniques Quality Assurance - Temperature Records, Sterility Testing. • Internal QC and External QC 	20
III	Quality parameters of various blood components <ul style="list-style-type: none"> • Quality Assurance blood components - red cells and FFP • Cryoprecipitate, platelets, Red Cell and WBC contamination. • Calibration, validation and maintenance of blood bank equipment • QC of blood bank technique. 	20
IV	Quality policy, quality manual, Internal and external audit and process control <ul style="list-style-type: none"> • Documents, Registers, Records & Formats to be kept. • Licensing, Drug authorities' inspection and compliance. • Registers forms, Documentation and Standard operating procedures (SOP or GMP), • Blood bank management system, • Regulations for blood bank operation, Drugs and cosmetics Law, • National blood policy, standards in Blood 	

	<p>Banking, licensing procedures, ethical aspects of blood transfusion.</p> <ul style="list-style-type: none"> • Recruitment and training of blood bank personnel, • Proficiency testing. • Hospital Transfusion Committee. • Blood Bank Accreditation- . ISBT, NABL, NABH standards and accreditation. • Legal and ethical aspects, Regulatory Acts, Bio hazard Waste Disposal Act, National blood policy. 	
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PRACTICAL (32 HOURS)

1. Quality control of AB antisera's and ABO Cells
2. Quality control of Rh antisera, coombs controlled cells and Rh Genotype determination
3. Titer of anti-D reagents with Homozygous and Heterozygous Rh positive cells
4. Titer determination
5. 5 Empty Blood bags Quality control
6. Quality control of various other consumables like- Normal saline, Oxygen cylinder
7. Quality of AHG reagents.
8. Quality control of 22% bovine albumin
9. Quality control of Papain Cysteine.
10. Quality control of Copper sulphate solution
11. Quality control in various blood Components products.
12. Quality control in various apheresis products.
13. Quality control in whole blood.
14. Writing standard operating procedures.
15. Validation of refrigerators, cold room, incubator etc.
16. SOP writing for simple lab tests

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

TEXT BOOKS

1. Modern Blood Banking and Transfusion practices by Denise M Harmening, 5th edition
Transfusion Medicine technical manual-DGHS, Ministry of Health and Family Welfare,
Govt. of India, Second edition, 2003
2. Indian Drugs and cosmetic act and rules 1945 pertaining to Blood bank AABB
Technical Manual, 17th ed, AABB
3. Compendium of transfusion medicine, RN Makroo Standards for blood banks and blood
transfusion services, NACO, Ministry of Health and Family Welfare, Govt. of India, New
Delhi 2007
4. Indian & other Pharmacopeia pertaining to blood products

PAPER-BBT-11 QUALITY CONTROL & DOCUMENTATION BLUE PRINT

Title of paper (Unit)	Module	Weightage	Marks Allotted	Knowledge/ Recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
BBT-11 QUALITY CONTROL & DOCUMENTATION	i. Quality control System	35%	28	1	2	2			1*			
	ii. Equipments	15%	12		1		1*		2			
	iii. Quality parameters of various blood components	38.75%	31		2	2	1		1*			1
	iv. Documents and Records	23.75%	19	1		1		1*	1			1

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions: 10 X3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100 marks

**PAPER-BBT- 11 QUALITY CONTROL & DOCUMENTATION
MODEL QUESTION PAPER**

TIME: 3 HOURS

MAXIMUM MARKS:80

Illustrate your answers with suitable diagrams wherever necessary.

(a) Long Question. (2 X10=20)

1. a) Describe daily internal control mandatory checks in blood bank.

(or)

b) Quality control parameters for various blood components.

2. a) Duties and responsibilities for blood bank technician.

(or)

b) Enumerate all mandatory registers maintained in blood bank.

(b) Short Answers. Choose Any 5 of the Following (5X6=30)

1. Calibration of refrigerated centrifuge.

2. Blood bank accreditation.

3. Quality control for blood group reagents

4. Hospital Transfusion Committee.

5. NACO

6. Standard operating procedure.

(c) Very Short Answer. Choose Any 10 of the Following (10 X 3=30)

1. Qualifications for blood bank medical officer.

2. Mention quality control parameter for normal saline.

3. Mention 2 functions of regional transfusion centre.

4. Name 2 forms for licensing blood bank according to Drugs and Cosmetics act.

5. Name four criteria for establishing blood storage centre.

6. Enumerate mandatory rooms required in blood bank.

7. Levy Jennings chart.

8. Potency.

9. Quality control for copper sulphate.

10. Prozone phenomenon.

11. Expand ISBT.

12. Titre determination.

APHERESIS & RECENT ADVANCES

PAPER-BBT-12 APHERESIS & RECENT ADVANCES

NAME OF THE SUBJECT PAPER	: APHERESIS & RECENT ADVANCES
DURATION OF THEORY CLASSES	: 80HRS
DURATION OF TUTORIAL SESSIONS	: 32 HRS
UNIVERSITY THEORY` EXAMINATION	: 100 MARKS (80 U + 20IA)
UNIVERSITY PRACTICAL EXAMINATION	: NO
DURATION OF THEORY EXAMINATION	: 3 HRS
YEAR IN WHICH SUBJECT PAPER IS TAUGHT	: III YEAR

COURSE DESCRIPTION

The course is designed to assist students to acquire knowledge of new technologies allow pooling, leukoreduction, and bacterial testing before storage, and apheresis.

OBJECTIVES

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

- Should be able to perform the procedure independently, obtain quality product and manage any adverse effects
- Should be able to select proper patient, machine, plan TPE, select replacement fluids and monitor the patient

PROGRAM OUTCOMES

BBT -PO1: Performs the duty as a blood bank Technologist, with leadership qualities having a good written & communication skills and also skilled at computer applications including E- library.

BBT -PO2: To gain knowledge about laboratory safety precautions, biomedical waste management adhering to the environmental needs of the society, and preventing the spread of infectious diseases.

BBT -PO3: Understanding the structure and functions of different organs in normal human body.

BBT -PO4: To learn the general Biochemistry, Microbiology and Pathology, gaining expertise in Clinical Laboratory practices.

BBT -PO5: Know how to follow sample acceptance and rejection criteria and also to pack, transport and store the samples.

BBT -PO6: Understanding of blood bank department and organization in a hospital

BBT -PO7: To gain knowledge about collection and processing, including selecting donors, collecting blood, blood group typing and molecular testing and drug reactions.

BBT -PO8: To Learn the test for blood group antigens, compatibility and antibody identification, Check blood for any viral/bacterial infections. Be cautious of transfusion- transmission infections

BBT PO9: Understand the basic concepts of hematology and blood components in detail

BBT -PO10: Understand the immune hematological tests

BBT -PO11: To learn the transfusion therapy and newly advanced blood bank equipment's require for process

BBT -PO12: Understand Quality control, Quality policy, quality manual, Internal and external audit and process control

BBT PO13: Understand stem cell preparation, recent advances in blood banking and apheresis

BBTPO14: To identify various life style disorders and with due counselling & guidance advising the patients with proper diet, hygiene and Yoga to keep the body, mind, soul and behavior healthy.

COURSE OUTCOMES

At the end of the course, students will be able to...

ARA-CO1: Should be able to perform the procedure independently, obtain quality product and manage any adverse effects

ARA-CO2: Should be able to select proper patient, machine, plan TPE, select replacement fluids and monitor the patient

ARA-CO3: Able to improve quality and functional capacity of each component

ARA-CO4: Able to use the optimal products for specific diseases

ARA-CO5: Understand the principles of apheresis technology, including centrifugation, filtration, and immune adsorption.

COURSE CONTENT

UNIT	TITLE	THEORY + TUTORIALS (80) HOURS
I	<p>General aspects of apheresis and its products</p> <p>Apheresis procedures</p> <p>Apheresis products</p> <p>Preparation of multiple products on cell separators,</p> <p>Maintenance of cell separator equipment.</p> <p>Preparation of multiple products on Cells separators -Platelet apheresis, Plasmapheresis (Single donor &TPE),</p> <p>Leukapheresis (Granulocyte & Peripheral hematopoietic blood stem)</p>	30
II	<p>Recent Advances in Blood Banking</p> <p>Latest trends in blood banking- Donor screening, retention, Blood collections, components etc.</p> <p>Recent advances in Automation of Blood Banking.</p> <p>Recent advances in apheresis procedures</p> <p>Nucleic Acid Testing.</p> <p>Stem Cells & Cord stem cell banking.</p> <p>Artificial blood</p>	20
III	<p>Stem cell Preparation and Banking</p> <p>Stem cell- Cord blood,</p> <p>Peripheral blood Hematopoietic stem cell</p> <p>Stem cell banking and application.</p> <p>Procedures of collection of stem cell and calculation of stem cell collected.</p> <p>Quality control of products.</p> <p>Cryopreservation, maintenance, QC and thawing procedures in stem cell banking.</p> <p>Regenerative medicine.</p> <p>Ethical guidelines</p> <p>Concept of Bio banking</p>	30

PRACTICAL (32 HOURS)

- Apheresis procedures
- Donor screening,
- Kit installation, trouble shooting and entire procedure.
- Labelling and Quality control of various apheresis products.

METHODS OF TEACHING

1. Lecture cum discussion
2. Demonstration
3. Lab visit
4. Practical work record

METHODS OF EVALUATION

1. Written Test
2. Laboratory observation Book
3. Assignments
4. Oral Presentations

REFERENCE BOOKS

1. Modern Blood Banking and Transfusion practices by Denise M Harmening, 5th edition
2. Transfusion Medicine technical manual-DGHS, Ministry of Health and Family Welfare, Govt. of India, Second edition,2003
3. Blood transfusion in clinical medicine by PLMollison AABB Technical Manual, 17thed,AABB
4. Compendium of transfusion medicine, RNMakroo Voluntary blood donation program NACO, Ministry of Health and Family Welfare, Govt.of India, New Delhi,2007.
5. National guide book in blood donor motivation. NACO, Ministry of Health and Family Welfare, Govt. of India.
6. Standards for blood banks and blood transfusion services, NACO, Ministry of Health and Family Welfare, Govt. of India, New Delhi2007.
7. Indian Drugs and cosmetic act and rules 1945 pertaining to Blood bank.

PAPER-BBT-12 APHERESIS & RECENT ADVANCES BLUE PRINT

Title of paper (Unit)	Module	Weightage	Marks Allotted	Knowledge / Recall			Understanding			Application		
				LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)	LAQ (10)	SAQ (6)	VSAQ (3)
PAPER - IV (BBT-12) Apheresis & Recent Advances	I. General aspects of aphaeresis and its products	30%	24	1*	2	2			1			1
	ii. Recent Advances in Blood Banking	38.75%	31	1	2	1*	1*		2		1*	1
	iii. Stem cell Preparation and Banking	31.25	25	1	1	2			1			1*

The duration of Examination (University) is Three (3) hours.

The total marks for the University Examination will be 100marks.

Long Answer Questions : 2 X 10 = 20 marks (Choice 2 out of 4)

Short Answer Questions : 5 X 6 = 30 marks (Choice 5 out of 6)

Very Short Answer Questions: 10 X3 = 30 marks (Choice 10 out of 12)

TOTAL = Theory 80 + IA 20 = 100 marks

PAPER-BBT-12 APHERESIS & RECENT ADVANCES
MODEL QUESTION PAPER

TIME: 3 HOURS

MAXIMUM MARKS:80

Illustrate your answers with suitable diagrams wherever necessary.

(a) Long Question. (2 X10=20)

1. (a) Define apheresis and different principles involved in apheresis procedure.
(or)

(b) Advantages of Peripheral stem cells vs. bone marrow transplant

2. (a) Criteria to undergo platelet apheresis

(or)

(b) Peripheral stem cell collection and cryopreservation.

(b) Short Answers. Choose Any 5 of the Following (5X 6=30)

1. Therapeutic plasma exchange

2. Radiofrequency identification devices (RFID)

3. Fluids used in apheresis

4. Automation of cross matching

5. Advantages of NAT

6. Hematopoietic growth factors

(c) Very Short Answer. Choose Any 10 of the Following (10 X 3=30)

1. Citrate toxicity

2. Name any two donor retention strategies

3. Labeling of apheresis procedure

4. Enumerate types of stem cells transplantation

5. Barcoding

6. Quality control of stem cells

7. Random donor platelets vs. single donor platelets

8. Sterility test for stem cells

9. Name different apheresis equipments

10. Leukapheresis

11. General requirements for apheresis

12. Enumerate 2 different adverse events due to apheresis

DISCIPLINE ELECTIVE - III YEAR

B.Sc. BLOOD BANKING TECHNOLOGY
DISCIPLINE SPECIFIC ELECTIVE
DEC I - Biomedical waste management

NAME OF THE SUBJECT PAPER	:	Biomedical Waste Management
DURATION OF THEORY CLASSES	:	64 Hrs.
THEORY EXAMINATION	:	50 Marks (40 U + 10 IA)
PRACTICAL EXAMINATION	:	NIL
DURATION OF THEORY EXAMINATION	:	1 1/2 Hrs

Course Description

The increasing amount of Biomedical wastes (BMW) being generated is becoming a serious problem to hospitals and has significant adverse impacts on public health and occupational health if improperly handled. Biomedical waste requires utmost care in handling, collection, processing and disposal due to inherent hazards of the waste. The basic goal of the course is to provide the fundamentals of and biomedical wastes and various aspects of their management right from generation through collection and disposal. Special emphasis will be given to the system approach to managing these wastes to meet regulatory requirements.

Learning Objectives

- To sensitize the students about health care waste and its impact on health and environment.
- Acquaint the students to existing legislation, knowledge and practices regarding health care waste.

Learning Outcomes

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

- Possess the knowledge on the sources of generation, of hazardous and non-hazardous waste in health care settings and research laboratories.
- Demonstrate understanding on the environmental and occupation hazards of improper BMW management.
- Understand the good practices for a systematic approach in the management of BMW
- Gain knowledge in various management strategies and technological solutions in BMW management, treatment and disposal.
- Be familiar with the applicable legislations and regulations for treatment and disposal.

SYLLABUS

1. Introduction to Hospital Waste

- Definition Classification of hospital wastes
- Types and composition: Types of solids, liquids, sharps, blood and blood tissue, radioactive material, biological and chemical material
- Hospital effluents: Nature and composition, Levels of Generation in a small clinic, nursing home, small and large hospitals, Storage of hospital waste; Types of bags and containers used for storage

2. Biomedical Waste Management Guideline

- Requirement
- Documentation of Biomedical waste types and guidelines
- Bio-medical wastes (Management & Handling) Rules, 1998; and amendments

3. Principles of Biomedical Waste Management

- Segregation of biomedical waste
- Handling and transport of hospital waste: Authorization and accidental spilling
- Methods / treatments required for disposal of pathogens
- Waste disposal methods
- Techniques of waste management
- Protocols for HW management

4. Waste prevention

- Waste reduction activities
- Waste recycling

5. Biomedical Waste Treatment Facility

- Introduction, location, land requirements
- Coverage area, types of equipment
- Infrastructure requirements
- Record keeping
- Waste collection, transport and storage facilities
- Precautions required

TEXT BOOKS

1. Sustainable Biomedical Waste Management, P. K. Behera, 2nd Edition. 2008
2. Biomedical Waste Management, R. Radhakrishnan, 1st Edition, 2005
3. The Environmental Protection Act, 1986.

MODEL QUESTION PAPER

TIME: 1 1/2 HOURS

MAXIMUM MARKS: 40

(A) Short Answer (Answer any Five)

(5x6=30)

1. Explain the different categories of biomedical waste.
2. Explain the different sources of health-care wastes and how the hospitals handle them.
3. What are the various guidelines given by WHO for safe health-care waste management?
4. Write the principles of hospital hazards management. Explain the various types of infections.
5. How does the color coding helps in medical waste management. Explain with examples.

(B) Very Short Answer (Any six)

(5x2=10)

1. How will you classify healthcare waste?
2. What are waste sharps?
3. Who is at risk from health-care waste?
4. Write few rules governing the disposal of medical wastes?
5. Why is segregation important?
6. How sharps are disposed?
7. List some non-infectious wastes in hospital.
8. What is chemical disinfection?

DISCIPLINE ELECTIVE II - PALLIATIVE CARE

NAME OF THE SUBJECT PAPER	: Palliative care
DURATION OF THEORY CLASSES	: 64 Hrs
THEORY EXAMINATION	: 50 Marks (40 U + 10 IA)
UNIVERSITY PRACTICAL EXAMINATION	: NIL
DURATION OF THEORY EXAMINATION	: 1 1/2 Hrs.

Course description

This virtual one-day course is designed to offer physicians, nurses, social workers and other clinicians the information and skills needed to provide high quality palliative care to patients with serious illnesses in a variety of practice settings. It addresses the assessment and management of current challenges in palliative care, including the physical, psychological, social, and spiritual/existential sources of suffering experienced by patients and their families.

Learning objectives

Upon completion of this activity, participants will be able to:

Access and manage physical, psychological, social, and spiritual/existential sources of suffering for patients and their families dealing with serious illnesses or towards the end of life

- Develop practical strategies for discussing patient fears, hopes, goals, and wishes for care in the face of serious illness and at the end of life, including balancing hope and honesty in discussing treatment options and dealing with the ethical, psychosocial and spiritual issues that arise
- Improve the access to quality palliative care for all people with serious illness regardless of setting, diagnosis, prognosis or age
- Describe key issues and principles of pain management with opioids, including equianalgesic dosing, common side effects, addiction, tolerance, and dependence

Learning Outcomes

- Interactive learning formats include: Q&A, panel presentations, and case based discussions and ask the expert sessions.
- The course is designed to change both learner competence and performance in practice for primary and specialty palliative care practitioners.

SYLLABUS CONTENT

1. Basic principles (20 Hrs)

- Definitions of palliative care; general palliative care; specialist palliative care
- Evolving nature of palliative care over the course of illness
- Re-adaptation and rehabilitation
- Personal qualities and attributes of palliative medicine

2. Physical care (20 Hrs)

- Initial Assessment - detailed history and examination
- Management of life limiting, progressive disease
- Management of vaginal discharge and bleeding
- Diagnosis of rectovaginal, rectovesical and vesicovaginal fistulae
- Management of Urgency and dysuria/anuria

3. Psychosocial care (20 Hrs)

- Social and Family Relationships
- Communication with patients and relatives
- Psychological responses of patients and carers to life-threatening illness and loss
- Attitudes and responses of doctors and other professionals
- Patient and family finance

4. Culture, language, religion and spirituality (5 Hrs)

5. Ethics (10 Hrs)

- Theoretical ethics, applied ethics
6. Legal framework, teamwork and management (5 Hrs)

**DEC - Palliative care
Model Question Paper**

TIME: 1 1/2 HOURS

MAXIMUM MARKS: 40

(A) Short Answer (Answer any two)

(5x6=30)

1. Indications and importance of providing palliative care
2. Principles of palliative care
3. Distinguish between palliative care and hospice care
4. Non pharmacological management for pain under palliative care
5. Psychosocial factors influencing palliative care

(B) Very Short Answer (Any six)

(5x2=10)

1. Signs of physiological death
2. Stages of palliative care
3. Definition of palliative care
4. Rehabilitation verses palliative care
5. Palliative care under hospital settings
6. Phases of rehabilitation
7. Pharmaco therapy for pain for patients under palliative care
8. Importance of palliative care

Discipline Elective III -BIOCHEMISTRY AND MOLECULAR BIOLOGY

NAME OF THE SUBJECT PAPER	: BIOCHEMISTRY AND MOLECULAR BIOLOGY
DURATION OF THEORY CLASSES	: 64 Hrs.
THEORY EXAMINATION	: 50 Marks (40 U + 10 IA)
PRACTICAL EXAMINATION	: NIL
DURATION OF THEORY EXAMINATION	: 1 1/2 Hrs.

SYLLABUS

UNIT-I: NUCLEO PROTEIN

- Purine and Pyrimidine bases, Ribose and Deoxy Ribose, Definition of Nucleosides and Nucleotides, Biologically significant Nucleotides
- Nucleic acids as genetic information carriers - experimental evidence e.g. action spectrum, genetic information, Hershey-chase experiment etc.
- Modes of replication, details of Meselson and Stahl experiment, semi conservative replication.

UNIT -II

- Genetic code - Evidence for a triplet code, properties of the code - sequential, ubiquitous, degenerative, wobble hypothesis, nonsense codon
- Mechanism of translation
- Mechanism of transcription, Regulation of transcription, Post translational processing
- Rates of eukaryotic and prokaryotic protein synthesis

UNIT-III: DEOXY RIBONUCLEIC ACID

- Physical properties of DNA - 5' - 3' direction, size range location, isolation, base composition, base equivalent, secondary structure, base pairing, Tertiary structures.
- DNA replication - properties of DNA dependent DNA polymerases I, II, III and their role in DNA replication
- DNA Repair systems

UNIT-IV: RIBONUCLEIC ACID

- Physical properties of RNA-classes of RNA-structure, methods of isolation and fractionation of RNA-primary, secondary and tertiary structures
- Rapid RNA sequencing techniques

UNIT-V

- Polymerase Chain Reaction (PCR)
- Recombinant DNA technology and its applications

Discipline Elective IV - PHARMACOLOGY

NAME OF THE SUBJECT PAPER	: PHARMACOLOGY
DURATION OF THEORY CLASSES	: 64 Hrs
THEORY EXAMINATION	: 50 Marks (40 U + 10 IA)
PRACTICAL EXAMINATION	: NIL
DURATION OF THEORY EXAMINATION	: 1 1/2 Hrs

SYLLABUS

UNIT I

GENERAL PHARMACOLOGY

- Introduction of Pharmacology
- Routes of Administration
- Pharmacokinetics
- Pharmacodynamics
- Adverse Drug Reaction

Unit II

Fundamental System

- GI System
- Respiratory System
- CVS
- Blood
- Drugs affecting renal system
- Excretion of drugs in stool , bile and other body fluids

UNIT III

Chemotherapeutic Agents

- Antibiotics
- Anti Viral
- Anti Fungal
- Anti Protozoal Agents
- Anti Helminthic
- Anti Septics and disinfectants

UNIT IV

- Applied Pharmacology
- Applied Pharmacology for GIT
- Applied Pharmacology for Blood and renal system
- Applied Pharmacology for Anti biotics

QUESTION BANK

B.Sc. AHS I YEAR
PAPER-1: ANATOMY

UNIT: 1 GENERAL ANATOMY

HUMAN CELL

Q. NO	TOPICS	TYPE
1.	Discuss the Cell & its Organelles.	SAQ

EPITHELIUM

Q.NO	TOPICS	TYPE
1.	Classification of Epithelium with its examples.	SAQ
2.	Draw the neat label diagram of Simple epithelium with its examples.	SAQ
3.	Draw the neat label diagram of Compound epithelium with its examples.	SAQ
4.	Write a note on Goblet cell.	VSAQ
5.	Write a note on Basement membrane of epithelium.	VSAQ

GLANDS

Q.NO	TOPICS	TYPE
1.	Classification of Glands with its examples.	SAQ
2.	Discuss the Microscopic structure of Mucous / Serous / Mixed salivary gland with its examples.	SAQ

CARTILAGE

Q.NO	TOPICS	TYPE
1.	Discuss the Microscopic structure of Hyaline cartilage / Elastic cartilage / White fibro cartilage with its examples.	SAQ
2.	Classification of Cartilage with its examples.	VSAQ
3.	Write a note on Perichondrium.	VSAQ

BONE

Q.NO	TOPICS	TYPE
1.	Classification of Bones with its examples.	SAQ
2.	Draw & Discuss the Microscopic structure of Compact bone (T.S)	SAQ
3.	Discuss the blood supply of long bone.	SAQ
4.	List out the bones in region wise.	SAQ
5.	State the parts of growing long bone.	VSAQ
6.	State the parts of adult long bone.	VSAQ
7.	Write a note on Periosteum.	VSAQ
8.	Write a note on carpal bones.	VSAQ
9.	Write a note on Sesamoid bone.	VSAQ
10.	Write a note on Fontanellae of fetal skull.	VSAQ
11.	Write a note on Haversian system of compact bone.	VSAQ
12.	List out the structural differences between the Bone & Cartilage.	VSAQ

JOINTS

Q.NO	TOPICS	TYPE
1.	Classification of Joints with its examples.	SAQ
2.	Classification of Synovial joint with its examples.	SAQ
3.	Discuss the structure of synovial joint.	SAQ
4.	Classification of Cartilagenous joint with its examples.	SAQ

MUSCULAR TISSUE

Q.NO	TOPICS	TYPE
1.	Draw & Discuss the Microscopic structure of Skeletal muscle / Cardiac muscle / Smooth muscle with its examples.	SAQ
2.	Classification of muscular tissue with its examples.	VSAQ
3.	State the muscles of mastication & its nerve supply.	VSAQ
4.	List out the microscopic structural differences between the types of muscles.	VSAQ

SKIN

Q.NO	TOPICS	TYPE
1.	Draw & Discuss the Microscopic structure of Thick / Thin skin.	SAQ
2.	Classification / Types of skin with its example.	VSAQ
3.	List out the structural differences between the types of skin.	VSAQ

UNIT: 2 CARDIOVASCULAR SYSTEMS**MEDIASTINUM**

Q.NO	TOPICS	TYPE
1.	Definition, location & general boundary / outline boundary of Mediastinum.	SAQ
2.	Discuss the boundaries & contents of Superior mediastinum.	SAQ
3.	Discuss the boundaries & contents of Inferior mediastinum.	SAQ

HEART

Q.NO	TOPICS	TYPE
1.	Explain the gross features of Right atrium under following headings - a) Definition, b) location, c) external features, d) internal features, e) Function, f) arterial supply.	LAQ
2.	Describe the Blood supply of Heart.	LAQ
3.	Discuss the location & External features of Heart.	SAQ
4.	Discuss the Valves of Heart. (A.V -valve & Semilunar valve)	SAQ
5.	Discuss the Systemic & Pulmonary circulation of Heart.	SAQ
6.	Discuss the Right coronary artery / Left coronary artery under following headings - a) Origin, b) course, c) branches.	SAQ
7.	Write a note on Apex of Heart.	VSAQ
8.	List out the chambers & great blood vessels of Heart.	VSAQ
9.	Trace the conducting system of Heart.	VSAQ
10.	State the definition, layers, sinuses & nerve supply of Pericardium.	VSAQ

BLOOD VESSELS

Q.NO	TOPICS	TYPE
1.	Describe the Portal vein under following headings - a) Definition, b) formation, c) location, d) course, e) branches, f) Parts, g) Tributaries.	LAQ
2.	Explain the Cavernous sinus under following headings - a) Definition, b) location, c) measurement, d) extension, e) relations, f) Tributaries, g) communications.	LAQ
3.	Parts & branches of Aorta	SAQ

4.	Discuss the origin, course, parts & branches of Subclavian artery.	SAQ
5.	Discuss the origin, course, parts & branches of Axillary artery.	SAQ
6.	Discuss the origin, course & branches of Brachial artery.	SAQ
7.	Discuss the origin & branches of Internal iliac artery.	SAQ
8.	Discuss the origin, course & branches of External carotid artery.	SAQ
9.	Discuss the origin, parts, course & branches of Internal carotid artery.	SAQ
10.	Classification of Dural venous sinuses.	SAQ / VSAQ
11.	Enumerate the branches of Brachial artery.	VSAQ
12.	State the branches of Radial & Ulnar artery.	VSAQ
13.	State the branches of Femoral artery.	VSAQ
14.	List out the sites of Peripheral pulse.	VSAQ
15.	List out the sites of Porto caval anastomosis.	VSAQ
16.	State the formation, course & termination of Great saphenous vein / Short saphenous vein.	VSAQ
17.	Write a note on Cysterna chyli.	VSAQ
18.	Formation, location & branches of Superficial palmar arch / Deep palmar arch.	VSAQ

UNIT: 3 RESPIRATORY SYSTEM

Q.NO	TOPICS	TYPE
1.	Explain the Larynx under following headings - a) Definition, b) location, c) extension, d) measurement, e) Skeletal framework, f) function.	LAQ
2.	Explain the Lung under following headings - a) Definition, b) location, c) coverings, d) weight & Colour, e) external features, f) medial surface impression, g) hilum, h) Root of lung, i) blood supply, j) note on Bronchopulmonary segments.	LAQ
3.	Discuss the definition, formation & structures opening in the Lateral wall of nose.	SAQ
4.	Discuss the definition, extension, measurement, external feature of Trachea.	SAQ
5.	Discuss the definition, layers, parts of layers, recesses, nerve supply of Pleura.	SAQ / VSAQ
6.	State the parts of Respiratory system.	VSAQ
7.	Enumerate the structures forming the Nasal septum.	VSAQ
8.	Write a note on Carina.	VSAQ
9.	Write a note on Bronchopulmonary segments.	VSAQ
10.	List out the Para nasal air sinuses.	VSAQ
11.	Enumerate the muscles of Respiration & state its nerve supply.	VSAQ

UNIT: 4 DIGESTIVE SYSTEMS

Q.NO	TOPICS	TYPE
1.	Describe the Tongue under following headings - a) Definition, b) location, c) parts, d) external features, e) muscles, f) Nerve supply.	LAQ
2.	Explain the Pharynx under following headings - a) Definition, b) location, c) extension, d) sub-division, e) Muscles forming the pharynx, f) nerve supply.	LAQ

3.	Explain the Stomach under following headings - a) Definition, b) location, c) capacity, d) measurement, e) External features, f) Parts, g) relations, h) blood supply.	LAQ
4.	Describe the Duodenum under following headings - a) Definition, b) location, c) parts, d) measurement, e) external features, f) Internal features (2 nd part), g) blood supply.	LAQ
5.	Explain the Liver under following headings - a) Definition, b) location, c) Colour, d) weight, e) external features, f) Relations, g) bare area, h) Porta hepatis, i) blood supply, j) function.	LAQ
6.	Explain the Pancreas under following headings - a) Definition, b) location, c) anatomical & functional parts, d) measurement, e) Colour, f) external features, g) relations, h) Duct of pancreas, i) Blood supply.	LAQ
7.	Discuss the location & external features of Tongue.	SAQ
8.	Discuss the parts, muscles of Tongue & state its nerve supply.	SAQ
9.	Discuss the location, external features, parts & blood supply of stomach.	SAQ
10.	Discuss the external & internal features of the 2 nd part of Duodenum.	SAQ
11.	Discuss the Caecum under following headings - a) Definition, b) location, c) measurement, d) types, e) external features, f) Internal features, g) blood supply.	SAQ
12.	Discuss the Appendix under following headings - a) Definition, b) location, c) parts, d) measurement, e) position, f) Blood supply.	SAQ
13.	Discuss the characteristic features / cardinal features of Large intestine.	SAQ
14.	Discuss the Extra hepatic biliary apparatus under following headings - a) Definition, b) parts, c) measurement, d) function, e) Note on gall bladder.	SAQ
15.	Discuss the definition, location, origin, course & branches of Coeliac trunk.	SAQ
16.	List out the parts of Digestive system.	VSAQ
17.	State the parts & papillae of Tongue.	VSAQ
18.	State the nerve supply of Tongue.	VSAQ
19.	Enumerate the muscles of Tongue.	VSAQ
20.	State the extension & sub-divisions of Pharynx.	VSAQ
21.	State the extension & constrictions of Esophagus.	VSAQ
22.	List out the structural differences between the Jejunum & Ileum.	VSAQ
23.	State the location & types of Caecum.	VSAQ
24.	State the location / parts & position of Appendix.	VSAQ
25.	Write a note on Porta hepatis.	VSAQ
26.	Write a note on bare area of Liver.	VSAQ
27.	Write a note on Pancreatic duct.	VSAQ
28.	Enumerate the parts & function of Biliary apparatus.	VSAQ
29.	Classification of Salivary glands.	VSAQ
30.	State the branches of Superior mesenteric artery.	VSAQ
31.	State the branches of Inferior mesenteric artery.	VSAQ
32.	State formation of Marginal artery / artery of Drummond.	VSAQ

UNIT: 5 URINARY SYSTEM

Q.NO	TOPICS	TYPE
1.	Explain the Kidney under following headings - a) Definition, b) location, c) measurement, d) Colour, e) external features, f) Hilum, g) relations, h) coverings, i) internal features, j) Blood supply.	LAQ
2.	Explain the Urinary bladder under following headings - a) Definition, b) location, c) shape, d) measurement, e) capacity, f) External features, g) relations, h) supports, i) Internal features (Trigone of urinary bladder), j) blood supply, k) role.	LAQ
3.	Discuss the location & relations of Kidney.	SAQ
4.	Discuss the extension, parts, measurement, constrictions & blood supply of Ureter.	SAQ
5.	Discuss the external features & supports of Urinary bladder.	SAQ
6.	State the parts of Urinary system.	VSAQ
7.	Write a note on hilum of kidney.	VSAQ
8.	State the extension, parts & constrictions of ureter.	VSAQ
9.	Write a note on Trigone of urinary bladder.	VSAQ
10.	State the definition, extension & parts of Male urethra.	VSAQ
11.	Write a note on Female urethra.	VSAQ

UNIT: 6 REPRODUCTIVE SYSTEMS**MALE REPRODUCTIVE SYSTEM**

Q.NO	TOPICS	TYPE
1.	Explain the Testis under following headings - a) Definition, b) location, c) measurement, d) shape, e) external features, f) Coverings, g) internal features, h) functions, i) blood supply.	LAQ
2.	Describe the Prostate gland under following headings - a) Definition, b) location, c) shape, d) measurement, e) shape, f) External features, g) lobes, h) coverings, i) blood supply.	LAQ
3.	Discuss the location, external features, layers & blood supply of Scrotum.	SAQ
4.	Discuss the External & internal features of Testis.	SAQ
5.	Discuss the External features, lobes & coverings of Prostate.	SAQ
6.	State the parts of Male Reproductive system.	VSAQ.
7.	Enumerate the layers of Scrotum & state its nerve supply.	VSAQ.
8.	State the parts & role of Epididymis.	VSAQ.
9.	State the coverings of Testis & Prostate.	VSAQ.
10.	State the coverings & contents of Spermaticcord.	VSAQ.

FEMALE REPRODUCTIVE SYSTEM

Q.NO	TOPICS	TYPE
1.	Explain the Mammary gland under following headings - a) Definition, b) location, c) extension, d) shape, e) structures / features, f) Blood supply.	LAQ
2.	Explain the Uterus under following headings - a) Definition, b) location, c) shape, d) measurement, e) external features, f) Positions, g) relations, h) supports, i) blood supply.	LAQ

3.	Discuss the Gross structure of Mammary gland.	SAQ
4.	Discuss the location & external features of Uterus.	SAQ
5.	Discuss the location, position & supports of Uterus.	SAQ
6.	Discuss the external & internal features of Ovary.	SAQ
7.	State the parts of Female Reproductive system.	VSAQ
8.	State the parts & role of Fallopian tube.	VSAQ
9.	Enumerate the ovarian follicles.	VSAQ
10.	State the parts & positions of Uterus.	VSAQ

UNIT: 7 ENDO CRINE SYSTEM

Q.NO	TOPICS	TYPE
1.	Describe the Thyroid gland under following headings - a) Definition, b) location, c) hormones, d) peculiarities, e) external features, f) Parts, g) relations, h) coverings, i) blood supply, j) Functions.	LAQ
2.	Explain the Pituitary gland under following headings - a) Definition, b) location, c) shape, d) measurement, e) external features & hormones, f) Blood supply.	LAQ
3.	Explain the Suprarenal gland under following headings - a) Definition, b) location, c) measurement, d) external features, e) Internal features, f) hormones, g) blood supply.	LAQ
4.	Discuss the external features of Thyroid gland, state its coverings & blood supply.	SAQ
5.	Discuss the external features & hormones of Pituitary gland.	SAQ
6.	Discuss the external & internal features of Suprarenal gland & state its hormones.	SAQ
7.	List out the Endocrine glands.	VSAQ
8.	Classification of Endocrine glands.	VSAQ
9.	State the location & blood supply of Thyroid gland.	VSAQ
10.	State the location & hormones of Pituitary gland.	VSAQ
11.	State the location & hormones of Parathyroid gland.	VSAQ

UNIT: 8 NERVOUS SYSTEM

Q.NO	TOPICS	TYPE
1.	Classification of Nervous system.	SAQ
2.	Discuss the Cerebrum under following headings - a) Definition, b) location, c) external features.	SAQ
3.	Discuss the external features & blood supply of Cerebrum.	SAQ
4.	Discuss the Supero-lateral surface of Cerebrum.	SAQ
5.	Discuss the Cerebellum under following headings - a) Definition, b) location, c) nucleus, d) functions, e) blood supply.	SAQ
6.	Discuss the Spinal cord under following headings - a) Definition, b) location, c) extension, d) measurement, e) coverings, f) Blood supply.	SAQ
7.	Discuss the extension & external features of Spinal cord.	SAQ
8.	Discuss the location & external features of Midbrain.	SAQ
9.	Discuss the location & external features of Pons.	SAQ
10.	Discuss the location & external features of Medulla oblongata.	SAQ
11.	Discuss the blood supply of Brain.	SAQ
12.	Discuss the formation of Circle of Willis.	SAQ
13.	Classification of Cranial nerves.	SAQ /

		VSAQ
14.	State the parts of Brain.	VSAQ
15.	Write a note on Sulci & Gyri.	VSAQ
16.	State the location & nucleus of Cerebellum.	VSAQ
17.	State the layers of Meninges & its space.	VSAQ
19.	State the layers of meninges & its modification.	VSAQ
18.	State the modification of Spinal meninges.	VSAQ
20.	Enumerate the cranial nerves emerges from Midbrain / Pons / Medulla oblongata.	VSAQ
21.	List out the Cranial nerves.	VSAQ
22.	List out the Basal nuclei	VSAQ
23.	State the location & parts of Corpus callosum.	VSAQ

UNIT: 9 GENERAL EMBRYOLOGY

Q.NO	TOPICS	TYPE
1.	Discuss the stages of Spermatogenesis.	SAQ
2.	Discuss the stages of Oogenesis.	SAQ
3.	Discuss the Placenta under following headings - a) Definition, b) external features, c) functions.	SAQ
4.	Write a note on Fertilization & state its phases.	VSAQ
5.	Write a note on Implantation.	VSAQ
6.	Write a note on Ovulation.	VSAQ

PAPER 2 - PHYSIOLOGY

UNIT - I

GENERAL PHYSIOLOGY

Very short answer questions (VSAQ)

1. Draw labeled diagram of human cell and mention any four functions of cell organelles.
2. Explain one function of
 - a) Mitochondria, b). Golgi apparatus
 - c) Endoplasmic reticulum d) Ribosome
3. Give two differences between mitosis and meiosis.
4. Name the phases of mitosis
5. Name different types of intercellular connections?
6. Classify various mechanisms of transport across cell membrane.
7. Describe different mechanism of passive transport across the cell membrane
8. Describe different mechanism of active transport across the cell membrane
9. Define osmosis. Give examples.
10. Define symport. Give one example.
11. Define antiport. Give one example.
12. Define homeostasis. Name the types of feedback mechanisms involved in homeostasis with one example.
13. Briefly explain negative feedback mechanisms with examples.
14. Briefly explain positive feedback mechanisms with examples.
15. Give normal values of i) Intracellular fluid (ICF), ii) Extracellular fluid (ECF), iii) plasma and iv) Interstitial fluid

HEMATOLOGY (BLOOD)

Long answer questions (LAQ)

1. What is erythropoiesis? Describe the stages and factors influencing it.
2. What is anemia? Describe the types of anemia. Give the blood picture in each of them.
3. What is immunity? Explain its types.
4. Explain the mechanism of hemostasis.
5. Explain intrinsic and extrinsic mechanisms of blood clotting.
6. Name the blood group systems. Explain the basis for its classification. Add a note on its clinical importance.

Short answer questions (SAQ)

1. Briefly describe the composition of blood.
2. Write the functions of blood.
3. List the plasma proteins. Write its functions.
4. What is Erythropoiesis? List its stages.
5. Define anemia with types. Explain iron deficiency anemia.
6. Briefly explain ABO and Rh system.
7. Erythroblastosis fetalis.
8. Define hemostasis with stages.
9. Name the clotting factors.
10. Define immunity. What are its types?

Very short answer questions (VSAQ)

1. Classifications of WBC.
2. Functions of neutrophil.
3. What is Phagocytosis?
4. Functions of eosinophil.
5. Functions of basophil.
6. Functions of lymphocytes.
7. Functions of red blood cell (RBC).
8. Write the normal values of hemoglobin in adults male and female.
9. Functions of hemoglobin.
10. Functions of platelets.
11. What is hemophilia?
12. What is anticoagulant?
13. Name any two anticoagulants.
14. Name the blood group systems.
15. Define Landsteiner's law.
Mismatch transfusion.

UNIT - II

CARDIOVASCULAR SYSTEM

Long answer questions (LAQ)

1. Define cardiac cycle. Explain with the help of a diagram the mechanical and pressure changes during cardiac cycle.
2. Draw a labelled diagram showing the innervations of heart. Describe the regulation of heart rate.
3. Define blood pressure. Give its normal values. Write the factors controlling blood pressure.
4. Define cardiac output and cardiac index. Give its normal values. Describe the factors regulating cardiac output.
5. What is shock? What are its types? Discuss the cardiovascular compensatory changes that occur during shock.

Short Answer Questions (SAQ)

1. Write the difference between pulmonary and systemic circulation.
2. Briefly describe the conducting system of heart.
3. Draw labeled diagram of conducting system of heart.
4. List out the properties of cardiac muscle. Briefly explain any two properties.
5. Draw a normal Lead II ECG indicating its waves and segments.
6. Define blood pressure (BP). What are the components of it and write its normal range.
7. List the factors affecting blood pressure
8. Define cardiac cycle. List the events during cardiac cycle.
9. Define shock. Name its types.
10. Briefly explain the types of heart sounds.

Very Short Answer Questions (VSAQ)

1. Write any two differentiating points between pulmonary and systemic circulation.
2. Define blood pressure.
3. What is systolic blood pressure? Write its normal value.
4. What is diastolic blood pressure? Write its normal value.
5. Define pulse. Write its normal range.
6. Write any two differences between tachycardia and bradycardia.
7. Define cardiac output. Write its normal values.
8. Define stroke volume. Write its normal values.
9. What is electrocardiogram (ECG)?
10. List any four properties of cardiac muscle.

UNIT III

RESPIRATORY SYSTEM

Long answer questions (LAQ)

1. Describe the mechanics of breathing.
2. Explain oxygen transport in the blood. Describe the oxygen dissociation curve.
3. Discuss the transport of carbon dioxide in the blood.
4. Name the respiratory centers. Explain the neural regulation of respiration.
5. Classify hypoxia. Describe the types with suitable examples.

Short answer questions (SAQ)

1. Briefly explain the mechanism of inspiration.
2. Briefly explain the mechanism of expiration.
3. Draw labeled diagram of pontine and medullary respiratory centers.
4. Briefly explain the transport of oxygen in the blood.
5. Briefly explain the transport of carbon dioxide in the blood.
6. Draw labeled diagram of normal spirogram indicating lung volume and capacities.
7. Define and give normal values of lung volumes.
8. Define and give normal values of lung capacities.
9. What is surfactant? Give its function.
10. Define hypoxia. List its various types.
11. Classify and explain any one type of hypoxia.

Very short answer questions (VSAQ)

1. Name the inspiratory muscles.
2. Name the expiratory muscles.
3. Name the respiratory and non-respiratory functions of lungs.
4. Write any four functions of respiratory system.
5. Function of surfactant.
6. Name the respiratory centers.
7. Normal values of lung volumes.
8. Normal values of lung capacities.
9. Draw labeled diagram of respiratory center.
10. List the types of hypoxia.
11. Vital Capacity.
12. What is dead space?
13. What is hypoxia?

14. What is dyspnea?
15. What is cyanosis?
16. What is periodic breathing?

UNIT - IV

IV - GASTRO-INTESTINAL PHYSIOLOGY

Long Answer Questions (LAQ)

1. Describe the phase and control of deglutition. Add a note on its applied importance.
2. Write the composition of saliva? Describe the regulation of salivary secretion. Discuss its functions.
3. Describe the composition and phases of gastric secretion. Briefly explain the HCl secretion in stomach.
4. Describe the phases of pancreatic secretion.

Short Answer Questions (SAQ)

1. Give the composition and functions of saliva?
2. Give composition and functions of gastric secretion?
3. Briefly explain mechanism of HCl secretion
4. Give composition and functions of pancreatic secretion?
5. Briefly explain entero-hepatic circulation with neat diagram.
6. Briefly explain the functions of liver.
7. Classify gastro intestinal (GI) hormones and write its actions of any two hormones.
8. Peptic ulcer.

Very Short Answer Questions (VSAQ)

1. What is mastication?
2. What is deglutition?
3. Write any four functions of saliva.
4. Write any four functions of liver.
5. Functions of pancreatic juice.
6. Name any four GI hormones.
7. Functions of gastrin.
8. Functions of secretin.
9. Functions of cholecystokinin pancreozymin.
10. What are the movements of stomach?
11. What are the movements of small intestine?
12. What are the movements of large intestine?
13. Write any four functions of bile.
14. What is the difference between liver and gall bladder bile?

UNIT - IV

RENAL PHYSIOLOGY (EXCRETORY SYSTEM)

Long Answer Questions (LAQ)

1. Describe the mechanism of urine formation.
2. Define GFR (Glomerular filtration rate). Write its normal values. Briefly explain the factors affecting GFR.
3. Describe the Structure and functions of juxta glomerular apparatus

4. Draw a labeled diagram showing nerve supply to the urinary bladder. Explain the mechanism of micturition. What is a neurogenic bladder?
5. Describe the role of counter current multiplier and exchange system in concentrating urine.
6. Discuss the role of different buffer systems in regulation of acid - base balance.

Short Answer Questions (SAQ)

1. Briefly explain the functions of kidney.
2. Briefly explain the formation of urine.
3. Briefly explain mechanism behind voiding of urine.
4. Define GFR (Glomerular filtration rate). Write its normal values. List the factors affecting GFR.
5. What is the normal renal blood flow? How is it measured?
6. List the Special features of renal blood flow.
7. List any three differences between Cortical and Juxtamedullary nephrons.
8. Draw a labeled diagram of juxtaglomerular apparatus. What are its functions?
9. With a flow chart and suitable diagram, indicate the process of micturition reflex.
10. Briefly explain the role of ADH (Anti-diuretic hormone) on kidney?
11. Briefly explain renal dialysis.

Very Short Answer Questions (VSAQ)

1. Draw labeled diagram of a nephron.
2. Draw labeled diagram of filtration membrane
3. Write any four functions of kidney.
4. Functions of macula densa and Juxtaglomerular cells
5. What are the steps of urine formation?
6. Give one substances used to measure GFR and renal plasma flow.
7. What is micturition reflex?
8. What is cystometrogram?
9. Filtration fraction.
10. Define renal clearance.
11. Name the types of renal clearance.
12. List any three differences between cortical and medullary nephrons.
13. What is diuresis?
14. What is diuretics?
15. Name any two diuretics.
16. Give two functions of skin?

UNIT - V

V - ENDOCRINE PHYSIOLOGY

Short Answer Questions (SAQ)

1. List the anterior pituitary (Adenohypophysis) hormones. Give any two hormone functions.
2. Mention the physiological role of GH (Growth hormone). Add a note on its hyper and hypo secretion.
3. Name the posterior pituitary hormones. Give their functions.
4. Name the adrenal cortical and medullary hormones. Mention the functions of glucocorticoids.
5. Mention the functions of aldosterone.

6. Name the thyroid hormones. Write its functions.
7. Name the hormones synthesized by pancreas. Mention their role in maintaining blood glucose.
8. Explain the actions of hormones on hyperglycemia and hypoglycemia.

Very Short Answer Questions (VSAQ)

1. Name any four hypothalamic hormones.
2. Name the anterior pituitary (Adenohypophysis) hormones.
3. List the posterior pituitary (Neurohypophysis) hormones
4. What is diabetes mellitus? What are its types?
5. What is the difference between gigantism and acromegaly?
6. What is dwarfism?
7. Name the thyroid hormones.
8. Write any two functions of thyroid hormones.
9. What is Grave's disease?
10. What is myxedema?
11. What is cretinism?
12. What is the difference between myxedema and cretinism?
13. Functions of parathormone.
14. Functions of mineralocorticoids (Aldosterone).
15. Functions of glucocorticoids.
16. What is Cushing's syndrome?
17. What is Addison's disease?
18. What is the difference between diabetes mellitus and diabetes insipidus?
19. Name the hormones secreted by pancreas.
20. Name the diabetogenic and antidiabetogenic hormones.
21. Functions of insulin.
22. Functions of glucagon.
23. What is diuresis? What are its types?
24. Functions of adrenal medullary hormone.
25. What is fight or flight response?

V- REPRODUCTIVE SYSTEM

Short answer questions (SAQ)

1. What is spermatogenesis? Mention its stages.
2. Briefly explain the ovarian cycle.
3. Briefly explain ovulation with hormonal regulations.
4. What is menstrual cycle? Briefly explain its phases.
5. Briefly explain any two female contraceptive methods.
6. List the contraceptive methods in male and female.
7. Explain the IUCD (Intrauterine contraceptive device).
8. List the functions of estrogen.
9. List the functions of progesterone.

Very short answer questions (VSAQ)

1. Write any two functions of testosterone.
2. What is menarche and menopause?
3. What is menstrual cycle?
4. List the placental hormones.
5. List the functions of Follicular stimulating hormone (FSH).
6. List the functions of sertoli cells

7. Functions of placenta.
8. Name the factors influencing spermatogenesis.
9. What is fertilization?

UNIT - VI

NERVE MUSCLE PHYSIOLOGY

Short answer questions (SAQ)

1. Draw the labeled diagram of neuromuscular junction (NMJ).
2. Briefly explain the ionic basis of action potential in a neuron.
3. Briefly explain the steps of neuromuscular transmission of signal impulse.
4. With the help of a flow chart, depict the steps of muscle contraction.
5. Briefly explain the excitation - contraction coupling in a skeletal muscle
6. Write any four differences between skeletal, cardiac and smooth muscles.
7. Myasthenia gravis

Very short answer questions (VSAQ)

1. Describe the structure of a neuron.
2. Give the normal value of resting membrane potential of i) motor neuron and ii) skeletal muscle.
3. Give normal resting membrane potential of neuron and skeletal muscle.
4. List any two properties of nerve fibers.
5. Name any two neuromuscular blocking agent
6. Draw the structure of sarcomere
7. Name the muscle proteins.
8. List any four properties of skeletal muscle.
9. Rigor mortis

VI - CENTRAL NERVOUS SYSTEM (CNS)

Short answer questions (SAQ)

1. Briefly explain the divisions of nervous system.
2. With a flow chart and suitable diagram briefly explain the synaptic transmission of excitatory postsynaptic potential (EPSP).
3. With a flow chart and suitable diagram briefly explain the synaptic transmission of inhibitory postsynaptic potential (IPSP).
4. Briefly explain the functions of cerebral cortex.
5. What are the functions of cerebellum?
6. What are the functions of basal ganglia?
7. What are the functions of hypothalamus?

Very short answer questions (VSAQ)

1. Name any four properties of synapse.
2. Write any two functions of thalamus.
3. Functions of medulla oblongata.
4. Functions of cerebro spinal fluid (CSF).
5. Name any two neurotransmitters.
6. Name any four hypothalamic hormones.
7. Name the anterior pituitary (Adenohypophysis) hormones.
8. List the posterior pituitary (Neurohypophysis) hormones

VI - SPECIAL SENSES

Short answer questions (SAQ)

1. Trace the visual pathway with a neat labeled diagram
2. Explain the errors of refraction
3. Trace the auditory pathway with a neat labeled diagram

4. Functions of Middle ear.
5. Trace the olfactory pathway.

Very short answer questions (VSAQ)

1. Name the receptors for vision, smell, taste and hearing.
2. Functions of eye
3. List the primary colors of vision
4. Accommodation reflex.
5. What are the functions of rods and cones in eye?
6. Explain the terms ageusia, hypogeusia, dysgeusia.
7. Name the primary taste sensations

PAPER-3: BIOCHEMISTRY

UNIT-I: INTRODUCTION TO BIOCHEMISTRY

Long answer questions

(10 marks)

1. How is acid base balance maintained in the body?
2. Write in detail about Acid base disorders

Short Questions

(6 marks)

1. Discuss the different buffer system of acid base homeostasis.
2. What is the normal PH of blood? How is it maintained?
3. Explain the role of lungs in acid base system
4. Glass electrode and determination of pH
5. Explain the Metabolic acidosis & Metabolic alkalosis
6. Explain the Respiratory acidosis & Respiratory alkalosis
7. Role of kidney in the regulation of blood pH
8. Biochemical assessment of acid base balance

Very Short answer questions:

(3 marks)

1. Define pH. What is the normal values of blood & urine PH
2. Define buffer and give 2 examples.
3. Define acid/ base with example
4. Write any 2 conditions for acid base imbalance.
5. What is Henderson Hasselbalch equation
6. Define Anion gap with example
7. List out any 2 causes & symptoms for Respiratory acidosis & alkalosis
8. List out any 2 causes & symptoms for Metabolic acidosis & alkalosis
9. Define isoelectric PH.

PROTEINS

Long answer questions

(10 marks)

1. Define proteins & detail in classification of Proteins with suitable examples
2. Describe the different levels of protein structure in detail with suitable diagram

Short Questions

(6 marks)

1. What are Essential amino acids & mention its clinical significance
2. Mention any five biologically important peptides & its clinical role
3. Define Protein denaturation & causes, characteristics with example
4. Classify amino acids in detail with example.
5. Explain Transamination & Give one example.
6. Functions of plasma proteins
7. Define Electrophoresis & its clinical significance
8. Define Chromatography & its clinical significance
9. Explain the secondary structural organization of proteins
10. Mention the hydrolytic products of proteins
11. Precipitation reactions of protein
12. Define peptide bond formation & characteristics of peptide bond
14. Determination protein structure
15. Biological functions of amino acids
16. Biological functions of proteins.

Very Short answer questions:**(3 marks)**

1. Name any 4 agents causing denaturation of protein
2. Name any 2 defense & buffer proteins
3. Name the Sulphur containing essential amino acid & functions.
4. Explain oxidative deamination with example
5. Explain decarboxylation with example
6. Mention the Properties of proteins
7. Name the conjugated protein with example
8. Name the derived protein with example
9. Define A:G ratio
10. Nutritional classes of proteins with example
11. Define zwitterion
12. Fibrous & globular proteins

ENZYMES**Long answer questions****(10 marks)**

1. Classify enzymes? Explain any 4 factors affecting the enzymes activity
2. Explain the different types of enzyme inhibition with suitable examples

Short Notes**(6 marks)**

1. How are enzymes classified and give one example for each class?
2. Explain factors affecting enzyme activity
3. Mention the clinical applications of enzymes and how they are useful in diagnosis of disease
4. Explain the features of active site of enzyme
5. Explain the competitive inhibition with suitable example
6. Explain the non-competitive inhibition with suitable example
7. What are the Co-enzymes & Explain the features with example
8. Explain the regulation of enzyme activity
9. Define Iso-enzyme? Give two examples and its importance in clinical diagnosis
10. Explain the types of specificity

Very Short answer questions**(3 marks)**

1. Define Enzymes & Catalyst
2. Define Active site
3. What is Co-enzymes, mention any 2 examples with significance.
4. Define Enzyme unit
5. Define Apo enzyme & Holoenzymes
6. What is Suicide Inhibition
7. List any 3 Therapeutic uses of enzymes.
8. Plasma enzymes
9. Define km
10. Koshland's induced fit theory
11. Fischer's template theory
12. Prosthetic groups
13. Examples of Metalloenzymes & Metal activated enzymes

UNIT II - CARBOHYDRATES

Long answer questions

(10 marks)

1. Write in detail about the Polysaccharides and mention its importance.
2. Properties of Monosaccharides
3. Define Carbohydrates & detail in classification of carbohydrates with examples
4. Explain the reaction of Monosaccharides.

Short Questions

(6 marks)

1. Define carbohydrate and classify with examples
2. Write a note on Mucopolysaccharides & mention one function of each
3. Differentiate between Glycogen and Starch
4. Define Mutarotation
5. List out the functions of carbohydrates
6. Explain the Clinical importance of monosaccharides
7. Properties of monosaccharides
8. Explain Homopolysaccharides & mention their function
9. Write a note on Disaccharides
10. Define glycosides? Name any 3 glycosides & mention their function

Very Short answer questions

(3marks)

1. What is heparin? Mention its composition & function
2. List any 2 reducing sugars
3. List any 4 functions of glycoprotein
4. Difference between glycoprotein & proteoglycan
5. Why is sucrose a non-reducing sugar
6. Mention the clinical application of Inulin & Dextran
7. Difference between reducing and non-reducing sugars
8. Define invert sugar
9. What is cellulose? Mention its function
10. Note on Anomers
11. Define Epimers with examples
12. Biological importance of mannitol
13. Optical isomerism with examples.
14. Define amino sugars with examples
15. Define glycosides

NUCLEIC CHEMISTRY

Short Answer Questions

(6 marks)

1. List any 5 synthetic analog bases and mention its function
2. Short notes on types of RNA & mention its function
3. Define nucleoside and nucleotide by giving suitable examples.
4. Describe the structure of t-RNA and mention its function
5. List the important functions of nucleotides
6. Give a detailed account on Secondary structure of DNA
7. Difference between DNA and RNA
8. Difference between Purines and Pyrimidines

Very Short Answer Questions**(3 marks)**

1. Name the purine and pyrimidine bases of DNA & RNA
2. Differentiate Ribose and Deoxy ribose.
3. Name any 4 minor bases
4. Draw a neat labeled diagram of DNA
5. Mention the types of DNA and give 3 points each
6. What are the biological important bases and its function
7. Define Chargaff's rule
8. Functions of nucleic acid
9. What is ribosomal RNA
10. Draw a neat labeled diagram of t-RNA

UNIT III - LIPIDS**Long answer questions****(10 marks)**

1. what are lipids? classify them. Give biological significance of lipids.
2. what are fatty acids? classify them. Give biological significance of polyunsaturated fattyacids
3. Explain the phospholipids with examples and its function.

Short Questions**(6 marks)**

1. Explain in detail about Sphingomyelins & their function
2. Write a short note on Micelles, Bio membranes
3. Write a short note on Sphingophospholipids
4. Write a short note on Liposomes
5. Write a short note on Triacylglycerol
6. What is saturated fatty acid and give three examples with biological significance
7. What are prostaglandins? Mention their function
8. What is unsaturated fatty acid? Explain the types and biological significance
9. Write a short note on Properties of fatty acids
10. Write a short note on Essential Fatty Acids?
11. Write a short note on Trans fatty acids
12. Write a short note on cholesterol
13. Describe briefly about the classifications of lipids with suitable examples
14. What are the compounds formed from cholesterol?
15. Write in detail about the lipoprotein & its functions

Very Short answer questions**(3 marks)**

1. Lung surfactant
2. Saponification number
3. Iodine number
4. Acid number
5. What are Apo Lipoproteins?
6. Respiratory Distress Syndrome (RDS)
7. Define halogenation
8. What is rancidity of lipids?
9. Omega 3 Fatty acids
10. Cardiolipin
11. Free Fatty Acids

12. Leukotriene's (LTs)
13. Thromboxane's (Tx)
14. Write the products formed due to complete hydrolysis of triacylglycerol
15. What is cephalin

UNIT IV - ENERGY METABOLISM AND NUTRITIONAL BIOCHEMISTRY

Long answer questions

(10 marks)

1. Write in detail about the RDA, dietary sources, biochemical role and deficiency manifestations of folic acid/ vitamin B12/ calcium /Iron
2. Explain the RDA, dietary sources, biochemical role and deficiency manifestations of vitamin A/ vitamin D/ vitamin C/ vitamin K

Short Notes

(6 marks)

1. List out the clinical significance of Vitamin E/ Vitamin K
2. Coenzymes & functions of any 1 B-complex vitamin (Thiamine/ Riboflavin/ Niacin/Pyridoxine/ Folic acid etc.)
3. Explain the Vitamin E has selenium sparing action.
4. Discuss the steps involved in digestion & absorption of calcium/ phosphorous / iron
5. How plasma calcium level is regulated
6. Functions of copper/ selenium/ zinc
7. Role of proteins in diets
8. Describe protein energy malnutrition
9. Nutritional value of protein
10. Dietary role of different lipids
11. Dietary fiber
12. Thermogenic effect of food
13. Obesity
14. Define nitrogen balance & Mention the factor that causes positive & negative nitrogen balance
15. Define BMR & factor affecting BMR
16. What are Essential Amino Acids? Mention their clinical importance
17. Explain the RDA, sources, biochemical role and deficiency of sodium / potassium
18. What are Essential Fatty Acids? Mention their clinical importance.

Very Short answer questions

(3marks)

1. Write any 3 causes for Tetany
2. Define Heme proteins/ non heme proteins
3. Hemochromatosis/ Hemosiderosis
4. Iron deficiency anemia
5. Wilson's disease
6. Fluorosis
7. Define balanced diet
8. Define calorific values & Its significance
9. Define Respiratory quotient
10. What is Glycemic index
11. What is pellagra
12. Ceruloplasmin

UNIT V CLINICAL CHEMISTRY

Short Notes

(6marks)

1. Detail account on basic principle, methodology and diagnostic significance of electrophoresis.
2. Detail account on basic principle, methodology and diagnostic significance of paper chromatography
3. Short notes on Osmolality, significance and measurement.
4. write about the different types of electrophoresis & application of each type
5. Explain the method of cholesterol /urea /glucose estimation
6. write about the different types of electrophoresis & application of each type

Very Short answer questions

(2 marks)

1. Define Osmolality/ Osmolarity
2. Write the principle of (GOD-POD) method
3. List any 3 simple test to identify Carbohydrates, lipids and proteins
4. Mention the normal values of glucose/ cholesterol/ protein/ urea/ creatinine
5. Define osmolal gap
6. what is Rf value
7. Write the principle of Molisch test /Benedict's test
8. List out the normal/ abnormal constituents of urine

ENVIRONMENTAL CHEMISTRY

Short Notes

(6 marks)

1. Explain in detail about biomedical waste management
2. Write short notes on air pollution
3. Write short notes on Acid Rain.
4. Write short notes on carbon monoxide
5. Write short notes on mutagenesis.
6. Explain in detail about bio pesticides & its types
7. Explain briefly about the harmful effects of plastics to human health

Very Short answer questions

(3marks)

1. Define pollutants & give 2 examples
2. What are biomedical wastes?
3. Name five categories of bio pesticides
4. Write about biological water borne disease
5. What are the problems caused by plastics?
6. Name some chemicals causing water borne disorders
7. What is Bio-degradable & Non-biodegradable Waste?
8. Define greenhouse effects
9. What is Ames test?
10. What is meant by carcinogens, and list any three chemicals causing carcinogens
11. What is biosafety?

PAPER 4A - GENERAL MICROBIOLOGY

UNIT -I : GENERAL BACTERIOLOGY

10 MARKS

1. Discuss the methods of collection and transportation of specimens.
2. Define the terms sterilization, disinfection and antisepsis. Name various agents used for sterilization and discuss the role of hot air oven in sterilization.
3. Define the terms sterilization. Discuss the role of moist heat in sterilization and their sterility control methods.
4. Discuss the various types of disinfectants and discuss the role of halogens in chemical disinfection.

6 MARKS

1. Write a short note on contribution of Louis Pasteur.
2. Write a short note on contribution of Robert Koch.
3. Write a short note on contribution of Edward Jenner.
4. Write a short note on Koch postulates.
5. Tabulate the difference between prokaryotes and Eukaryotes .
6. Draw a labeled diagram of a bacterial cell. Describe the cell wall of bacteria.
7. Draw a labeled diagram of Autoclave. Describe the structure and functioning.
8. Draw a labeled diagram of Hot air oven. Describe the structure and functioning.
9. Tabulate the difference between differentiate between flagella and fimbria .
10. Write a short note on spores.
11. Describe bacterial growth curve.
12. What are culture media? Classify and discuss them in brief.
13. Discuss in detail anaerobic methods of cultivation of bacteria.
14. Discuss the methods of preservation of microorganisms.
15. Write a short note on phenols as disinfectant.
16. Write a short note on Aldehydes as disinfectant.
17. Write a short note on Antimicrobial sensitivity testing.
18. Discuss the methods of collection and transportation of specimens.
19. Outline the steps in Gram staining and interpretation.
20. Outline Ziehl-Neelsen staining procedure and interpretation.
21. Name the different types of hospital wastes and discuss in detail the methods of disposal of hospital wastes

3 MARKS

1. Write four functions of bacterial cell wall.
2. Write four differences between gram positive & gram negative bacterial cell wall.
3. What is protoplast & spheroplast.
4. What are the functions of capsule.
5. How will you classify bacteria based on position of flagella.
6. Write four examples of spore producing bacteria.
7. Write four examples of capsule producing bacteria.
8. Write four examples of capnophilic bacteria.
9. Write four examples of strict aerobic bacteria.
10. Write four examples of strict anaerobic bacteria.

11. Write four examples of microaerophilic bacteria.
12. Define sterilization .
13. Define disinfectant .
14. Name the types of filters and their uses.
15. What is cold sterilization.
16. Define inspissation.
17. What is an agar? write its role in preparation of media.
18. Name four selective media.
19. Name four differential media.
20. Name four transport media.
21. Write the composition of TSI agar.
22. Write the principles of catalase test.
23. Write the principles of oxidase test.
24. Name the two motile and non-motile organisms

UNIT -2 : IMMUNOLOGY

6 MARKS

1. Discuss the mechanism of innate and acquired immunity.
2. What is hypersensitivity? Classify hypersensitivity reactions? Describe in detail about type I reactions.
3. Discuss the principle and clinical applications of immunofluorescence technique.
4. Discuss the principle and clinical applications of ELISA technique.
5. Describe the structure and functions of Ig M, Ig G & Ig A.
6. Write a short notes on autoimmunity.
7. Discuss about delayed type hypersensitivity.
8. Describe about phagocytosis process.
9. Herd immunity.
10. Type III Hypersensitivity.

3 MARKS

1. Write the difference between active & passive immunity.
2. Define Immunity.
3. Write two examples of each , live attenuated bacterial & viral vaccines.
4. Write two examples of each , killed bacterial & viral vaccines
5. Write four difference between live & killed vaccines.
6. Define hapten.
7. What is heterophile antigen? write two examples.
8. Write two uses of ELISA.
9. Define hypersensitivity.
10. Difference between immediate and delayed type of hypersensitivity.
11. Define autoimmunity

UNIT -3 SYSTEMIC BACTERIOLOGY

10 MARKS

1. Discuss the pathogenicity and laboratory diagnosis of *Staphylococcus aureus*.
2. Name various organism causing sore throat and discuss in detail the laboratory diagnosis of diphtheria.
3. Classify Streptococci. Discuss the pathogenesis and lab diagnosis of *S.pyogenes*.

4. Classify the Clostridia of medical importance. Describe the pathogenesis, laboratory diagnosis of gas gangrene.
5. Classify Mycobacteria. Give an account on pathogenesis and laboratory diagnosis of pulmonary tuberculosis. Add a note on BCG vaccine.
6. Discuss the morphology, pathogenesis and laboratory diagnosis of syphilis.
7. Discuss in detail about pathogenesis and laboratory diagnosis of enteric fever.
8. List the diarrhea causing bacteria. Write in detail about pathogenesis and laboratory diagnosis of *vibrio*.

6 MARKS

1. Name four causative agents of enteric fever and explain about WIDAL test.
2. Name the UTI causing bacteria. How to collect urine & laboratory diagnosis of *E.coli*.
3. Describe about Toxin produced by *staphylococcus aureus*.
4. Discuss about prophylaxis of diphtheria.
5. Difference between *Streptococcus viridians* & *Streptococcus pneumoniae*.
6. Coagulase test.
7. Tetanus.
8. Explain about morphology and pathogenicity of *Bacillus anthracis*.
9. Classification of shigella and explain the antigenic structure and toxins produced by *Shigella*.
10. Weil's diseases.
11. Laboratory diagnosis of syphilis
12. Discuss the pathogenicity of Chlamydia.

3 MARKS

1. Name the pigments produced by *Pseudomonas*.
2. Name two toxins produced by *Clostridium tetani*.
3. Define Asepsis.
4. Enumerate any four diseases caused by *Streptococcus pyogenes*.
5. Gas gangrene.
6. Name four first line drugs used to treat tuberculosis infections.
7. List four species of *Shigella*.
8. List the cultivation methods of leprae.
9. MRSA.
10. ASO
11. CRP
12. Non -gonococcal urethritis (NGU).
13. Name two selective media for *V.cholera*
14. Significant bacteriuria.
15. Meningitis .
16. Selective medium of Salmonella
17. VDRL and RPR.
18. Name two transport and enrichment media for *V.cholerae*.
19. What are coliform bacilli? write two examples.
20. Actinomycosis
21. List the atypical mycobacteria.
22. Ghon's focus.
23. BCG vaccine
24. Name the two beta hemolytic bacteria.

25. Mantoux test.

UNIT -4 : VIROLOGY

10 MARKS

1. Name two RNA viruses. Name four methods of transmission of Hepatitis B virus infection in man. Mention the schedule of Hepatitis B vaccination.
2. Mention the modes of transmission of HIV in humans. Draw a neat diagram of HIV and label the parts. List the tests available for the confirmation of HIV in the microbiology laboratory.
3. Describe the laboratory diagnosis and prophylaxis of poliomyelitis.
4. Explain the laboratory diagnosis and prophylaxis of Rabies.

6 MARKS

1. Describe the serological markers of Hepatitis B virus.
2. Describe the prophylaxis of polio virus.
3. Complications of dengue virus.
4. Write a short note on adenovirus.
5. Infectious mononucleosis.
6. List the opportunistic infections in AIDS patient.

3 MARKS

1. Name four DNA virus.
2. Name four RNA virus
3. Haemorrhagic causing virus.
4. MMR vaccine.
5. Draw a neat labeled diagram of HIV.
6. Rabies vaccine.
7. List the cultivation methods of virus.

UNIT -5: PARASITOLOGY

6 MARKS

1. Difference between amoebic and bacillary dysentery.
2. Describe the life cycle of *Entamoeba histolytica*.
3. Describe the life cycle of *Giardia lamblia*
4. Describe the life cycle of *Malaria*
5. Describe the life cycle of *hookworm*
6. Describe the life cycle of *Roundworm*
7. Lab diagnosis of Plasmodium.
8. Describe the lab diagnosis of parasitological samples.

3 MARKS

1. Morphology of *E. histolytica*.
2. Black water fever.
3. Vectors.
4. Morphology of Leishmania.
5. Peripheral blood smear of Malaria.
6. Dog tapeworm.
7. *Cysticercus bovis*.
8. *Cysticercus cellulose*.
9. *Microfilaria*.

UNIT -6: MYCOLOGY

6 MARKS

1. Discuss the laboratory diagnosis of fungal infections.
2. Write a short notes on zygomycosis.
3. Aspergillosis
4. Describe about systemic mycoses.
5. Cryptococcosis - Lesions caused & Laboratory diagnosis.
6. Discuss the opportunistic mycoses.
7. Describe the morphology & cultural characteristics of Dermatophytes.
8. Describe the morphology& cultural characteristics of *Candida albicans*

3 MARKS

1. SDA
2. Name two selective culture media for *Candida* spp.
3. Name two selective culture media for *Cryptococcus* spp.
4. What is germ tube test.
5. Mention four fungal laboratory contaminants .
6. Name four dimorphic fungus.
7. Name two examples of yeast.
8. Name four opportunistic fungus.
9. Name four superficial mycoses.
10. Mycetoma

UNIT -7: HOSPITAL INFECTION CONTROL

6 MARKS

1. Biomedical waste management.
2. Write a short note on universal precaution.
3. Write a short note on universal precaution.
4. Mode of transmission of infections.
5. Write short note on the vaccines recommended for health care workers.
6. Recall the procedure to be followed for sharp injury to health care workers.
7. Describe the prevention of Nosocomial infections.

3 MARKS

1. Define segregations.
2. List four infectious waste.
3. Define land filling.
4. What is HICC? List two roles of HICC.
5. List two techniques used for the treatment of infectious waste.
6. Define universal precautions.
7. Define PPE.
8. List four methods to control the Hospital acquired infections.

PAPER 4B - GENERAL PATHOLOGY

LONG ANSWER

(10 MARKS)

1. Mention the types of necrosis with two example each
2. Mention the types of cellular adaptations with one example each
3. Mention the types of cell injury and describe the changes seen in each type
4. Describe the morphological alterations in reversible cell injury
5. Describe the morphological alterations in irreversible cell injury

SHORT ANSWERS

(6 MARKS)

1. Tabulate the differences between exudate and transudate
2. Tabulate the differences between benign and malignant tumor
3. Define Gangrene. Mention the types of gangrenes with one example each
4. Mention the factors that influence wound healing and repair
5. Tabulate the differences between acute and chronic inflammation
6. Describe the principle chemical mediators of inflammation
7. Tabulate the differences between necrosis and apoptosis
8. Write a short note on apoptosis
9. Describe causes and morphological features of chronic inflammation
10. Explain granulomatous inflammation with a neat labeled diagram
11. Tabulate the differences between dry and wet gangrene
12. Explain mode of spread of tumors in brief
13. Adverse effects of smoking
14. Write a short note on asbestosis
15. Write a short note on silicosis

VERY SHORT ANSWERS

(3 MARKS)

1. Define apoptosis. Mention two examples.
2. List the cardinal signs of acute inflammation
3. Define acute inflammation reaction and mention its outcome
4. Define chronic inflammation and give 2 examples
5. Mention the components of granulation tissue
6. Mention the parts of microscope
7. Give 2 examples of granulomatous inflammation
8. Define neoplasia
9. Define hypertrophy. Give 2 example
10. Define atrophy. Give 2 example
11. Define hyperplasia. Give 2 example
12. Define metaplasia. Give 2 example
13. Define reversible cell injury and mention two features
14. Define phagocytosis.
15. Define Virchow triad

HAEMATOLOGY

SHORT ANSWERS

(6 MARKS)

1. Define anemia. Mention the types of anemia on the basis of etiology.
2. Classify leukemia. Mention general features of acute leukemia.
3. Enumerate various color codings of various biomedical waste disposal with 4 examples

4. Describe the collection, transport, preservation and processing of clinical specimen
5. Describe the structure and function of different types of WBC'S with a neat labeled diagram
6. Write a short note on occupational health hazards.
7. Describe mechanism of homeostasis
8. Describe various types anticoagulant and its uses with its color coding
9. Explain microscopic examination of urine samples.
10. Describe the method of collection, transport, preservation of CSF.
11. Write short note on Coomb's test
12. Define anemia . Mention the general clinical features and basic interpretation of anemia.
13. Classify hemolytic anemia and mention in brief the laboratory findings

VERY SHORT ANSWERS

(3 MARKS)

1. Define Landstenier's Law
2. Define blood group
3. Mention the normal platelet count and function of platelets.
4. Mention the types of transfusion transmitted infection
5. Mention 2 causes of Eosinophilia.
6. Mention 2 causes of Neutrophilia.
7. Mention 4 preservative of urine and its indication
8. Define cross matching
9. Mention Principle of major cross matching
10. Mention Principle of minor cross matching
11. Write about the principle of benedicts test.
12. Write about biomedical waste management.

SYSTEMIC PATHOLOGY

LIVER

1. Define Cirrhosis. (3M)
2. Describe in detail about viral hepatitis. (6M)
3. Mention the various stages of alcoholic liver disease(3M)
4. Describe in detail about gall stones. (6M)
5. Write about the etiology, pathogenesis and clinical features of chronic cholecystitis. (10M)

BRAIN TUMOURS

1. Classify brain tumours (3M)

KIDNEY

1. Mention the types of renal calculi. (3M)
2. Describe the clinical features of renal stones. (3M)
3. Define hydronephrosis (3M)
4. Classify renal tumours. (3M)

BONE TUMOURS

1. Classify bone tumours(3M)
2. Give two examples of benign bone tumors. (3M)
3. Give two examples of malignant bone tumours(3M)

FEMALE GENITAL TRACT

1. Classify ovarian tumours(3M)
2. Describe the types of endometrial hyperplasia and risk factors associated with it.(6M)
3. Write a short note on risk factors for endometrial cancer.(6M)
4. Describe the etiopathogenesis and risk factors for cervical cancer.(10M)

BREAST

1. Describe the risk factors and clinical features of breast carcinoma.(10M)
2. Give 2 example of benign breasts tumour (3M)
3. Give 2 example of malignant breast tumours.(3M)

CARDIOVASCULAR SYSTEM

RHEUMATIC HEART DISEASES

1. Enumerate the modified Jones criteria for rheumatic heart disease(6M)

INFECTIVE ENDOCARDITIS

1. List the causative organisms for infective endocarditis(3M)
2. Enumerate the Dukes criteria for infective endocarditis.(6M)

ARTHEROSCLEROSIS

1. Enumerate the risk factors for atherosclerosis.(6M)
2. Mention two complications of atherosclerosis (3M)\
3. Mention the types of Ischemic heart disease. (3M)
4. Write in detail about myocardial infarction. (10M)

RESPIRATORY SYSTEM

LUNG INFECTIONS

1. Describe the various Stages of Pneumonia.(6M)
2. Define Pneumonia.(6M)

COPD

1. Define emphysema.(3M)
2. Define chronic bronchitis.(3M)
3. Define broncheactasis.(3M)
4. Tabulate the differences between chronic bronchitis and emphysema.(6M)
5. Mention various systemic effects of smoking (3M)

ASTHMA

1. Describe the etiopathogenesis and clinical features of bronchial asthma.(6M)
2. Define ARDS(3M)
3. Give 2 examples for conditions associated with ARDS.(3M)

GASTROINTESTINAL SYSTEM

1. Enumerate the clinical features of peptic ulcer.(3M)
2. Describe the Risk factors and clinical features of carcinoma stomach.(10M)
3. Describe the Risk factors and clinical features of carcinoma colon.(10M)

**ABILITY ENHANCEMENT COMPULSORY ELECTIVES
AECC-1- ENGLISH QUESTION BANK**

UNIT-1 - GRAMMAR

Six Mark Questions

1. Define grammar, Explain the types of grammar with example.
2. What do you mean by noun and Explain its type with examples?
3. Write a brief note on types of sentences with examples.
4. How many types of tenses are there?

Two Mark Questions

1. Define verb.
2. Define Adjective with example.
3. Define Adverb with example.
4. Define Gerund and preposition.
5. What do you mean by conjunction and interjection?
6. How many types of tenses are there?
7. He Said, "My father is ill".(Change the sentence into indirect speech)
8. He said to her, "Where are you going"? (Change the sentence into indirect speech)
9. They said that they can't live without water.(change the sentence into direct speech)
10. Radha said, "I am very busy now".(Change the sentence into indirect speech)
11. She says that she is a little bit nervous.(change the sentence into direct speech)
12. You are busy, _____? (Fill the sentence with suitable question tag)
13. Helmet makes driving safe, _____? (Fill the sentence with suitable question tag)
14. Dogs cannot fly, _____? (Fill the sentence with suitable question tag)
15. She was talking, _____?(Fill the sentence with suitable question tag)
16. He won't come today____?(Fill the sentence with suitable question tag)
17. He _____ (drink)tea every morning. (Fill the sentence with suitable tense)
18. I enjoy_____(read) at a cafe.(Fill the sentence with suitable tense)
19. We_____(see) a film last night.(Fill the sentence with suitable tense)
20. They went home, after they_____(finish) their work.(Fill the sentence with suitable tense)
21. I_____(stay) here till you return.(Fill the sentence with suitable tense)
22. I_____ do it tomorrow. (Fill the sentence with modal verb)
23. _____ you help me with the house work, please? (Fill the sentence with modal verb)
24. I _____ speak English.(Fill the sentence with modal verb)
25. The doctor_____ see you now.(Fill the sentence with modal verb)
26. He _____ be the love of my life.(Fill the sentence with modal verb)
27. All_____ submit your notebook.(Fill the sentence with modal verb)
28. Seetha loves Rama. (Change the sentence to passive voice)
29. The story has been read by me. (Change the sentence to active voice)
30. Do you speak English well? (Change the sentence to passive voice)
31. Open the door (Change the sentence to passive voice)
32. Let the T.V be watched by them. (Change into active voice)
33. He admitted his guilt. (Change the simple sentence into complex sentence)
34. In-spite of his hard work, he failed. (Change the simple sentence into compound sentence)

35. It was raining, but they went out. (Change the compound sentence into simple sentence)
36. He failed to prove that he was innocent. (Change the complex sentence into simple sentence)
37. If you do not work hard, you will fail. (Change the complex sentence into compound sentence)
38. Everest is _____ highest mountain in the world. (Fill up with the suitable article)
39. The rose is _____ beautiful flower. (Fill up with the suitable article)
40. _____ umbrella is useful in rain. (Fill up with the suitable article)
41. Do you play _____ Piano? (Fill up with the suitable article)
42. _____ unicorn is a special creature. (Fill up with the suitable article)
43. Red _____ danger. (Fill up with suitable prepositions)
44. I acted _____ him. (Fill up with suitable prepositions)
45. Mr. Kumar is _____ the office. (Fill up with suitable prepositions)
46. I am ready _____ help. (Fill up with suitable prepositions)
47. Put it _____ (Fill up with suitable prepositions)
48. Bharath is the cleverest of all the boys in the class. (Identify the degrees of comparison)
49. Seetha is taller than Geetha. (Identify the degrees of comparison)
50. Hyderabad is not so hot as Chennai. (Identify the degrees of comparison)
51. I am not so strong as he. (Identify the degrees of comparison)
52. Mumbai is bigger than Hyderabad. (Identify the degrees of comparison)

UNIT-2 : VOCABULARY

Six Mark Questions

1. Define vocabulary and explain its types.
2. How to improve our vocabulary.
3. Write the uses of Dictionary.

Two Mark Questions

1. Use a prefix to make the word meaningful:
Possible
2. Use a prefix to make the word meaningful:
Legal
3. Use a suffix to make the word meaningful:
Beauty
4. Use a suffix to make the word meaningful:
Clever
5. Use a suffix to make the word meaningful:
Danger
6. Give the antonym:
Weak
7. Give the antonym:
Open
8. Give the antonym:
Narrow
9. Give the antonym:
Expand
10. Give the antonym:
Superior

11. Give the synonym:

Incredible

12. Give the synonym:

Ecstatic

13. Give the synonym:

Rest

14. Give the synonym:

Behavior

15. Give the synonym:

Tired

16. Use the following idioms / phrases into sentence:

In black and white

17. Use the following idioms / phrases into sentence:

Get away

18. Use the following idioms / phrases into sentence:

Come forward

19. Use the following idioms / phrases into sentence:

Break down

20. Use the following idioms / phrases into sentence:

Look after someone

21. Write any two words miss used or confused?

22. Define Homophones.

23. Use the homophonic words in the sentences.

Write & right

24. Use the homophonic words in the sentences.

Whole & hole

25. Use the homophonic words in the sentences.

Weight & wait

26. Use the homophonic words in the sentences.

Sell & cell

27. Use the homophonic words in the sentences.

Sum & some

UNIT-3 : WRITING SKILLS

(Six Mark Questions)

1. Make a precise of the following passage and suggest a heading:

Effective speaking depends on effective listening. It takes energy to concentrate on hearing and to concentrate on understanding what has been heard. Incompetent listeners fail in a number of ways. First, they may drift. Their attention drifts from what the speaker is saying. Second, they may counter. They find counter-arguments to whatever a speaker may be saying. Third, they compete. Then, they filter. They exclude from their understanding those parts of the message which do not readily fit with their own frame of reference. Finally, they react. They let personal feelings about a speaker or subject override the significance of the message which is being sent. What can a listener do to be more effective? The first key to effective listening is the art of concentration. If a listener positively wishes to concentrate on receiving a message his chances of success are high. It may need determination. Some speakers are difficult to follow, either because of voice problems or because of the form in which they send a message. There is then a particular need for the determination of a listener to concentrate on what is being said. Concentration is helped by alertness. Mental alertness is helped by physical alertness. It is not simply physical fitness, but also positioning of the body, the limbs and the head. Some people also find it helpful to their concentration if they hold the head slightly to one side. One

useful way for achieving this is intensive note-taking, by trying to capture the critical headings and sub-headings the speaker is referring to. Note-taking has been recommended as an aid to the listener. It also helps the speaker. It gives him confidence when he sees that listeners are sufficiently interested to take notes; the patterns of eye-contact when the note-taker looks up can be very positive; and the speaker's timing is aided-he can see when a note-taker is writing hard and can then make effective use of pauses. Posture too is important. Consider the impact made by a less competent listener who pushes his chair backwards and slouches. An upright posture helps a listener's concentration. At the same time it is seen by the speaker to be a positive feature amongst his listeners. Effective listening skills have an impact on both the listener and the speaker.

2. Make a precise of the following passage and suggest a heading:

Despite all the research every one of us catches cold and most of us catch it frequently. Our failure to control one of the commonest of all ailments sometimes seems ridiculous. Medical science regularly practises transplant surgery and has rid whole countries of such killing diseases as Typhus and the Plague. But the problem of common cold is unusually difficult and much has yet to be done to solve it. It is known that a cold is caused by one of a number of viral infections that affect the lining of the nose and other passages leading to the lungs but the confusing variety of viruses makes study and remedy very difficult. It was shown in 1960 that many typical colds in adults are caused by one or the other of a family of viruses known as rhinoviruses, yet there still remain many colds for which no virus has as yet been isolated. There is also the difficulty that because they are so much smaller than the bacteria which cause many other infections, viruses cannot be seen with ordinary microscopes. Nor can they be cultivated easily in the bacteriologist's laboratory, since they only grow within the living cells of animals or plants. An important recent step forward, however, is the development of the technique of tissue culture, in which bits of animal tissue are enabled to go on living and to multiply independently of the body. This has greatly aided virus research and has led to the discovery of a large number of viruses. Their existence had previously been not only unknown but even unsuspected. The fact that we can catch a cold repeatedly creates another difficulty. Usually, a virus strikes only once and leaves the victim immune to further attacks. Still, we do not gain immunity from colds. Why? It may possibly be due to the fact that while other viruses get into the bloodstream where antibodies can oppose them, the viruses causing cold attack cells only on the surface. Or it may be that immunity from one of the many different viruses does not guarantee protection from all the others. It seems, therefore, that we are likely to have to suffer colds for some time yet.

3. Make a precise of the following passage and suggest a heading:

There is nothing more frustrating than when you sit down at your table to study with the sincerest of intentions and instead of being able to finish the task at hand, you find your thoughts wandering. However, there are certain techniques that you can use to enhance your concentration. "Your concentration level depends on a number of factors," says Samuel Ghosh, a social counsellor. "In order to develop your concentration span, it is necessary to examine various 2 facets of your physical and internal environment," she adds. To begin with one should attempt to create the physical environment that is conducive to focussed thought. Whether it is the radio, TV or your noisy neighbours, identify the factors that make it difficult for you to focus. For instance, if you live in a very noisy neighbourhood, you could try to plan your study hours in a nearby library. She disagrees with the notion that people can concentrate or study in an environment with distractions like a loud television, blaring music etc. "If you are distracted

when you are attempting to focus, your attention and retention powers do not work at optimum levels,” cautions Ghosh. “Not more than two of your senses should be activated at the same time,” she adds. What that means is that music that sets your feet tapping is not the ideal accompaniment to your books. Also do not place your study table or desk in front of a window. “While there is no cure for a mind that wants to wander, one should try and provide as little stimulus as possible. Looking out of a window when you are trying to concentrate will invariably send your mind on a tangent,” says Ghosh. The second important thing, she says, is to establish goals for oneself instead of setting a general target and then trying to accomplish what you can in a haphazard fashion. It is very important to decide what you have to finish in a given span of time. The human mind recognizes fixed goals and targets and appreciates schedules more than random thoughts. Once your thoughts and goals are in line, a focussed system will follow. She recommends that you divide your schedule into study and recreation hours. When you study, choose a mix of subjects that you enjoy and dislike and save the former for the last so that you have something to look forward to. For instance, if you enjoy verbal skill tests more than mathematical problems, then finish Maths first. Not only will you find yourself working harder, you will have a sense of achievement when you wind up. Try not to sit for more than 40 minutes at a stretch. Take a very short break to make a cup of tea or listen to a song and sit down again. Under no circumstances, should one sit for more than one and a half hours. Short breaks build your concentration and refresh your mind. However, be careful not to overdo the relaxation. It may have undesired effects.

4. Make a precise of the following passage and suggest a heading:

Research has shown that the human mind can process words at the rate of about 500 per minute, whereas a speaker speaks at the rate of about 150 words a minute. The difference between the two at 350 is quite large. So a speaker must make every effort to retain the attention of the audience and the listener should also be careful not to let his mind wander. Good communication calls for good listening skills. A good speaker must necessarily be a good listener. Listening starts with hearing but goes beyond. Hearing, in other words is necessary but is not a sufficient condition for listening. Listening involves hearing with attention. Listening is a process that calls for concentration. While, listening, one should also be observant. In other words, listening has to do with the ears, as well as with the eyes and the mind. Listening is to be understood as the total process that involves hearing with attention, being observant and making interpretations. Good communication is essentially an interactive process. It calls for participation and involvement. It is quite often a dialogue rather than a monologue. It is necessary to be interested and also show or make it abundantly clear that one is interested in knowing what the other person has to say. Good listening is an art that can be cultivated. It relates to skills that can be developed. A good listener knows the art of getting much more than what the speaker is trying to convey. He knows how to prompt, persuade but not to cut off or interrupt what the other person has to say. At times the speaker may or may not be coherent, articulate and well organized in his thoughts and expressions. He may have it in his mind and yet he may fail to marshal the right words while communicating his thought. Nevertheless, a good listener puts him at ease, helps him articulate and facilitates him to get across the message that he wants to convey. For listening to be effective, it is also necessary that barriers to listening are removed. Such barriers can be both physical and psychological. Physical barriers generally relate to hindrances to proper hearing whereas psychological barriers are more fundamental and relate to the interpretation and evaluation of the speaker and the message.

5. Make a precise of the following passage and suggest a heading:

The term dietary fibres refers collectively to indigestible carbohydrates present in plant foods. The importance of these dietary fibres came into the picture when it was observed that the people having diet rich in these fibres, had low incidence of coronary heart disease, irritable bowel syndrome, dental caries and gall stones. The foodstuffs rich in these dietary fibres are cereals and grains, legumes, fruits with seeds, citrus fruits, carrots, cabbage, green leafy vegetables, apples, melons, peaches, pears etc. These dietary fibres are not digested by the enzymes of the stomach and the small intestine whereas most of other carbohydrates like starch and sugar are digested and absorbed. The dietary fibres have the property of holding water and because of it, these get swollen and behave like a sponge as these pass through the gastrointestinal tract. The fibres add bulk to the diet and increase transit time in the gut. Some of these fibres may undergo fermentation in the colon. In recent years, it has been considered essential to have some amount of fibres in the diet. Their beneficial effects lie in preventing coronary heart disease, and decreasing cholesterol level. The fibres like gums and pectin are reported to decrease postprandial (after meals) glucose level in the blood. These types of dietary fibres are recommended for the management of certain types of diabetes. Recent studies have shown that the fenugreek (Methi) seeds, which contain 40 per cent gum, are effective in decreasing blood glucose and cholesterol levels as compared to other gum containing vegetables. Some dietary fibres increase transit time and decrease the time of release of ingested food in colon. The diet having less fibres is associated with colon cancer and the dietary fibres may play a role in decreasing the risk of it. The dietary fibres hold water so that stools are soft, bulky and readily eliminated. Therefore, high fibre intake prevents or relieves constipation. The fibres increase motility of the small intestine and the colon and by decreasing the transit time there is less time for exposure of the mucosa to harmful toxic substances. Therefore, there is a less desire to eat . and the energy intake can be maintained within the range of requirement. This phenomenon helps in keeping a check on obesity. Another reason in helping to decrease obesity is that the high-fibre diets have somewhat lower coefficients of digestibility. The dietary fibres may have some adverse effects on nutrition by binding some trace metals like calcium, magnesium, phosphorus, zinc and others and therefore preventing their proper absorption. This may pose a possibility of nutritional deficiency especially when diets contain marginal levels of mineral elements. This may become important constraints on increasing dietary fibres. It is suggested that an intake of 40 grams dietary fibres per day is desirable.

6. Write a letter to your uncle thanking him for the birthday present he had sent for you.
7. Write a letter to your mother about your daily routine.
8. Write a letter to your younger brother who has grown very weak. Suggest ways how he can improve his health.
9. Write a letter to your younger brother who has grown very weak. Suggest ways how he can improve his health.
10. Write a letter to your father requesting him to buy you a cycle.
11. Write an application to your Principal requesting him to grant leave. Also mention reason/reasons.
12. You are Nirmal/Nirmala, a student of Government High School, Gurgaon. Write an application to the Principal of your school, requesting him to allow you full fee concession.

13. Write an application to the Principal of your school to allow you to change your section.
14. You have lost your library card. Write a letter to the librarian to issue you a duplicate card.
15. Write a letter to the Chairman of the Municipal Board regarding insanitary conditions of the locality you live in.

Rearrange the following jumbled sentences to meaningful sentences:

1. are machines/to think/robots/that use/a computer brain
2. are sent/computer brain/in the robot's parts/messages/from the/to motors
3. can be/to do/of work/robots/programmed/many kinds
4. is the/computer science/concerned with/robotics/field/and engineering/creating robots

Two Mark Questions

1. How is note making important in your profession?
2. How many types of letters are there?
3. Define skimming.

UNIT-4 : SPOKEN COMMUNICATION

Six Mark Questions

1. Write a Dialogue between a shopkeeper and a customer.
2. Write a Dialogue between two friends on the topic of air pollution.
3. Write a Dialogue between two new comers in college campus.
4. Write a Dialogue between a Nurse and a doctor.
5. Write a Dialogue between a student and a teacher.
6. Why is phonetics important in studying English.
7. Write a conversation two friends discussing about the online classes.
8. Describe a brief note on group discussion.
9. What are the good qualities of debater?

Two Mark Questions

1. Write a short note on hazards of cell phone usage?
2. Describe your favorite friend.
3. Define pronunciation.
4. Define intonation.
5. Write any two words in British English and American English.
6. Define debate.

UNIT-5 : LISTENING AND READING SKILLS

Six Mark Questions

1. Read the following and answer the questions given below

"I Have a Dream" is a public speech delivered by American civil rights activist Martin Luther King Jr. during the March on Washington for Jobs and Freedom on August 28, 1963, in which he calls for an end to racism in the United States and called for civil and economic rights. Delivered to over 250,000 civil rights supporters from the steps of the Lincoln Memorial in Washington, D.C., the speech was a defining moment of the civil rights movement.

Beginning with a reference to the Emancipation Proclamation, which freed millions of slaves in 1863, King observes that: "one hundred years later, the Negro still is not free". Toward the end of the speech, King departed from his prepared text for a partly improvised peroration on the theme "I have a dream", prompted by Mahalia Jackson's cry: "Tell them about the dream, Martin!" In this

part of the speech, which most excited the listeners and has now become its most famous, King described his dreams of freedom and equality arising from a land of slavery and hatred. Jon Meacham writes that, "With a single phrase, Martin Luther King Jr. joined Jefferson and Lincoln in the ranks of men who've shaped modern America". The speech was ranked the top American speech of the 20th century in a 1999 poll of scholars of public address.

Q1. What issues does Martin Luther King's speech address?

1. Continuation of racism
2. End to racism and civil and economic rights
3. Civil rights
4. Civil War

Q2. What pushes King to speak: "I have a dream"?

1. He reads out the Emancipation Proclamation
2. He is prompted by Mahalia Jackson
3. He is overwhelmed by the crowd
4. Lincoln had asked him to give the speech.

Q3. From the last paragraph, give one word for "to leave"

1. Departed
2. Proclamation
3. Improvised
4. Address

Q4. What is the name of Martin Luther King's famed speech?

1. The Emancipation Proclamation
2. An Improvisation
3. A Peroration
4. I Have a Dream

Q5. In front of whom does King speak?

1. The civil rights supporters
2. His friends
3. Lincoln
4. The Negroes

Read the following and answer the questions given below

Conflict had existed between Spain and England since the 1570s. England wanted a share of the wealth that Spain had been taking from the lands it had claimed in the Americas.

Elizabeth I, Queen of England, encouraged her staunch admiral of the navy, Sir Francis Drake, to raid Spanish ships and towns. Though these raids were on a small scale, Drake achieved dramatic success, adding gold and silver to England's treasury and diminishing Spain's supremacy. Religious differences also caused conflict between the two countries. Whereas Spain was Roman Catholic, most of England had become Protestant. King Philip II of Spain wanted to claim the throne and make England a Catholic country again. To satisfy his ambition and also to retaliate against England's theft of his gold and silver, King Philip began to build his fleet of warships, the Spanish Armada, in January 1586.

Philip intended his fleet to be indestructible. In addition to building new warships, he marshaled 130 sailing vessels of all types and recruited more than 19,000 robust

soldiers and 8,000 sailors. Although some of his ships lacked guns and others lacked ammunition, Philip was convinced that his Armada could withstand any battle with England.

The martial Armada set sail from Lisbon, Portugal, on May 9, 1588, but bad weather forced it back to port. The voyage resumed on July 22 after the weather became more stable.

The Spanish fleet met the smaller, faster, and more maneuverable English ships in battle off the coast of Plymouth, England, first on July 31 and again on August 2. The two battles left Spain vulnerable, having lost several ships and with its ammunition depleted. On August 7, while the Armada lay at anchor on the French side of the Strait of Dover, England sent eight burning ships into the midst of the Spanish fleet to set it on fire. Blocked on one side, the Spanish ships could only drift away, their crews in panic and disorder. Before the Armada could regroup, the English attacked again on August 8.

Although the Spaniards made a valiant effort to fight back, the fleet suffered extensive damage. During the eight hours of battle, the Armada drifted perilously close to the rocky coastline. At the moment when it seemed that the Spanish ships would be driven onto the English shore, the wind shifted, and the Armada drifted out into the North Sea. The Spaniards recognized the superiority of the English fleet and returned home, defeated.

Q1. Sir Francis Drake added wealth to the treasury and diminished Spain's ____.

- unlimited power
- unrestricted growth
- territory
- treaties

Q2. King Philip recruited many __ soldiers and sailors.

- warlike
- strong
- accomplished
- timid
- inexperienced

Q3. The __ Armada set sail on May 9, 1588.

- complete
- warlike
- independent
- isolated

Q4. The two battles left the Spanish fleet ____.

- open to change
- triumphant
- open to attack
- defeated
- discouraged

Q5. The Armada was __ on one side.

- closed off
- damaged
- alone
- circled

2. Read the following and answer the questions given below

Opera refers to a dramatic art form, originating in Europe, in which the emotional content is conveyed to the audience as much through music, both vocal and

instrumental, as it is through the lyrics. By contrast, in musical theater an actor's dramatic performance is primary, and the music plays a lesser role. The drama in opera is presented using the primary elements of theater such as scenery, costumes, and acting. However, the words of the opera, or libretto, are sung rather than spoken. The singers are accompanied by a musical ensemble ranging from a small instrumental ensemble to a full symphonic orchestra.

1. It is pointed out in the reading that opera ----.
 - A) has developed under the influence of musical theater
 - B) is a drama sung with the accompaniment of an orchestra
 - C) is not a high-budget production
 - D) is often performed in Europe
 - E) is the most complex of all the performing arts

2. We can understand from the reading that ----.
 - A) people are captivated more by opera than musical theater
 - B) drama in opera is more important than the music
 - C) orchestras in operas can vary considerably in size
 - D) musical theater relies above all on music
 - E) there is argument over whether the music is important or the words in opera

3. It is stated in the reading that ----.
 - A) acting and costumes are secondary to music in musical theater
 - B) many people find musical theater more captivating than opera
 - C) music in musical theater is not as important as it is in opera
 - D) an opera requires a huge orchestra as well as a large choir
 - E) opera doesn't have any properties in common with musical theater.

Read the following passage and answer the questions given below.

Dolphins are regarded as the friendliest creatures in the sea and stories of them helping drowning sailors have been common since Roman times. The more we learn about dolphins, the more we realize that their society is more complex than people previously imagined. They look after other dolphins when they are ill, care for pregnant mothers and protect the weakest in the community, as we do. Some scientists have suggested that dolphins have a language but it is much more probable that they communicate with each other without needing words. Could any of these mammals be more intelligent than man? Certainly the most common argument in favor of man's superiority over them that we can kill them more easily than they can kill us is the least satisfactory. On the contrary, the more we discover about these remarkable creatures, the less we appear superior when we destroy them.

1. It is clear from the passage that dolphins ----.
 - A) don't want to be with us as much as we want to be with them
 - B) are proven to be less intelligent than once thought
 - C) have a reputation for being friendly to humans
 - D) are the most powerful creatures that live in the oceans
 - E) are capable of learning a language and communicating with humans

2. The fact that the writer of the passage thinks that we can kill dolphins more easily than they can kill us ----.

- A) means that they are better adapted to their environment than we are
- B) shows that dolphins have a very sophisticated form of communication
- C) proves that dolphins are not the most intelligent species at sea
- D) does not mean that we are superior to them
- E) proves that Dolphins have linguistic skills far beyond what we previously thought

3. One can infer from the reading that ----.

- A) dolphins are quite abundant in some areas of the world
- B) communication is the most fascinating aspect of the dolphins
- C) dolphins have skills that no other living creatures have such as the ability to think
- D) it is not usual for dolphins to communicate with each other
- E) dolphins have some social traits that are similar to those of humans.

Read the following and answer the questions given below.

Naval architects never claim that a ship is unsinkable, but the sinking of the passenger-and-car ferry Estonia in the Baltic surely should have never have happened. It was well designed and carefully maintained. It carried the proper number of lifeboats. It had been thoroughly inspected the day of its fatal voyage. Yet hours later, the Estonia rolled over and sank in a cold, stormy night. It went down so quickly that most of those on board, caught in their dark, flooding cabins, had no chance to save themselves: Of those who managed to scramble overboard, only 139 survived. The rest died of hypothermia before the rescuers could pluck them from the cold sea. The final death toll amounted to 912 souls. However, there were an unpleasant number of questions about why the Estonia sank and why so many survivors were men in the prime of life, while most of the dead were women, children and the elderly.

1. One can understand from the reading that ----.

- A) the lifesaving equipment did not work well and lifeboats could not be lowered
- B) design faults and incompetent crew contributed to the sinking of the Estonia ferry
- C) 139 people managed to leave the vessel but died in freezing water
- D) naval architects claimed that the Estonia was unsinkable
- E) most victims were trapped inside the boat as they were in their cabins

2. It is clear from the passage that the survivors of the accident ----.

- A) helped one another to overcome the tragedy that had affected them all
- B) were mostly young men but women, children and the elderly stood little chance
- C) helped save hundreds of lives
- D) are still suffering from severe post-traumatic stress disorder
- E) told the investigators nothing about the accident

3. According to the passage, when the Estonia sank, ----.

- A) there were only 139 passengers on board
- B) few of the passengers were asleep
- C) there were enough lifeboats for the number of people on board
- D) faster reaction by the crew could have increased the Estonia's

chances of survival
E) all the passengers had already moved out into the open decks

6. Medical report writing.

You are a staff nurse in the psychiatry ward. Mr. Rammohan aged 40 was admitted in your ward with the complaint of Dengue. Write a report of this to your clinical instructor.

7. Medical report writing.

You are a staff nurse in the psychiatry ward. Ms. Lalitha aged 34 was admitted in your ward with the complaint of Alzheimer disorder (memory loss). Write a report of this to your clinical instructor.

8. Medical report writing.

You are a staff nurse in the psychiatry ward. Mr. Ranjith aged 50 was admitted in your ward with the complaint of Obsessive compulsive disorder. Write a report of this to your clinical instructor.

9. Medical report writing.

You are a staff nurse in the special ward. Mrs. Jaya Priya aged 30 was admitted in your ward with the complaint of Diarrhea. Write a report of this to your clinical instructor.

10. Medical report writing.

You are a staff nurse in the psychiatry ward. Mr. Vijay aged 20 was admitted in your ward with the complaint of Anxiety disorder. Write a report of this to your clinical instructor.

11. Write a Comprehensive Report on the outbreak of Covid-19 in your Locality.

12. Write a Comprehensive Report on the outbreak of Malaria in your Locality.

13. Write a Comprehensive Report on the outbreak of Dengue in your Locality.

14. Write a Comprehensive Report on the outbreak of Cholera in your Locality.

15. Write a Comprehensive Report on the outbreak of Pneumonia in your Locality.

Two Mark Questions

1. How to make effective reading?
2. What are the types of reading?
3. Why medical report writing is important in your profession?
4. What are the skills you should have for successful Telephone conversation