REGULATIONS AND CURRICULUM GOVERNING

B.Sc. MEDICAL IMAGING TECHNOLOGY

Implemented in Academic Year 2015-16

Revised in 2016

Amended up to 2025

Name of the Constituent Unit: Yenepoya School of Allied Health Sciences



YENEPOYA
(DEEMED TO BE UNIVERSITY)

Deralakatte, Mangalore, Karnataka.

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NOTIFICATION FROM THE UNIVERSITY

Sl. No.	ACM with date	Decisions/Approvals
1.	18th ACM 8.10.2014	Starting of BSc course in Medical Imaging Technology from the academic year 2015-2026 under faculty of allied health and basic sciences
2.	21st ACM/ 31.07.2015	Board of Studies for B.Sc.(Tech) Courses Medical Imaging Technology
3.	25th ACM/ 22.08.16	B.Sc. Technical Programmes amendment to Examination Regulations: B.Sc,Medical Imaging Technology
4.	27th ACM/ 09.01.2017	Conduct of Supplementary examination for B.Sc.Tech. Programmes
5.	37th ACM/ 13.12.2019	Increase in the annual Intake – Faculty of Healthcare Professions – 20 - 40
6.	38th ACM/ 27.04.2020	All the Undergraduate programs offered by the Faculty of Allied and Healthcare Professionals approved for the Credit Based Semester System from the Academic year 2020-21
7.	39th ACM/ 27.08.2020	Reallocation of existing / proposed course under the respective faculties & starting of an Institute of Allied Health Sciences To start the Yenepoya Institute of Allied Health Sciences- B.Sc., Medical Imaging Technology
8.	44th ACM/ 22.03.2021	Proposal for introduction of Choice Based Credit System in all the undergraduate programmes under the Faculty of Allied & Healthcare Professions
9.	47th ACM/	Starting of New Open Elective courses of UG

Sl. No.	ACM with date	Decisions/Approvals
	20.06.2022	programme with the suggestions
10.	48th ACM/ 05.11.2022	Increase the intake of seats for B.Sc. Tech Programme B.Sc. Medical Imaging Technology : 40- 100
11.	49th ACM/ 13.12.2022	Curriculum of B.Sc. –M.Sc. Integrated UG –PG programme with NEP regulations have approved for the implementation
12.	51st ACM/ 16.05.2023	Introduction of New National Credit Framework (NCRF) for all undergraduate programme under the faculty of Allied & Healthcare Professions
13.	51st ACM/ 16.05.2023	Introduction of New Multidisciplinary Elective course for Undergraduate programmes
14.	54th ACM/ 20.11.2023	Increase in intake of seats for Programmes under the Faculty of Allied & Healthcare Professions B.Sc. Medical Imaging Technology : 100 to 180
15.	58th ACM/13.08.2024	Amendment in the scheme of examinations and dissertation credits distribution of 2022 batch Integrated B.Sc.-M.Sc. Program
16.	61th ACM 13.02.2025	Amendment in the syllabus of the course Pathology and Microbiology II of the B.Sc. Technology Programme
17.	64th ACM 14.08.2025	Implementing the ability enhancement course (AEC) (English Communication) in all BSc Technology Programmes • English and Communication – Part I – to be introduced in I Semester (3 Credit) English and Communication – Part II – to be introduced in II Semester (3 Credit)

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1. Preamble

Health care sector has become one of the largest employment generation sectors in India and abroad. Rapidly changing and expanding horizon of the health care sector demands formal training programs in all its allied areas. Advanced complex instrumentation & equipment require technologists not only to operate but also to care & maintain these instruments and equipment. These technologists should possess a strong scientific foundation to be able to perform these tasks at a much higher level than the traditionally trained technicians of the past used to perform. The students who are trained in the technological aspects of medical care with a good scientific foundation will be in a position to competently assist the Physician or Surgeon. Hence to prepare the students to meet the demands of the healthcare sectors and in accordance with Ministry of Human Resource Development (HRD), Govt. of India education system, Choice based Credit system is introduced from the academic year 2020- 21 onwards.

Medical Imaging plays a very important role in Diagnosis of patients. After the discovery of X-ray in 1895, Radiology has become an indispensable tool in medical community. From the humble but effective X-ray to the advanced imaging modality like MRI and CT, the advances have been rapid and highly technical. Knowledge not only is Biology but also in physics and its principles play an important role in operating these modalities. So along with the skills of doctors and nurses, the skills of the technologist also matter in a successful patient outcome. Hence, hospital needs a qualified and skilled Medical Imaging Technologist.

Choice based Credit System is a flexible system of learning. The distinguishing features of CBCS are following:

- It permits students to learn at their own pace.
- Choose Electives from a wide range of Elective courses offered by other Depts/University.
- Undergo additional courses acquire more than the required number of credits.
- Adopt an Inter-disciplinary and Intra-disciplinary approach in learning.
- Make best use of the available expertise of the faculty across the departments or disciplines.
- Has an inbuilt evaluation system to assess the analytical and creative skills of students in addition to the conventional domain knowledge assessment pattern.

2. Definitions

2.1 Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.

2.2 Semester System / Choice Based Credit System: The semester system accelerates the teaching – learning process. The CBCS provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice -based credit system provides a cafeteria type approach in which the students can take courses of their choice, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

An academic year shall consist of two semesters:

Odd Semester 1st, 3rd, 5th& 7th	September/October to February/March
Even semester 2nd, 4th, 6th& 8th	March/April to August/September

2.3 Course: Usually referred to, as "papers" is a component of a programme. The courses shall define learning objectives and learning outcomes. A course shall comprise lectures/ tutorials/ laboratory work/ field work/ outreach activities/ project work/ vocational training/viva/ seminars/ term papers/assignments/ presentations/ self-study etc. or a combination of some of these. The courses can be of the following types i.e. Core, Ability Enhancement, Skill enhancement, Value added courses, Multidisciplinary Electives and Internship.

2.4 Credits: Credit defines the quantum of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, normally in each of the courses, credits will be assigned on the basis of the number of lectures/tutorial laboratory work and other forms of learning required, to complete the course contents in a 15-20week schedule: One credit =1 hour of lecture per week/ two hours of Laboratory or practical/three hours of clinical rotation, field work/posting. All courses need not carry the same credits.

	Lecture (L)	**Tutorial (T)**	**Practical (P)**	**Clinical Rotation (CR)**

1 Credit	1 Hour	1 Hour	2 Hours	3-5 Hours

Credit Hours for different types of courses: Each course may have only a lecture component or a lecture and tutorial component or a lecture and practicum component or a lecture, tutorial, and practicum component, or only practicum component. For example, a three-credit lecture course in a semester means three one-hour lectures per week with each one-hour lecture counted as one credit. In a semester of 15 weeks duration, a three-credit lecture course is equivalent to 45 hours of teaching.

One credit for tutorial work means one hour of engagement per week. In a semester of 15 weeks duration, a one-credit tutorial in a course is equivalent to 15 hours of engagement.

A one-credit course in practicum or lab work, community engagement and services, and fieldwork in a semester mean two-hour engagement per week. In a semester of 15 weeks duration, a one-credit practicum in a course is equivalent to 30 hours of engagement.

A one-credit of Seminar or Internship or Studio activities or Field practice/projects or Community engagement and service means two-hour engagements per week. Accordingly, in a semester of 15 weeks duration, one credit in these courses is equivalent to 30 hours of engagement.

A course can have a combination of lecture credits, tutorial credits, and practicum credits. For example, a 4–credit course with three credits assigned for lectures and one credit for practicum shall have three 1-hour lectures per week and one 2-hour duration field-based learning/project or lab work, or workshop activities. In a semester of 15 weeks duration, a 4-credit course is equivalent to 45 hours of lectures and 30 hours of practicum. Similarly, a 4 –credit course with 3- credits assigned for lectures and one credit for tutorial shall have three 1-hour lectures per week and one 1-hour tutorial per week. In a semester of 15 weeks duration, a four-credit course is equivalent to 45 hours of lectures and 15 hours of tutorials.

Experiential learning credit is equal to 3-hour duration per week. For example, 1 credit for experiential learning will mean 45 hours of learning. The credits assigned to the

course is indicated as L:T:P format. For example, for a 4credit course format could be: 4:0:0 or 1:2:1 or 3:1:0 or 0:0:4etc.

2.5 **Programme:** An educational program leading to award of a degree, diploma or certificate. The following types of courses/activities constitute the programmes of study. Each of them will require a specific number of hours of teaching/guidance and laboratory/studio/workshop activities, field-based learning/projects, internships, and community engagement and service.

a. **Lecture courses:** Courses involving lectures relating to a field or discipline by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.

b. **Tutorial courses:** Courses involving problem-solving and discussions relating to a field or discipline under the guidance of qualified personnel in a field of learning, work/vocation, or professional practice.

c. **Practicum or Laboratory work:** A course requiring students to participate in a project or practical or lab activity that applies previously learned/studied principles/theory related to the chosen field of learning, work/vocation, or professional practice under the supervision of an expert or qualified individual in the field of learning, work/vocation or professional practice.

d. **Seminar:** A course requiring students to participate in structured discussion/conversation or debate focused on assigned tasks/readings, current or historical events, or shared experiences guided or led by an expert or qualified personnel in a field of learning, work/vocation, or professional practice.

e. **Internship:** A course requiring students to participate in a professional activity or work experience, or cooperative education activity with an entity external to the education institution, normally under the supervision of an expert of the given external entity. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations,

business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning.

f. **Studio activities:** Studio activities involve the engagement of students in creative or artistic activities. Every student is engaged in performing a creative activity to obtain a specific outcome. Studio-based activities involve visual- or aesthetic focused experiential work.

g. **Field practice/projects:** Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity.

h. **Community engagement and service:** Courses requiring students to participate in field-based learning/projects generally under the supervision of an expert of the given external entity. The curricular component of 'community engagement and service' will involve activities that would expose students to the socio-economic issues in society so that the theoretical learnings can be supplemented by actual life experiences to generate solutions to real-life problems.

i. **Experiential learning activities:** Field project work / Day out learning activities etc are considered as experiential activities.

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

2.7 Credit Point: It is the product of grade point and number of credits for a course.

2.8 Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters: O, A+, A, B+, B, C, P, F, AB.

2.9 Cumulative Grade Point Average (CGPA): It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of

the total credits of all courses in all the semesters. It is expressed up to two decimal places.

2.10 Semester Grade Point Average (SGPA): It is a measure of performance of work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

2.11 Transcript or Grade Card or Certificate: Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester.

2.12 Academic Bank Account: Means an individual account with the Academic Bank of Credits opened and operated by a student, to which all academic credits earned by the student from course(s) of study are deposited, recognized, maintained, accumulated, transferred, validated or redeemed for the purposes of the award of degree/diploma/certificates etc. by an awarding institution.

2.13 Academic Bank of Credits: Means the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses or Programmes in Disciplines of study leading to Degree or Diploma or Post Graduate Diploma or Certificate of Study offering multiple entry and multiple exit facilities, while removing rigid curricular boundaries and creating new possibilities of life-long learning.

2.14 Credit Accumulation: Means the facility created by Academic Bank of Credits in the Academic Bank Account opened by students in order to transfer and consolidate the credits earned by them by undergoing Courses.

2.15 Credit Redemption: Means the process of commuting the accrued credits in the Academic Bank Account of the students maintained in ABC for the purpose of

fulfilling the credits requirements for the award of Degrees or Diplomas or Certificates or Course work for Ph.D. programme etc., by the registered degree-awarding Higher Educational Institutions.

2.16 Credit Transfer: Means the mechanism by which the Registered Higher Educational Institutions are able to receive or provide prescribed credits to individual Academic Bank Accounts in adherence to the University Grants Commission credit norms for the 'course/s' undertaken by students enrolled in any Registered Higher Education Institution within India.

2.17 Curricular components of the B.Sc.Medical Imaging Technology Programme:

Courses in the programme may be of the following types:

a. Core Course
b. Skill Enhancement Courses (SEC)
c. Ability Enhancement Courses (AEC)
d. Value Added Courses (VAC)
e. Multidisciplinary Elective (ME)
f. Internship

a. Core Course (CC): A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. This is the course which is the major disciple/subject having main focus and degree will be awarded in this discipline. This core course provides opportunity for our student to pursue in depth study of a particular subject or discipline hence, it is compulsorily studied by a student as a core requirement to complete the program of study in a said discipline. Every Core course shall be restricted to a minimum of 4 credits.

b. Skill Enhancement Course (SEC): SEC courses are aimed at imparting practical skills, hands- on training, competencies etc to enhance the skill-based knowledge and thus the employability of the students.

c. Ability Enhancement Courses (AEC): These are the courses which aim to provide

the students the competency in a modern Indian language (MIL) and in the English language with special emphasis on language and the communication skills. The courses aim at enabling the students to acquire and demonstrate the core linguistic skills, including critical reading and expository and academic skills, that helps students articulate their arguments and present their thinking clearly and coherently and recognize the importance of language as a mediator of knowledge and identity. The courses will also emphasize the development and enhancement of skills such a communication, and the ability to participate/ conduct discussion and debate.

d. Value Added Courses (VAC): These are the courses relating to understanding India, environmental science/ education, Health and Wellness etc..

i. Constitution of India: The course aims at enabling the students at acquire and demonstrate the knowledge and understanding of contemporary India with its historical perspective, the basic framework of the goals and policies of National development, and the constitutional obligations with special emphasis on constitutional values and fundamental rights and duties.

ii. Environmental Studies: The course aims to equip the students with the ability to apply the acquired knowledge, skills, attitudes, and values require to take appropriate actions for mitigating the effects of environmental degradation, climate change, and pollution, effective waste management, conservation of biological diversity, management of biological resources, forest and wild life conservation, and sustainable development and living.

iii. Human Rights & Gender equity: TheCourse emphasis understanding social justice issues and roles of human rights in promoting equitable society including international, national perspective, contemporary issues with this holistic coverage and relevance to today's world.

iv. Medical Ethics: The course deals with ethics involving fundamental and moral issues related to decision making while performing professional practice. It guides the students in systematic and rational way of working through dilemmas and to

determine the best course of action in their field of practice.

e. **Multidisciplinary Electives (ME):** These courses are intended to broaden the intellectual experience and form part of liberal arts and science education. Students are not allowed to choose or repeat courses already undergone at the higher secondary level (Twelfth class). The courses relating to any of the broad discipline given below will come under this category.

i. **Natural and Physical Sciences:** Students can choose basic courses from disciplines such as natural science, for example, Biology, Botany, Zoology, Biotechnology, Biochemistry, Chemistry, Physics, Biophysics, Astronomy and Astrophysics, Earth and Environmental sciences, etc.

ii. **Mathematics, Statistics and computer applications:** Courses under this category will facilitate the students to use and apply tools and techniques in their major and minor disciplines. The course may include training in programming software like python among others and application software like STATA, SPSS, TALLY, etc. Basic courses under this category will be helpful; for science and social science in data analysis and the application of quantitative tools.

iii. **Library, Information, and Media Sciences:** Courses from this category will help the students to understand the recent developments in information and media science (journalism, Mass Media, and Communication)

iv. **Commerce and Management:** Courses include business management, accountancy, financial institutions, Fintech, etc.,

v. **Humanities and Social Sciences:** The courses relating to Social sciences, for example, Anthropology, Communication and Media, Economics, History, Linguistics, Political science, Psychology, Social work, Sociology, etc. will enable students to understand the individuals and their social behavior, society and nation. Students be introduced to survey methodology and available large – scale databases for India. The courses under humanities include for example,

Archeology, History, Comparative Literature, Arts and Creative Expressions, Creative writing and literature, language(s), philosophy etc., and interdisciplinary courses relating to humanities. The list of courses that can include interdisciplinary subjects such as cognitive science, environmental science, gender studies, global environment and health, international relations, political economy and development, sustainable development, Women's and gender studies, etc. will be useful to understand society.

The Multidisciplinary elective offered by Yenepoya (Deemed to be) University includes:

i. **First Aid and Basic Life Support (BLS):** ThisCourse deals with training the students to be a first responder when there are medical or traumatic emergencies.

ii. **Yoga:** The coursedevelop a comprehensive understanding of yoga, including its history, various schools, practices, and their application in daily life, while also recognizing its potential for personal well-being, professional growth, and promoting positive health.

iii. **Vermitechnology:** This category of course will help students to gain skills in using worms to convert decomposing food waste into nutrient-rich fertilizer in simple, inexpensive and energy efficient way.

iv. **Positive Psychology:** The course will enable students to enrich themselves to thrive on the belief that people want to lead meaningful and fulfilling lives, cultivate what is best within them, and enhance their experiences of love, work, and play.

v. **National Service Scheme (NSS):**Students can choose NSS to understand the basic concept of NSS, to identify the needs and problems of the community in which they work and to gain skills in mobilizing community participation.

vi. **Lifestyle Management:** This course will help students to learn to achieve

health goals through lifestyle and behavior adjustments by creating healthy habits as well as stress management.

vii. **Youth Red Cross:** The course deals withproviding knowledge on Youth Red Cross volunteer ship and identifying the role of youth in humanitarian service. It also enables youth to promote national and international understanding by using international link of the movement.

viii. **Jeevan Kaushal:**University grant commission identified 4 modules on life skills (Jeevan Kaushal), the skills that required through our life. Jeevan Kaushal courses such as Communication skills, Professional Skills, Leadership and Management skills and Universal Human Values which will help students in developing personal competencies that helps to deal with challenges of life effectively thereby realizing his/her infinite potential as a human being.

ix. **Self – learning course:** In accordance with the UGC (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2021, New Delhi, dated 25th March 2021, and reference No.F.1-100/2016 (MOOCs/e-content), students are encouraged to augment their learning experience by opting for Massive Open Online Courses (MOOCs), Study Webs of Active Learning for Young Aspiring Minds (SWAYAM), and Coursera courses as part of the multidisciplinary elective.

Yenepoya (Demed to be University) will adhere to UGC regulations governing MOOCs/SWAYAM/Coursera courses, incorporating amendments as communicated by UGC over time. To facilitate the seamless completion of chosen courses, the department will appoint a designated course coordinator. The coordinator will guide and support students throughout the duration of the selected online courses.

The evaluation process will adhere to predefined norms and parameters, which will be communicated in the course overview at the time of offering.

In COURSERSA, the assessment are multifaceted and include quizzes or tests at the

conclusion of each module, assignments or projects demonstrating the practical application of concepts, active participation in discussion forums, and peer-reviewed assessments. The culmination of each course involves final quizzes or capstone projects tailored to the course's content. Upon successful completion, students receive an online certificate, Yenepoya (Deemed to be University) will integrate the acquired credits into the student's official marks sheet.

In SWAYAM, Assessment will include formative continuous online assessments and end-of-course proctored exams, all of which are mandatory for successful completion by the student. Yenepoya (Deemed to be University) will integrate the marks or grade achieved by the student, conveyed by the Host Institution through the PI of the SWAYAM course, into the student's official marks sheet. These marks contribute to the final award of the degree conferred by the University.

f. Internship

The internship time period provides the candidate the opportunity to develop confidence and increased skill in simulation and treatment delivery. Candidate will demonstrate competence in basic and intermediate procedures and will observe the advanced and specialized treatment procedures. The candidate will complete the clinical training by practicing all the skills learned in classroom and clinical instruction. The candidate is expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

3. Eligibility for Admissions:

To be eligible for admission in B. ScMedical Imaging Technology, a candidate should have passed two-years Pre-University examination/ Pre-Degree examination/ two years after ten years of schooling or its equivalent as recognized by the Yenepoya (Deemed to be) University with Physics, Chemistry and Biology as principal courses of study.

Candidate needs to secure 40% or above marks in the qualifying examination to be eligible for admission. For SC/ST/OBC candidates minimum marks required in the qualifying exam is 35% marks.

4. Duration of the Program

The duration of the programme shall extend over 8 semesters (three academic years with one year internship) each semester comprising minimum of 15 weeks with the minimum of 90 actual working days of instruction in each semester. The successful completion of the Undergraduate program, along with internship as applicable will lead to Bachelor's degree inMedical Imaging Technology (B.Sc. MIT).

5. Maximum Period for Completion of Programme:

A candidate shall complete six semesters (Three Years) programme within Six years from the date of admission. Hence, the maximum period for completion of the programme is seven years.

6. Aim of the Program

To prepare competent entry-level medical imaging technology professionals with comprehensive scientific and technical knowledge in imaging sciences, capable of safely performing, optimizing, and interpreting diagnostic imaging procedures across diverse clinical settings. Graduates will demonstrate ethical and patient-centered practice, effective communication, critical thinking, and collaborative functioning within multidisciplinary healthcare teams, while upholding radiation safety, quality assurance, and a commitment to lifelong learning, research awareness, and community-oriented healthcare delivery.

7. Outcomes of the Program

Program Outcome (PO): (Knowledge – K, Skill – S, Attitude – A, Communication – C)
Upon successful completion of the undergraduate course, students will have developed a broad knowledge in the field of evaluation, diagnosis and management of different conditions of the Medical Imaging system.

In particular they will be:

PO 1: Function as competent entry level medical imaging technologists (K, S, A)

PO 2: Demonstrate the ability to use theoretical knowledge and critical thinking skills in clinical practice (K, S)

PO 3: Select appropriate technical factors for exposure related to the positioning (K, S)

PO 4: Provide patient care before, during and after the procedures (S, A, C)

PO 5: Perform appropriate examination required for patients (K, S)

PO 6: Select and operate different modalities as per to the need of physician (K, S)

PO 7: Understand the various diagnostic and therapeutic modalities based on the patients history and examination findings (K, S)

Expected skills to be acquired by the end of the programme:

PO 8: Prepare the patient as per the need of the procedure to be performed(S, A, C)

PO 9: Provide best clinical information to the physician(K,C)

PO 10: Modify the protocols according to the demand and need(K,S)

PO 11: Assist radiologists during minimally invasive procedures under the imaging guidance(K,S,A)

PO 12: Demonstrate effective oral and written communication skills - C

PO 13: Use of radiation protective devices to limit the radiation dose for both patient and radiation personnel (K,S,A)

Program Structure:

	Broad category of course	**Hours / Credits**	**Course (Title)**
1.	**Discipline-Specific Courses**		
a)	Theory	**I Semester**	
		60 Hours / 4 Credits	Human Anatomy & Physiology-I
		60 Hours / 4 Credits	Pathology & Microbiology- I
		60 Hours / 4 Credits	Basic Physics
		60 Hours / 4 Credits	Biochemistry
		II Semester	
		60 Hours / 4 Credits	Human Anatomy & Physiology-II
		60 Hours / 4 Credits	Pathology & Microbiology- II
		60 Hours / 4 Credits	Radiation and Medical Physics
		III Semester	

		60 Hours / 4 Credits	Radiographic Photography and Image Processing
		60 Hours / 4 Credits	General Pharmacology
		60 Hours / 4 Credits	Radiographic Positioning - I
		60 Hours / 4 Credits	Radiation Protection
		IV Semester	
		60 Hours / 4 Credits	Radiological Positioning - II
		60 Hours / 4 Credits	Radiological Procedure - I
		60 Hours / 4 Credits	Ultrasound and Doppler
		V Semester	
		60 Hours / 4 Credits	Radiological Procedure - II
		60 Hours / 4 Credits	Nuclear Medicine and Interventional Radiology
		60 Hours / 4 Credits	Patient Care
		VI Semester	
		60 Hours / 5 Credits	Basic and Advanced Instrumentation of Computed Tomography
		60 Hours / 5 Credits	Basic and Advanced Instrumentation of Magnetic Resonance Imaging
b)	Practical (SEC)*	-	-
c)	Clinical (SEC)*	**III Semester**	
		120 Hours / 5 Credits	Clinical Radiology - I
		IV Semester	
		120 Hours / 5 Credits	Clinical Radiology - II
		V Semester	
		120 Hours / 4 Credits	Clinical Radiology - III
		VI Semester	
		120 Hours / 5 Credits	Clinical Radiology - IV
d)	Simulation-based (SEC)*	-	-
2.	**Curriculum Enrichment Courses**		

a)	Field Visit	-	-
b)	Community Posting	-	-
c)	Industry / Clinical Internship	**VII Semester**	
		42 Hours/week / 20 Credits	Internship I
		VIII Semester	
		42 Hours/week / 20 Credits	Internship II
d)	Research Project	-	-
3.	**Electives**		
a)	Discipline-Specific Electives	-	-
b)	Interdisciplinary Courses	45 Hours / 3 Credits per year	Coursera/Swayam/NSS/Red cross
Ability Enhancement Courses • *Soft skills development* • *Language and communication skill development* • *Analytical skill development* • *Personality and professional development* • *Employability skill development*		**I Semester**	
		45 Hours / 3 Credits	English and Communication I
		30 Hours / 2 Credits	Kannada
		II Semester	
		45 Hours / 3 Credits	English and Communication II
		45 Hours / 3 Credits	Multidisciplinary Elective
		IV Semester	
		45 Hours / 3 Credits	Multidisciplinary Elective
		VI Semester	
		45 Hours / 3 Credits	Multidisciplinary Elective
c)	Value Added Courses	**II Semester**	
		30 Hours / 2 Credits	Constitution of India
		III Semester	
		30 Hours / 2 Credits	Human Rights & Gender Equity

		V Semester	
		30 Hours / 2 Credits	Biostatistics
		30 Hours / 2 Credits	Environmental Science
		VI Semester	
		30 Hours / 2 Credits	Medical Ethics
	Total	**171 Credits**	

8. Attendance:

- Each course (theory, practical, clinical etc.) shall be treated as an independent unit for the purpose of attendance. Candidates having minimum 80% attendance in each of the Courses can only qualify to appear for the Semester End Examination. The Candidates with less than 80% of attendance shall be required to repeat that Course by attending the semester.
- There shall be no provision for condonation of shortage of attendance.
- The HOD/Programme Coordinator through the Dean of Faculties shall announce the names of the candidates who will not be eligible to take the Semester End-Examinations (SEE) in the various courses and send a copy of the same to the Controller of Examinations (COE) Office. Registrations of such candidates for those courses shall be treated as cancelled.

9. Teaching-Learning Methods Course wise:

Teaching - Learning method	**Courses**
Experiential learning	Human Anatomy & Physiology – I Internship I & Internship II Radiological Positioning – II
Integrated/Inter-disciplinary learning	Basic Physics Multidisciplinary Elective
Participatory learning	Radiation Protection English & Communication – I & II

Problem-solving methodologies	Pathology & Microbiology – I
Self-directed learning	Basic & Advanced Instrumentation of CT Basic & Advanced Instrumentation of MRI Coursera / SWAYAM / NSS / Red Cross
Patient-centric learning	Clinical Radiology – I Clinical Radiology – II Clinical Radiology – III Clinical Radiology – IV
Evidence-based learning	General Pharmacology
The Humanities	Human Rights & Gender Equity
Project-based learning	Environmental Science
Role-play	Patient Care
Team-work	Radiological Procedure – II
Reflective writing	Constitution of India

10. Scheme of Examination

Evaluation of a course shall be done based on continuous internal assessment (CIA) mode followed by Semester End University Examination (SEE) for each core, SEC, AEC & VAC. The evaluation of Multidisciplinary elective offered by Yenepoya (Deemed to be) University shall be done based on formative assessment.

The components of CIA (Continuous Internal Assessment) may include sessional tests, Seminar, Assignment/ Social involvement and other activities as determined by the respective speciality.

The marks for CIA shall be 50% and SEE shall be 50%.

The minimum marks for CIA shall be 40% and SEE shall be 40% for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.

There shall be examinations at the end of each semester ordinarily during February/March for odd semesters and during August/September for even semesters.

The SEE duration shall be 60 minutes for 25 marks paper and 120 minutes for 50 marks paper.

The various Formative assessment method include Assignments, reports, quizzes…

10.1 Examination Structure

The examination structure shall vary dep ending on the course, however, broadly divided as follows:

Examination / Assessment	**Core / SEC**	**AEC (English, Kannada) / VAC**
Continuous Internal Assessment	50 Marks	25 Marks
Semester End Examination	50 Marks	25 Marks
Total	100 Marks	50 Marks

10.2 Multidisciplinary Elective:

Multidisciplinary elective will be assessed through continuous and comprehensive assessment throughout the Semester (50 Marks)

i. **Evaluation and Certification of online courses:**

Evaluation will be based on predefined norms and parameters and announced in the overview of the Course at the time of offering the course. Formative continuous online assessments and end of course proctored exams shall be completed by the student.

The certificate obtained shall be submitted to the college office which will be communicated to the office of the Controller of Examinations of Yenepoya (Deemed to be University).

The Yenepoya (Deemed to be) University will give the equivalent credit weightage to the students for the credits earned through online learning courses through MOOCS/Coursera as per the credit plan of the program.

ii. **Credit Mobility of Online Courses:**

The Yenepoya (Deemed to be University) will give the equivalent credit weightage to the students for the credits earned through online learning courses as per the credit plan of the program.

In case a student fails to complete the online course he/ she may be allowed to complete the course requirements by registering for another online course in subsequent semester or opt for a course offered at this Yenepoya (Deemed to be University).

The elective course offered by the Yenepoya (Deemed to be University) shall be restricted to a maximum of 3 credits.

A candidate shall compulsorily complete total 9 Credits of Multidisciplinary courses.

These courses shall be selected either from the Generic Electives offered by the Yenepoya (Deemed to be) university or from the SWAYAM/Coursera courses. A Candidate shall have freedom to choose the courses of once own choice and learn at their own pace but, require to complete minimum 3 credits before second semester, 6 credits before fourth semester and 9 credits before sixth semester end examination.

A candidate who is desirous to add more credits shall be permitted to do so during the academic duration. Extra credits earned by a candidate shall be included in the marks card on submission of course completion certificate. However, it shall not be considered for awarding the Grade in the UG programme.

10.3 Parameters for Continuous Internal Assessment (CIA)

Internal Assessment Components	**Core / SEC**	**AEC (English, Kannada) / VAC**
Internal Assessment tests	20	10
Assignment	10	05
Continuous and comprehensive assessment	20	10
Total Marks	**50**	**25**

10.4 Assessment Methods:

1	Quiz	6	Role Play
2	Group Discussion	7	Peer to Peer

			Assessment
3	Open Book Exam	8	Mind Mapping
4	Think-Pair-Share	9	Minute paper
5	Presentations	10	Case Study

10.5 Question Paper Pattern for Core course (Internal Assessment & Semester End Examination)

	MAXIMUM MARKS = 50				**Duration**
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	120 minutes
LONG ESSAY TYPE	02	01	10	10	
SHORT ESSAY TYPE	07	05	04	20	
SHORT ANSWERS	12	10	02	20	
			Total	**50**	

	MAXIMUM MARKS = 50				**Duration**
PART A					
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	120 Minutes
LONG ESSAY TYPE	02	01	10	10	
SHORT ESSAY TYPE	02	01	05	05	
SHORT ANSWERS	06	05	02	10	
PART B					
LONG ESSAY TYPE	02	01	10	10	

SHORT ESSAY TYPE	02	01	05	05	
SHORT ANSWERS	06	05	02	10	
			Total	**50**	

10.6 Question Paper Pattern for Ability Enhancement Compulsory (AEC) Course

	MAXIMUM MARKS = 25				**Duration**
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	
ESSAY	05	03	05	15	60 minutes
SHORT ANSWERS	07	05	02	10	
			Total	**25**	

10.7 Question Paper Pattern for Value Added (VAC) Course

	SUBJECTS HAVING MAXIMUM MARKS = 25				**Duration**
Type of question	**Number of questions**	**To be Answered**	**Marks for each question**	**Total**	
ESSAY	05	03	05	15	60 minutes
SHORT ANSWERS	07	05	02	10	
			Total	**25**	

10.8 Practical examination (SEC)

SI.NO	**Components**	**Marks**
1	Spotters	10
2	Case scenario/Stations	20

3	Viva Voce	20
Total Marks		50

Particulars of Practical, Viva-Voce

Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as a specialist.

Viva- Voce examination shall aim at assessing depth of knowledge, logical reasoning, confidence &oral communication skills.

OSCE/OSPE- shall have minimum of 4 stations.

11 Eligibility to appear for University Examination

Each course (theory, practical, clinical etc.) shall be treated as an independent unit for the purpose of attendance. Candidates having minimum 80% attendance in each of the Courses can only qualify to appear for the Semester End Examination. The Candidates with less than 80% of attendance shall be required to repeat that Course by attending the semester.

There shall be no provision for condonation of shortage of attendance.

Evaluation of a course shall be done based on continuous internal assessment (CIA) mode followed by Semester End University Examination (SEE) for each core, SEC, AEC & VAC.

The evaluation of Multidisciplinary elective offered by Yenepoya (Deemed to be) University shall be done based on formative assessment.

The components of CIA (Continuous Internal Assessment) may include sessional tests, Seminar, Assignment/ Social involvement and other activities as determined by the respective speciality.

The marks for CIA shall be 50% and SEE shall be 50%.

The minimum marks for CIA shall be 40% and SEE shall be 40% for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.

The HOD/Programme Coordinator through the Dean of Faculties shall announce the names of the candidates who will not be eligible to take the Semester End- Examinations (SEE) in the various courses and send a copy of the same to the Controller of Examinations (COE) Office. Registrations of such candidates for those courses shall be treated as cancelled.

12 Criteria for Passing

The marks for CIA shall be 50% and SEE shall be 50%.

The minimum marks for CIA shall be 40% and SEE shall be 40% for a pass, but the minimum marks for pass per course shall be 50% CIA and SEE added together.

A candidate shall be declared to have passed the UG programme if he/she secures at least CGPA of 5.0 (Course Alpha-Sign Grade P) in the aggregate of both Internal Continuous Assessment and Semester End Examination.

The results of the candidates who have passed the sixth semester examination but not passed the lower semester examinations shall be declared as NCL (Not Completed Lower semester examinations). Such candidates shall be eligible for the degree only after completion of all the lower semester examinations.

13 Grading and Classifications

The results of successful candidates at the end of each semester shall be declared in terms of Grade Point Average (GPA) and Alpha-Sign Grade. The results at the end of the sixth semester shall be classified on the basis of the Cumulative Grade Point Average (CGPA) obtained in all the six semesters and the corresponding overall alpha sign grade.

a. Letter Grades and Grade Points:

i. The Deemed to be University would be following the absolute grading system, where the marks are compounded to grades based on pre-determined class intervals.

ii. The UGC recommended 10-point grading system with the following letter grades are given below:

Letter Grade	Marks	Grade Point
O (Outstanding)	90-100	10
A+ (Excellent)	80-89	9
A (Very Good)	70-79	8
B+ (Good)	60-69	7
B(Above Average)	55-59	6
P (Pass)	50-55	5
F (Fail)/ RA (Reappear)	Below 50	0

Ab (Absent)		0

*The Marks with 0.5 shall be rounded up to the next whole number.

iii. A student obtaining Grade RA/ Ab shall be considered failed and will be required to reappear in the end semester examination.

b. The Semester Grade Point Average (SGPA)

The performance of a student in a semester is indicated by a number called 'Semester Grade Point Average' (SGPA). The SGPA is the weighted average of the grade points obtained in all the courses by the student during the semester.

For example, if a student takes five (Theory/Practical) in a semester with credits C1, C2, C3, C4 and C5 and the student's grade points in these courses are G1, G2, G3, G4 and G5, respectively, and then students' SGPA is equal to:

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4G4 + C5G5}{C1 + C2 + C3 + C4 + C5}$$

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

$$SGPA = \frac{C1G1 + C2G2 + C3G3 + C4 * ZERO + C5G5}{C1 + C2 + C3 + C4 + C5}$$

c. Cumulative Grade Point Average (CGPA)

The CGPA is calculated with the SGPA of all the VI semesters to two decimal points and is indicated in final grade report card/final transcript showing the grades of all VI semesters and their courses. The CGPA shall reflect the failed status in case of F grade(s), till the course(s) is/are passed. When the program(s) is/are passed by obtaining a pass grade on subsequent examination(s) the CGPA shall only reflect the

new grade and not the fail grades earned earlier. The CGPA is calculated as:

$$CGPA = \frac{C1S1+C2S2+C3S3+C4S4+C5S5+C6S6}{C1+C2+C3+C4+C5+C6}$$

where C1, C2, C3,…. is the total number of credits for semester I,II,III,…. and S1, S2, S3….is the SGPA of semester I,II,III,…..

Calculation of GPA & CGPA: An example (1st semester)

Program Code	Course	Credits (a)	Grade Obtained	Credit Value (b)	Grade Points (axb)
	Course 1	4	B	8	32
	Course 2	4	B	8	32
	Course 3	4	O	10	40
	Course 4	2	C	7	14
	Course 5	2	A	9	18
	Total	**16**	**-**	**-**	**136**

1st Semester GPA = Total Grade Points / Total Credits = 136 / 16 = 8.5

2nd Semester GPA = 7 with respect to 18 Credits

Then 1st Year CGPA = (8.5 x 16) + (7 x 18) / 16 + 18 = 7.7

14 **Any other Information**(Progression Criteria, Re-entry after break of the study, Evaluation of Answer Scripts, Internship)

14.1 Progression Criteria

- The students are allowed to carry over any number of courses till sixth semester. But student is eligible to appear for the End semester exam of sixth semester if he/she has cleared all the Courses both Core, AEC, SEC & VAC of first, second, third & fourth semesters. If student has any pending course of first to fourth semesters, he/she is not eligible to appear for the end semester exam of the sixth semester. However, Fifth semester courses are allowed to club with sixth semester end examination. But, all the Core, AEC, SEC &

VAC of first to fourth semester should be completed to be eligible for sixth semester End Semester Examination.

- Candidate should clear all Courses (Core, AEC, SEC, VAC & ME) of all the semester, to be eligible to start the one year of mandatory internship.
- A fail in any one Course will mean the candidate has to reappear for the exam in that Course only.
- A candidate who passes the semester examinations in parts is eligible for only CGPA and letter grade but not for award/medal from the University.

14.2 Re-Entry after Break of the study:

Candidates admitted to a program abstaining for more than 3 months must seek readmission into the appropriate semester.

The candidate shall follow the syllabus in vogue (currently approved/is being followed) for the program.

All re-admissions of candidates are subject to the approval of the University.

14.3 Evaluation of Answer Scripts

a. Each theory examination shall have single evaluation. There shall be provision for re-evaluation on a payment of a fee. An external examiner shall value the paper, if the difference is more than 15% of previous marks the answer script shall be sent for third evaluation. In such an event, the average of the best two out of the three scores will be taken as the final score.

b. Practical examination shall be jointly conducted and evaluated by one internal examiner and one external examiner.

14.4 Internship

A candidate has to mandatorily complete 1 year (2 semesters) of internship. The total credit per semester is 20 and for two semesters it is 40.

- **Eligibility:** A candidate should have passed in all the courses (Core, AEC, VAC and Multidisciplinary Electives) amounting to 131 number of credits before entering in to internship.
- **Internship guidelines:** Each semester of Internship shall be minimum of 20 credits. The credits are calculated based on 1 credit = 3 to 5 hours of practical training. There shall be an exit exam at the end of the each semester at the college level.

- **Components of Exit Exam**

Sl. No.	Components	Marks
1	Spotters	30
2	Case scenario/Stations	30
3	Viva Voice	40
Total Marks		100

Particulars of Practical, Viva-Voce

- Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as an Optometrist.
- Viva- Voce examination shall aim at assessing, i.e., depth of knowledge, logical reasoning, confidence &oral communication skills.
- OSCE/OSPE- shall have minimum of 3 stations.

SEMESTERI

HUMANANATOMY&PHYSIOLOGYI

Course:Core

Credits:04 **Numberof hours:60**

PARTA-HUMANANATOMY

- **CourseOutcomes:**

Attheendofthecourse,studentswillbeableto:

CO1:Toidentifyandlocateeachofthebodysystemstoapplyanatomicalknowledgetoperformminor technicalprocedural skills.

CO2:Toknowthenormaldispositionofthestructuresinthebodywhileclinicallyexamininga patient and while conducting clinicalprocedures.

CO3:To know theanatomical basis ofdiseaseand injury

CO4: To discuss the interrelationship of systems in maintaining homeostasis.

CO5:Todescribethestructureofeach body system

➢ **COURSECONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	4	**Introduction:** **Human body as a whole** 1.1 Definition of anatomy and its divisions 1.2Terms of location, positions, and planes 1.3 Cell and its organelles. 1.4Epithelium: definition, classification, describe with examples, function. 1.5 Glands: classification, describe serous & mucous glands with examples. 1.6 Basic tissues: classification with examples 1.7Demonstration: Histology of types of epithelium. Histology of serous, mucous & mixed salivary gland.	√			10	SE & SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit II	5	**Locomotion and support** 2.1Bone: classification, names of bone cells, parts of long bone, microscopy of compact bone, names of all bones, vertebral column, inter-vertebral disc, fontanelles of fetal skull. 2.2 Joints: classification of joints with examples, synovial joint (in detail for radiology). 2.3Muscular system: classification of muscular tissue & histology, names of muscles of the body. 2.4 Demonstration: Bones & joints. Histology of compact bone (TS & LS). Demonstration of all muscles of the body. Histology of skeletal, smooth &cardiac muscle (TS & LS).	√			15	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		Histology of the 3 types of cartilage. Demo of all bones showing parts, radiographs of normal.					
Unit III	5	**Cardiovascular system** 3.1Heart: size, location, chambers, exterior & interior, blood supply of heart 3.2 Systemic &pulmonary circulation, branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial artery, superficial palmar arch, femoral artery, internal iliac artery, peripheral pulse, inferior vena cava, portal vein, Porto-systemic anastomosis, great saphenous vein, Dural venous sinuses. 3.3 Lymphatic	√			25	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		system: cisterna chyli& thoracic duct, histology of lymphatic tissues, names of regional lymphatics, axillary and inguinal lymph nodes in brief. 3.4Demonstration of heart and vessels in the body. Histology of large artery, medium sized artery & vein, large vein. Histology of lymph node, spleen, tonsil & thymus. Normal chest radiograph showing heart shadows.					
Unit IV	10	**Gastro-intestinal system** 4.1 Parts of GIT, oral cavity, lip, tongue, dentition, pharynx, oesophagus, stomach, small and large intestine,liver,gall bladder, pancreas. 4.2 Tonsil, salivary glands extrahepatic	√			30	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		biliary apparatus,Waldeyer's ring 4.3Demonstration of parts of gastro intestinal system. Normal radiographs of gastro intestinal system. Histology of gastro intestinal system.					
Unit V	4	**Respiratory system** 5.1 Parts of RS, nose, nasal cavity, larynx, trachea, lungs, broncho-pulmonary segments, histology of trachea, lung and pleura, names of paranasal air sinuses. 5.2 Demonstration of parts of respiratory System Normal radiographs of chest. -Histology of lung and trachea.	√			15	LE, SE, SA
Unit VI	2	**Embryology** 6.1Spermatogenesis & oogenesis. Ovulation, fertilization. Fetal		√		5	SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		circulation. Placenta, Demonstration of models.					

❖ **LE**- Long Essay**, SE**- Short Essay**, SA-** Short Answer

Recommendedbooks:

1. Ranganath P, Leelavathy N. Basics in human anatomy for BSc paramedical courses. Revised and updated ed. Hyderabad: The Health Sciences Publisher; .

2. Chaurasia BD. Human anatomy. 4th ed. New Delhi: CBS Publishers & Distributors; 2004.

3. Singh V. Textbook of anatomy. Revised and updated ed. New Delhi: Elsevier; .

4. Waugh A, Grant A. Ross and Wilson anatomy and physiology in health and illness. 12th ed. Edinburgh: Elsevier Health Sciences; 2014.

5. Inderbir S. Textbook of human histology with colour atlas. 6th ed. New Delhi: Jaypee Brothers Medical Publishers; 2006.

PARTB-PHYSIOLOGY

- **CourseOutcomes:**

Attheend ofthecourse,studentswill beable to:

CO1:Todemonstratetheunderstandingofphysiologicalstructureof Renalsystem,endocrinesystem,Nervoussystemand specialsenses.

CO2:Tobroadlyidentifytheclinicalabnormalitiesoforgansanditsclinicalphysiologicalimplications

- **COURSECONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	2	**General Physiology** 1.1 Introduction to physiology 1.2 Homeostasis: Definition, Positive feedback, negative feedback. PH 1.3 Body Fluid Compartments	√	√		15	SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit II	5	**Muscle Nerve physiology** 2.1.1Introduction, Classification and structureof muscle, sarcomere 2.2Neuromuscular junction, Transmission across neuromuscular junction. 2.3 Excitation contraction coupling. Mechanism of muscle contraction, rigor mortis.	√	√		20	LE, SE, SA
Unit III	7	**Blood** 3.1 Introduction: composition and function of blood. 3.2 Blood Cells: types, Normal Count 3.3 Red blood cells: function. Erythropoiesis: Definition, Stages, Factors affecting 3.4 Hemoglobin: Function, concentration Physiological variation of RBC	√	√		25	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		Count and Hb 3.5 White blood cells: different types, functions, normal count, differential count 3.6 Platelets: origin, normal count, functions. 3.7 Haemostasis: definition, steps, clotting factors, mechanism of clotting, disorders of clotting 3.8 Blood groups: ABO system, Rh system: Rh factor, Rh incompatibility. 3.9 Blood grouping & typing, cross matching. 3.10 Blood transfusion: indication, universal donor and recipient concept. Selection criteria of a blood donor, transfusion reactions. 3.11 Anaemias: definition, Symptoms					

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		and signs (brief). 3.12 Blood indices: colour index, MCH, MCV, MCHC (def and Normal Values). 3.13 ESR and PCV: normal values, definition, determination (methods). 3.14Plasma proteins: types and concentration, functions of albumin, globulin, fibrinogen, prothrombin. 3.15 Blood volume: normal value, determination of blood volume					
Unit IV	8	**Cardiovascular system** 4.1 Heart: physiological anatomy, nerve supply. 4.2Properties of cardiac muscle PH 4.3Cardiac cycle: definition, systole, diastole, phases,	√	√		20	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		JVP(brief) 4.4Cardiac output, stroke volume, EDV (only definitions). 4.5 Heart sounds, normal heart sounds, mechanism and features, areas of auscultation. 4.6 Blood pressure: definition, normal value, clinical measurement of blood pressure, hypotension, hypertension 4.7Heart rate: Physiological variations, regulation (brief), radial pulse 4.8Electrocardiogram (ECG): Definition, Normal ECG, Causes of ECG waves, Uses of ECG. 4.9Cardiac shock: Definition, Types (brief), Triple response.					

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit V	6	**Respiratory system** 5.1Introduction: Functions of respiratory system, physiological anatomy of respiratory system, respiratory tract 5.2Respiratory organs: lungs, alveoli, respiratory membrane 5.3Mechanism of breathing: Inspiration and Expiration, muscles involved, Mechanism. 5.4Surfactant: Composition, Function, 5.5Transport of oxygen: forms of transport, Oxygen Hemoglobin Curve. 5.6Lung volumes and capacities: Spirogram, Definitions and normal Volumes. 5.7Regulation of respiration: Nervous and chemical	√	√		20	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		regulation, respiratory centre, Herring Breur reflexes. 5.8Hypoxia: Def, Classification, Description (in brief). 5.9 Cyanosis, Asphyxia, Dyspnea, Dysbarism, Artificial Respiration, Apnoea.(Definition Only)					

❖ **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

RecommendedBooks

1. Guyton AC, Hall JE. Textbook of medical physiology. 13th ed. Philadelphia: Elsevier; 2016.
2. Ganong WF. Review of medical physiology. 26th ed. New Delhi: McGraw Hill Education; 2018.
3. Chatterjee CC. Human physiology. Vol 1. 12th ed. Kolkata: Medical Allied Agency; .
4. Choudhary SK. Concise medical physiology. New Delhi: New Central Book Agency; .

PATHOLOGY&MICROBIOLOGY-I

Course:Core

Credits:4 **NoofHours:60 Hours**

PARTA-PATHOLOGY

- **CourseOutcome:**

Atthe endof thecourse,thestudentshouldbeableto:

CO1: Explain the blood cells structure, functions & its formation.

CO2:Enumerate themethods of estimatingcell counts.

CO3:Demonstratebloodcollectionbyvariousmethods

- **COURSECONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	2	**Introduction to Pathology**		√		05	SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit II	12	**Hematology** 2.1. Normal constituents of Blood, their structure and functions. 2.2. Collection of Blood samples. 2.3. Various anticoagulants used in hematology. 2.4. Hemoglobin estimation, different methods and normal values. 2.5. RBC count. 2.6. WBC count. 2.7. Platelet count.	√			35	LE,SE, SA
Unit III	10	**Blood Bank** 3.1. Introduction to blood banking. 3.2. Blood group system: ABO & Rh system. 3.3. Methods of blood grouping: Forward & Reverse. 3.4. Donor selection criteria. 3.5. Collection and processing of blood for	√			30	LE,SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		transfusion.					
Unit IV	6	**Clinical Pathology** 4.1. Collection, transport, preservation and processing of various clinical specimens. □ Urine. □ CSF. □ Stool. □ Sputum. □ Body fluids. 4.2. Urine examination- collection and preservation, Physical, chemical and microscopicexamination for abnormal constituents.	√			30%	LE,SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **RecommendedBooks**

1. Makroo RN. Compendium of transfusion medicine. 2nd ed. New Delhi: Jaypee Brothers Medical Publishers; 2009.

2. Harmening DM. Modern blood banking and transfusion practices. 6th ed. Philadelphia: F.A. Davis Company; 2012.

PARTB-MICROBIOLOGY

- **CourseOutcome:**

  Attheend ofthe course,thestudent shouldbe ableto:

- Thegeneralcriteriaformicrobial classification,Typesofculturemediasand methods.
- Identifykeyconceptsofimmunology.
- Implementthe commonsterilizationanddisinfectionmethods.
- Outlineandpracticegeneralbiomedicalwastemanagement.

- **COURSECONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit 1	5	**Introduction** 1.1 Introduction & history of Microbiology 1.2 Classifications of microorganisms & structure of bacteria 1.3 Microscopy and types of microscope	✓			10	LE, SE
Unit 2	3	**Growth & Nutrition** 2.1 Nutrition, growth and multiplication of bacteria, Bacterial Growth Curve 2.2 Culture medias 2.3 Culture methods	✓			10	LE, SE,SA
Unit 3	4	**Sterilization & Disinfection** 3.1 Classification of Sterilization and	✓			30	LE, SE

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		Disinfection 3.2Sterilization:Different methods of sterilization, Principles and use of equipment's of sterilization- Hot Air oven &Autoclave in detail 3.3 Disinfection: Commonly used chemical disinfectants and their uses					
Unit 4	9	**Immunology** 4.1 Immunity-Classification and types 4.2 Antigen 4.3 Antibody 4.4 Antigen antibody reactions 4.5 Hypersensitivity reactions 4.6 Immunization schedule	✓			30	LE, SE, SA
Unit 5	4	**Infection** 5.1 Infection-Definition, types, sources and mode of transmission 5.2 Hospital acquired	✓			10	SE,SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		infections 5.3 Types of infectious diseases- outbreak, endemic, epidemic, pandemic					
Unit 6	5	**Applied Microbiology** 6.1 Biomedical Waste Management: Principles & Practices 6.2 Standard precautions 6.3 Hand hygiene technique and body fluids spill management 6.4 Needle stick injury management-1	✓			10	SE,SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **RecommendedBook**

1. Baveja CP. Textbook of microbiology. 4th ed. New Delhi: Arya Publications; 2005.
2. Ananthanarayan R, Paniker CKJ. Textbook of microbiology. 8th ed. Hyderabad: Orient Blackswan; 2006.
3. Owen JA, Punt J, Stanford SA, Jones PP. Kuby immunology. 7th ed. New York: W.H. Freeman and Company; 2013.

YENEPOYA
(DEEMED TO BE UNIVERSITY)

BASIC PHYSICS

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

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

  CO1: To distinguish imaging modalities based on the phenomenon used**.**

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit I	15hrs	**Fundamentals of electricity** 1.1 Electric charges &Units of electric charge 1.2 Coulombs law 1.3 Electric induction 1.4 Resistance 1.5 Conductors 1.6 Insulators& Semiconductors 1.7 Electric current 1.8 Ohm's, EMF, Kirchhoff's law 1.9 Alternating Current 1.10 Charge and discharge of a Capacitor through resistance and inductance.	✓			15%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
Unit II	10hrs	**Electromagnetic Radiation** 2.1. Maxwell's equation 2.2. Electromagnetic induction 2.3. Electromagnetic waves & their properties 2.4.The Electromagnetic spectrum 2.5. Spectrum of white light 2.6. spectra- continuous, line & band spectra, Absorption spectra 2.7. Luminescence 2.8. Energy density and Intensity 2.9. Quality of Electromagnetic Radiation 2.10. Radiation in atmosphere		✓		10%	SE, SA
Unit III	5hrs	**X-ray generators** 3.1.Transformers and its types, 3.2. Laws of transformers, 3.3. Transformer losses 3.4. Filament circuit, 3.5. High voltage circuit 3.6. Rectification 3.7. Types of generators 3.8. Fuses, switches, and exposure timers 3.9. Interlocking circuits /thyristors 3.10. Circuit breakers, Meters	✓			30%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
		3.11. Earthing, insulation, High tension cables construction & design					
Unit IV	10hrs	**Fundamentals of magnetism** 4.1. Introduction 4.2. The Bar magnet 4.3.Magnetism 4.4. Gauss's law 4.5.Magnetic force 4.6. Magnetization and magnetic intensity 4.7. Solenoid and toroid 4.8. Magnetic properties of materials 4.9. Permanent magnets, electromagnets 4.10. Earth's magnetism	✓			20%	LE, SE, SA
Unit V	10hrs	**Sound** 5.1. The nature and propagation of sound wave 5.2. Transverse and longitudinal waves 5.3. Interference of sound waves 5.4. Beats 5.5. Decibel			✓	10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Type of questions
		5.6. Speed of sound in a material medium 5.7. Intensity of sound 5.8. Super imposition of the wave 5.9. Doppler effect principle					
Unit VI	10hrs	**Atomic physics** 6.1. The structure of the Atom, 6.2. Nucleus, 6.3. Atomic Number(Z), 6.4. Mass Number(A) 6.5. Ionization & Excitation 6.6. Alpha particle scattering 6.7. Atomic models 6.8. Atomic spectra 6.9. Atomic masses and composition of nucleus 6.10. Mass energy and nuclear binding energy 6.11. Nuclear force and energy 6.12. Radioactivity 6.13. Nuclear reactor	✓			15%	LE, SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

Recommended Books:

1. Resnick R, Halliday D, Walker J. Fundamentals of physics. 10th ed. Hoboken: Wiley; 2016.
2. Adams S, Allday J. Advanced physics. Oxford: Oxford University Press; .

BIOCHEMISTRY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

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

CO1: Have knowledge and understanding of procedures of specimen collection, reagent preparation of specimens, performing biochemical tests, interpreting results, and managing biomedical waste effectively.

CO2: Understand the basic procedures in specimen collection, reagent preparation, and testing in a clinical laboratory

CO3: Demonstrate the knowledge of properties of biomolecules and their function.

CO4: Have knowledge of the importance of nutrition in health and diseases.

- **Course Content:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
Unit I	5hrs	**Introduction to Biochemistry and Clinical Laboratory** **1.1Specimen collection:** Pre analytical, variables, collection of blood, Urine, CSF, and other body fluids, anticoagulants and preservatives **1.2 Dilutions:** Dilution of solutions (Preparation of 0.1 N NaCl from 1 N NaCl), Preparation of percent solutions, Preparing working standard from stock standard, Specimen dilutions, Serial dilutions, and Reagent dilution **1.3 Special investigations:** Normal values, methods, and interpretation of biochemical parameters. Preparation of patients for special investigations, and interfering substances **1.4 Quality control:** Definition, types, IQAS and EQAS, Calculation of mean, standard deviation and percentage of coefficient variation **1.5 Safety measures, Conventional and SI units** **1.6 Bio Medical waste management**	✓ ✓ ✓ ✓	✓		15%	LE, SA, SE

Unit II	10hrs	**Carbohydrate and Lipid chemistry** **2.1** Introduction, Definition, Properties of carbohydrates, Classification with suitable examples. **2.1.1** Biomedical importance of carbohydrates. **2.2** Introduction, Definition, Functions, and Classification of Lipids. Definition and Classification of fatty acids, Essential fatty acids with examples.	✓ ✓ ✓			25%	LE, SE
Unit III	5hrs	**Protein chemistry and Plasma Proteins** **3.1** Introduction, Definition, and Classification of amino acids with examples. **3.1.1** Peptides: definition & biologically important peptides with examples **3.1.2** Introduction, Definition, and Classification of Proteins with examples **3.1.3** Functions of amino acids and Proteins **3.2** Introduction, types, functions, and biological reference range of plasma proteins. **3.2.1** Immunoglobulins	✓ ✓ ✓ ✓ ✓ ✓			15%	LE, SE, SA
Unit IV	5hrs	**Enzymes** **4.1** Introduction, Definition,	✓			10%	LE,SE,SA

		classification with suitable examples, Active site of enzyme, Factors influencing enzyme activity, **4.1.1** Definition of Cofactor, Coenzyme, And isoenzymes with examples.	✓				
Unit V	10hrs	**Vitamins and Minerals** **5.1** Introduction, Definition, classification, Fat soluble and water-soluble vitamins: Sources, RDA, Biological functions and deficiency disorders. **5.2** Introduction, Definition and classification of macro and micro minerals with examples **5.2.1** Calcium, Phosphorous, iron, Sodium, Potassium: Sources, RDA, Reference ranges, Functions and Disorders of deficiency and excess	✓ ✓ ✓			20%	LE,SE
Unit VI	10hrs	**Nutrition** **6.1** Calorific values of carbohydrates, proteins, and fats **6.2** Nutritional importance of Carbohydrates, lipids, proteins, and Essential amino acids **6.3**SDA: Definition, values for major macronutrients, Significance of SDA **6.4** Basal metabolic rate (BMR): Definition, Reference range of BMR in men and women, Factors affecting BMR **6.5** Dietary fibers: Definition, functions, importance and their daily requirements Balanced diet **6.6** Essential fatty acids: Definition,	✓ ✓ ✓ ✓ ✓ ✓			15%	LE, SE, SA

		functions and deficiency manifestations **6.7** Define the classes of protein-energy malnutrition: marasmus and kwashiorkor.					

❖ **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

➢ **Recommended Books**

1. Vasudevan DM, Sreekumari S, Vaidyanathan K. Textbook of biochemistry for medical students. 8th ed. New Delhi: Jaypee Brothers Medical Publishers; 2019.
2. Satyanarayana U, Chakrapani U. Biochemistry. 4th ed. New Delhi: Elsevier; 2013.

ENGLISH AND COMMUNICATION – I

Course: AEC

Credits: 3 **No of Hours: 45 Hours**

➢ **Course Outcomes:**

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

CO1: Acquire the LSRW (Listening, Speaking, Reading, and Writing) skills. Through Cambridge Interchange Fifth Edition, students will develop real world communication skills-enhancing fluency in speaking, listening, reading and writing – wile mastering grammar, expanding vocabulary and improving pronunciation with supportive digital tools.

CO2: Learn to appreciate Literature.

CO3: Be aware of social responsibilities.

CO4: Enhance the analytical skill

➢ **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
Unit I	10	**Cambridge: Interchange Fifth Edition** 1.1 Good Memories 1.2 Life in the City 1.3 Making Changes 1.4 Have you ever tried it? 1.5 Hit the Road. 1.6 Sure. I will do it. 1.7 What do you use this for? 1.8 Time to Celebrate.	√			23%	SA
Unit II	8	**Phonetics** 2.1 Brief Introduction 2.2 Classification of Vowels, Diphthongs and Consonants 2.3 Pronouncing the words phonemically and transcribing them into Phonetics 2.4 IPA	√			18%	SA
Unit III	11	**Grammar and Written Communication** 3.1 Parts of Speech 3.2 Verb Tenses 3.3 Articles 3.4 Capitalization and Punctuation 3.5 E-mail Drafts 3.6 Formal Letters 3.7 Essay Writing	√			24%	SA
Unit IV	4	**Prose** 4.1 Steev Jobs: Commencement Address	√			9%	

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types Of Questions
		4.2 Mother Teresa's Award Winning Speech					LE, SE
Unit V	6	**Poetry** 5.1 The Road Not Taken: Robert Frost 5.2 The Man with the Wooden Leg: Catherine Mansfield 5.3 Our Casuarina Tree: Toru Dutt	√			13%	LE, SE
Unit VI	6	**Short Stories** 6.1 Gift of the Magi: O' Henry 6.2 Kabulivala: Raindranath Tagore 6.3 The Blue Umbrella: Ruskin Bond		√		13%	LE, SE

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended Books:**

1. Richards JC, Hull J, Proctor S. Interchange student's book. 5th ed. Cambridge: Cambridge University Press; .
2. Green D. Contemporary English grammar structures and composition. New Delhi: Macmillan; .
3. Wren PC, Martin H. English grammar and composition. New Delhi: S Chand Publishing; .
4. Murphy R. English grammar in use. 5th ed. Cambridge: Cambridge University Press; .

KANNADA

Course:AEC

Credits:2No ofHours:30Hours

- **CourseOutcome:**

- Enablestudentstolearn alphabet,wordsandsimplesentencesinKannada.
- Enable students to enhance speaking and writing communicative skills inKannada and learntechnicalwordsrelated to medical science

- **COURSECONTENT:**

- UnitI:KannadaLetters (vowels,Consonant)

- Unit II: Words, Phrases, formation of sentences, Letter Writing, Essay Writing. Treatment related Kannadawords(from English toKannada)

- UnitIII:
  1) Possiblecommunicationin kannadabetween Patientsand Doctors.
  2) Advisingsentencesto thepossiblequestionsofpatients.
  3) Someimportantsentenceswhichenabletocommunicatewithdoctorsandcolleagues.

- **RecommendedBooks**

1. Government of Karnataka. Kannada vyakarana. 8th–10th standard textbooks. Bengaluru: Karnataka Textbook Society; .

2. HSK. Vyavaharika Kannada. Bengaluru: HSK Publications; .

SEMESTERII

HUMANANATOMY& PHYSIOLOGYII

Course:Core

Credits:4 **No ofHours: 60Hours**

PART A- HUMAN NANATOMY

- **Course Outcomes:**

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

  CO1. To identify and locate each of the body systems to apply anatomical knowledge to perform minor technical procedural skills.

  CO2. To know the normal disposition of the structures in the body while clinically examining a patient and while conducting clinical procedures.

  CO3. To know the anatomical basis of disease and injury

  CO4. To discuss the interrelationship of systems in maintaining homeostasis.

  CO5. To describe the structure of each body system

- **COURSECONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	5	Urinary system 1.1 Kidney, ureter, urinary bladder, male and female urethra. 1.2 Demonstration of parts of urinary system. Histology of kidney, ureter, urinary bladder.	√			15	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOOD TO KNOW	DESIRABLE TO KNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit II	10	Reproductive system 2.1Parts of male reproductive system, testis, vas deferens, epididymis, prostate 2.2 Parts of female reproductive system, uterus, fallopian tubes, ovary 2.3 Mammary gland 2.4 Demonstration of section of male and female pelvis with organs in situ. Histology of male and female reproductive organs.	√			30	LE, SE, SA
Unit III	3	Endocrine glands 3.1Endocrine glands: pituitary gland, thyroid gland, parathyroid gland, suprarenal gland 3.2 Demonstration of the glands. Histology of pituitary, thyroid, parathyroid, suprarenal glands.		√		15	SE, SA
Unit IV	10	Nervous system 4.1 Neuron, classification of nervous system, cerebrum,cerebellum,midbrain,pons ,medullaoblongata,spinalcordwiths pinalnerve,meninges, ventricles & cerebrospinal fluid, names of basal nuclei, blood supply of brain, cranial nerves. Sympathetic trunk& names of parasympathetic ganglia 4.2 Histology of peripheral nerve & optic nerve. Demonstration of all	√			25	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOOD TO KNOW	DESIRABLE TO KNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		plexuses and nerves in the body. Demonstration of all parts of brain. Histology of cerebrum, cerebellum, spinal cord.					
Unit V	2	Sensory organs 5.1 Skin: histology, appendages of skin. 5.2 Eye: parts of eye & lacrimal apparatus. Extra-ocular muscles & nerve supply. 5.3 Parts of ear: external, middle, and inner ear and contents. 5.4 Histology of thin and thick skin. Demonstration and histology of eyeball. Histology of cornea & retina.		√		15	SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended Books**

1. Chaurasia BD. BD Chaurasia's Human Anatomy. CBS Publishers & Distributors PVt Ltd.; 2010.
2. Sampath Madhyastha, Manipal Manual of Anatomy for Allied Health Sciences,New Delhi: CBS publishers and distributors.
3. Waugh A, Grant A. Ross & Wilson Anatomy and physiology in health and illness E-book. Elsevier Health Sciences; 2014 Jun 25.
4. Dilly PN. Essentials of Human Embryology. Postgraduate Medical Journal. 1984 Jun;60(704):447.
5. Inderbir S. Textbook of human histology with color atlas. New Delhi: Jaypee Brothers Medical Publishers. 2006.

6. Priya Ranganath, Leelavathy N, Basics in Human Anatomy for BSc Paramedical Courses, Revised and updated edition, The Health

PART B- PHYSIOLOGY

- **Course Outcomes:**

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

CO1: To demonstrate the understanding of physiological structure of Renal system, endocrine system, Nervous system and special senses.

CO2: To broadly identify the clinical abnormalities of organs and its clinical physiological implications

- **COURSE CONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	5	**Digestive System** 1.1 Introduction 1.2Physiological anatomy of gastro intestinal tract (All Structures in brief), functions of digestive system 1.3Functions of Saliva 14Deglutition: definition, stages 1.5Stomach: functions 1.6Gastric secretion: composition, function, Phases of secretion	√			15	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		1.7Pancreas: Functions (exocrine), pancreatic juice: composition and regulation. Secretin and CCK-PZ 1.8Liver: Functions, Bile secretion, composition, function of bile; 1.9Bilirubin metabolism, types of bilirubin, Vandenberg reaction, Jaundice: types, significance. 1.10Gall bladder: Functions. 1.11Small intestine: functions, digestion and absorption, movements. (brief) 1.12Large intestine:					

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		functions, defecation reflex					
Unit II	5	**Renal system** 2.1 Introduction: Functions of kidneys, composition of urine, nephron, cortical and juxtamedullary nephrons (comparison), 2.2 Juxta Glomerular Apparatus: structure and function. 2.3 Mechanism of urine formation 2.4 GFR: Definition, Normal Values, factors effecting GFR, Measurement (Creatine, Inulin Clearance). Tubular reabsorption,	√	√		15	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		TMG, Tubular secretion (brief). 2.5Mechanism of urine concentration: Counter-current mechanisms, Role of ADH 2.6 Micturition, innervation of bladder, cystometrogram.					
Unit III	2	**Skin and Body temperature** 3.1Structure and function of Skin 3.2 Body Temperature: physiological variation. 3.3 Regulatory mechanisms: Mechanisms Activated by Heat/Cold 3.4 Role of hypothalamus, and fever.	√	√		10	SE
Unit IV	5	**Endocrine System** 4.1 Introduction: Definition,		√		15	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		classification of endocrine glands & their hormones. 4.2 Hypothalamo-pitiutary Axis 4.3 Pituitary hormones: anterior and posterior pituitary hormones, Functions of Growth hormone, 4.4 Thyroid gland: Thyroid Hormones: physiological function, regulation of secretion, disorders: hypo and hyper secretion of hormone. 4.5Adrenal cortex: functions of Cortisol and Aldosterone 4.6 Adrenal					

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		medulla: functions of Adrenalline and Noradrenalline . 4.7Pancreas (Endocrine): Hormones of pancreas. 4.8Insulin: functions, regulation of blood glucose level, Diabetes mellitus 4.9 Regulation of Calcium Metabolism: Hormones involved, actions of PTH, Calcitonin, Vit D3					
Unit V	5	**Reproductive system** 5.1 Introduction, Function of reproductive system, Changes during puberty. 5.2 Male reproductive system: functions	√	√		15	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		of testes Spermatogenesis: Definition, site, stages, factors influencing, Endocrine functions of testes. 5.3 Androgens: testosterone functions. 5.4 Female reproductive system 5.5Menstrual cycle: Definition, changes, ovulation 5.6 Functions of progestorene and estrogen 5.7 Physiological changes during pregnancy, Lactation(brief), milk ejection reflex					
Unit VI	3	**Special senses** 6.1 Vision: Functions of different	√	√		15	SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		parts(brief) 6.2 Optic Pathway, Dark Adaptation, Colour vision. 6.3Hearing: Function of Middle Ear, Functions of inner ear, mechanism of hearing (brief). 6.4Chemical Senses: Taste: types, receptor, Smell: physiology, receptors.					
Unit VII	7	**Nervous system** 7.1 Introduction: Parts of CNS and PNS, Functions of nervous system 7.2Neuron: definition ,structure 7.3 Nerve Fibre: classification, conduction of impulses continuous and	√	√		15	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		saltatory. 7.4Synapse: Definition, structure, types, properties (brief). Receptors: definition, classification, properties (brief). 7.5Reflex: Definition, Reflex Arc, Examples. 7.6Spinal cord nerve tracts: Diagram and Functions: Lateral Spino Thalamic Tract, Dorsal Column, Pyramidal Tract. 7.7Spinal cord nerve tracts: Diagram and Functions: Lateral Spino Thalamic Tract, Dorsal Column, Pyramidal Tract. 7.8Cerebro Spinal Fluid (CSF): site of					

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		formation, circulation (brief), functions. 7.9Autonomic Nervous System: Sympathetic and parasympathetic distribution and functions (brief).					

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1. Guyton AC, Hall JE. Textbook of medical physiology. 13th ed. Philadelphia: Elsevier; 2016.
2. Ganong WF. Review of medical physiology. 26th ed. New Delhi: McGraw-Hill Education; 2018.
3. Chatterjee CC. Human physiology. Vol 1. 12th ed. Kolkata: Medical Allied Agency.
4. Choudhary SK. Concise medical physiology. New Delhi: New Central Book Agency.

PATHOLOGY&MICROBIOLOGY-II

Course:Core

Credits:4 **No ofHours: 60Hours**

PART A- PATHOLOGY

- **Course objectives:**

  CO1: To study fundamental aspects of different groups of microorganisms and their importance.

  CO2: To compute medically important infective organisms and their diagnosis.

  CO3: To enumerate the common infections of bacteria, virus, parasite and fungi.

  CO4: To understand fundamental analytical principles and process used in histopathology

- **COURSE CONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	12	Histopathology 1.1 Introduction to histopathology 1.2. Grossing technique 1.3. Tissue processing (Fixation, Dehydration, Clearing & Impregnation) 1.4. Embedding technique 1.5. Section cutting 1.6. H&E staining	√			30	LE,SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit II	6	Cytology 2.1. Introduction to cytology. 2.2 FNAC 2.3. PAP stain.	√			25	SE, SA
Unit III	12	General Pathology 3.1. Cell injury: Agents causing cell injury, cellular adaptations (hypertrophy, atrophy, hyperplasia, metaplasia) reversible and irreversible injury. 3.2. Inflammation: Cardinal signs of inflammation, acute and chronic inflammation. Laboratory tests in inflammation. 3.3. Hemodynamic □ Edema & shock □ Thromboembolism & Infarction. 3.4. Neoplasia: Definition of neoplasm, differences	√			45	LE,SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		between benign and malignant tumors, Carcinogenesis. 3.5. Genetic disorders: Introduction to genetic disease and classification of geneticdisorder.					

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended Books:**

1. Nayak R. Histopathology techniques and its management. New Delhi: Jaypee Brothers Medical Publishers.
2. Sood R. Textbook of medical laboratory technology. 6th ed. Vol 1–2. New Delhi: Jaypee Brothers Medical Publishers.

PART B- MICROBIOLOGY

- **Course Outcomes:**

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

CO1: To outline fundamentals aspects of microbiology including origin, evolution of microorganisms, different groups of microorganisms and their importance, microscopy principles and applications, morphology, and structure.

CO2: To explain microbiological media, isolation, cultivation and enumeration methods of microorganisms, microbial growth characteristics, maintenance, and preservation of microbial cultures

CO3: To develop knowledge on basic immunological concepts.

CO4: To develop knowledge on general characteristics, structure and reproduction of fungi and parasites.

COURSECONTENT:

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	11	**Systematic Bacteriology** **1.1** Overview of common bacterial infections & bacterial virulence factors and Antimicrobial sensitivity test **1.2** Morphology, pathogenesis and laboratory	✓			30	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		diagnosis of medically important bacteria (Staphylococcus aureus & MRSA, Pneumococcus. Enterobacteriaceae-Salmonella (Enteric fever), E. coli, Vibrio cholerae, Mycobacterium tuberculosis **1.3** Biochemical reactions and identification of bacteria.					

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit II	8	**Virology** 2.1 Nutrition, growth and multiplication of bacteria, Bacterial Growth Curve 2.2 Morphology, pathogenesis and laboratory diagnosis of (HIV-1, Hepatitis viruses- Hepatitis B & Hepatitis C virus, Rabies-1, Arbo viruses- Dengue virus	✓			30	LE, SE,SA
Unit III	4	**Mycology** 3.1 Introduction to Mycology-1 3.2 Morphology, pathogenesis and laboratory diagnosis of (Dermatophytes, Candida, Cryptococcus)	✓			20	LE, SE,SA
Unit IV	7	**Parasitology** 4.1 Introduction to Parasitology.	✓			20	LE, SE,SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		4.2 Morphology, Life cycle, pathogenesis and laboratory diagnosis of (E.histolytica, Plasmodium, Ascaris, T.solium, T.saginata, Ancylostoma)					

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Baveja CP. Textbook of microbiology. Arya Publications; 2005.
2. Ananthanarayan R, Paniker CKJ. Textbook of microbiology. 8th ed. Hyderabad: Orient Blackswan; 2006.

RADIATION AND MEDICAL PHYSICS

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcome:**

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

CO1: To list the advantages and disadvantages of radiation.

CO2: To relate the use of accessory devices to control primary and secondary radiation.

CO3: To provide best quality image with optimized radiation dose.

- **COURSE CONTENT:**

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	15hrs	Production of X-rays 1.1 Discovery of x-rays 1.2X-ray production & properties 1.3 Diagnostic x-ray tube and its construction 1.4 Thermionic emission 1.5. Space charge effect 1.6 Line focus principle 1.7.heel effect 1.8.saturation voltage 1.9. Grid controlled X-ray tube 1.10 Interaction of electron beam with X-ray tube target 1.11 characteristic radiation and bremsstrahlung radiation 1.12. X-ray beam intensity 1.13. Methods of X-ray tube cooling	√			20%	LE, SE,SA

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit II	10hrs	Attenuation & Absorption 2.1Reduction in intensity due to absorption & attenuation 2.2 Inverse square law (exponential formula) 2.3 filtration 2.4 Attenuation coefficients 2.5.half value layer 2.6 Energy absorbed from x-rays 2.7. factors affecting transmission of a homogenous beam through an object 2.8. transmission of a heterogeneous x-ray beam.	√			15%	LE, SE,SA
Unit III	5hrs	Basic Interaction between X-Rays and Matter 3.1 Coherent Scattering 3.2 Photoelectric Effect 3.3 Compton Scattering 3.4 Pair production	√			10%	LE, SE,SA

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
		3.5. Photo disintegration					
Unit IV	10hrs	Control of secondary radiation 4.1 Filters- inherent, added and heavy metal filters 4.2 X-ray beam restrictors 4.3 Grids 4.4 Air gap technique	√			20%	LE, SE,SA
Unit V	10hrs	Fluoroscopic imaging 5.1 Direct fluoroscopy 5.2Fluoroscopy image intensifier 5.3 Automatic brightness control 5.4Viewing and rcording the fluoroscopic image		√		15%	LE, SE,SA
Unit VI	10hrs	Equipment for special procedures 6.1 Portable and mobile x-ray units			√	20%	LE, SE,SA

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
		6.2Radiographicand fluoroscopic tables 6.3 Tele-command tables 6.4 Cranial and dental equipment 6.5 Skull tables 6.6 Mammography 6.7 Tomography 6.8 Rapid cassette changer 6.9 Rapid film changer					

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

Recommended Books

1. Thayalan K.*Basic Radiological Physics*. 2nd ed. New Delhi: Jaypee Brothers Medical Publishers; 2017. ISBN: 9789352700486.
2. Curry TS, Dowdey JE, Murry RC Jr.*Christensen's Physics of Diagnostic Radiology*. 4th ed. Philadelphia (PA): Lea &Febiger; 1990. ISBN: 9780812113105.
3. Chesney DN, Chesney MO.*X-ray Equipment for Student Radiographers*. Oxford: Blackwell Scientific Publications; 1971. ISBN: 9780632053605.

YENEPOYA
(DEEMED TO BE UNIVERSITY)

CONSTITUTION OF INDIA

Course: VAC

Credits: 2 **No of Hours: 30 Hours**

- **Course Outcome:**

At the end of this course, students will gain knowledge on

CO1: This course is to keep the students abreast with the knowledge of the Constitution of India.

CO2: To make the students understand the importance of human rights as citizens of India.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
Unit I	5hrs	**Indian Constitution** 1.1 Meaning and Importance of Constitution 1.2 The Constituent Assembly 1.3 The Preamble 1.4 Salient Features of Constitution	√			**10%**	SE, SA
Unit II	3hrs	**Fundamental Rights and Directive Principles** 2.1 Meaning and Differences between Fundamental Rights and Directive Principles 2.2 Fundamental Rights 2.3 Rights Information Act Meaning ,importance of RTI	√			20%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
		2005					
Unit III	4hrs	**Union Government** 1.1 The President of3.1 India-Election ,Powers and Position 3.2 Prime Minister and council of Ministers Parliament – Loksabha, Rajyasabhaorganisations and powers.	√			15%	LE, SE, SA
Unit IV	4hrs	**State Government** 4.1 The Governor 4.2 Chief Minister and Council of Ministers 4.3 State Legislature Vidhanasabha ,vidhanaParishad-Organisations and Powers	√			10%	SE, SA
Unit V	2hrs	**Federalism in India** 1.1 Meaning Federal and Unitary Features	√			10%	SE, SA
Unit VI	2hrs	**The Judiciary** 6.1 The Supreme Court-Organization ,Jurisdiction and Role 6.2 The High Court-Organization ,Jurisdiction and Role	√			10%	SE, SA
Unit VII	2hrs	**Electoral Process In India** 7.1 Election Commission –	√			10%	

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of Question
		Organization ,Functions					SE, SA
Unit VIII	2hrs	**Local Governments** 8.1 Rural and Urban-Organization ,Powers and Functions	√			5%	SE, SA
Unit IX	3hrs	**Human Rights** 9.1Human Rights-Meaning 9.2 Universal Declaration of Human Rights 9.3 Remedies against Violation of Human Rights in India	√			5%	LE, SE, SA
Unit X	3hrs	**Special Constitutional Provisions** 10.1Special Rights created in the constitution for: Dalits ,Backwards ,Women and Children and the Religious and Linguistic Minorities. 10.2Constitution and Sustainable Development in India 10.3Minority Commission in India	√			5%	SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended Books**

- Basu, D.D , Constitution of India, New Delhi Himalaya Publication ; 2001
- Dinesh Shelton, David P Stuart, International Human Rights in Nutshell. Thomas Burgenthel, West Nutshell Publisher; London; 2005.

- ParvathyAppaiah, Constitution of India, Mangalore DivyaDeepa Publication; 2005
- ParvathyAppaiah, Human Rights. DivyaDeepa Publication Mangalore; 2016
- RajRam. M, Constitution of India Himalaya Publication, New Delhi; 1999

ENGLISH AND COMMUNICATION – II

Course: AEC

Credits: 3 **No of Hours: 45 Hours**

➢ **Course Outcomes:**

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

CO1: Acquire the LSRW (Listening, Speaking, Reading, and Writing) skills. Through Cambridge Interchange Fifth Edition, students will develop real world communication skills-enhancing fluency in speaking, listening, reading and writing – wile mastering grammar, expanding vocabulary and improving pronunciation with supportive digital tools.

CO2: Learn to appreciate Literature.

CO3: Be aware of social responsibilities.

CO4: Enhance the analytical skill

➢ **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to K	Desirable to Know	Weightage	Types Of Questions
Unit I	13	**Cambridge Interchanges Fifth Edition** 1.1 Only Time Will Tell 1.2 I Like Working with People 1.3 It's Really Worth Seeing 1.4 It's a Long Story 1.5 That's Entertainment 1.6 Now I Get it 1.7 I wouldn't have done that 1.8 Making Excuses	√			29%	SA

Unit	Hrs	Content	Must Know	Good to	Desirable to Know	Weightage	Types Of Questions
Unit II	3	**Phonetics – IPA Transcription**	√			7%	SA
Unit III	13	**Grammar and Written Communication** 3.1 Reported Speech 3.2 Modals 3.3 Clauses 3.4 Gerunds 3.5 Active and Passive Voice 3.6 Synonyms and Antonyms 3.7 News Report Writing 3.8 Speech Writing 3.9 Dialogue Writing	√			29%	SA
Unit IV	4	**PROSE** 4.1 Chicago Address by Swami Vivekananda 4.2 I have a Dream: Martin Luther King	√			9%	LE, SE
Unit V	6	**Poetry** 5.1 Still I Rise: Maya Angelou 5.2 The Raven: Edgar Allen Poe 5.3 Break, Break, Break: Alfred Lord Tennyson	√			13%	LE, SE
Unit VI	6	**Short Stories** 6.1 The Luncheon: William Somerset Maugham 6.2 The Power of Prayer: APJ Abdul Kalam 6.3 The Necklace: Guy De Maupassant		√		13%	LE, SE

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Cambridge: Interchange Fifth Edition
2. Contemporary English Grammar Structures & Composition by David Green
3. English Grammar and Composition: Wren & Martin
4. English Grammar in Use by Raymond Murphy

SEMESTER-III

YENEPOYA
(DEEMED TO BE UNIVERSITY)

RADIOGRAPHIC PHOTOGRAPHY AND IMAGING PROCESSING

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

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

  CO1 : To relate the different practices of processing methods of a film

  CO2 : To determine the possible film artifacts by improper handling

  CO3: To define the principles behind the radiographic image formation

.

- **Course Content:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
ues	8hrs	**Unit 1: Photographic Principles** 1.1 Radiographic film-construction and types 1.2 Photographic effect and latent image formation 1.3 Film density and log relative exposure 1.4 Characteristic curve – its formation and features 1.5 Film faults and Artifacts	✓			10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
Unit II	6hrs	**Unit 2: Intensifying Screens** 2.1 Luminescence-fluorescence and phosphorescenc 2.2 Construction and types of Intensifying Screen 2.3 Resolving power of Intensifying Screens 2.4 Speed of intensifying screen film contact tests 2.5 Advantages and limitations of Intensifying Screens.	✓			10%	LE, SE, SA
Unit III	4hrs	**Unit 3: X-ray Cassette:** 3.1 Construction of X-ray cassettes 3.2 Types of cassettes 3.3 Mounting Intensifying Screens on cassettes 3.4 Care and maintenance of cassettes	✓			5%	LE, SE, SA
Unit IV	5hrs	**Unit 4: Dark Room – Planning &Construction** 4.1 Planning for a small & large Hospital Location of Darkroom 4.2 Construction of Dark Room	✓			10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
		4.3 Ventilation Wall Protection 4.4 Entrance to Dark Room - Single Door, Double Door, Labyrinth and rotating					
Unit V	7hrs	**Unit 5: Dark Room Accessories** 5.1 Dry bench 5.2 Hopper, Drawer, Cupboard 5.3 Loading and unloading cassettes 5.4 Hangers, types of hangers and storage of hangers 5.5 Wet bench 5.6 Cleanliness, control of dust, dark room sinks ,Hatches 5.7 Drier 5.8 Safe Lights- types and uses, factors affecting safelight performance, safelight Tests 5.9 viewing room ,Film dispensing	✓			15%	LE, SE, SA
Unit VI	5hrs	**Unit 6: Film Processing** 6.1 Photochemistry Developer 6.2 Rinsing 6.3 Fixer 6.4 Washing and drying	✓			10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
		6.5 Preparation of processing solutions 6.6 Manual processing apparatus 6.7 Effect of temperature in processing 6.8 Rapid processing					
Unit VII	5hrs	**Unit 7: Automatic processor** 7.1 Principle of working and features, 7.2 Thermal regulation and replenishment system 7.3 Care and maintenance 7.4 Advantages and Limitations	✓			10%	LE, SE, SA
Unit VIII	4hrs	**Unit 8: Computerized and Digital Radiography** 8.1 Day Light Film handling 8.2 Computerized radiography- Principles, Processing, Equipments, Advantages, disadvantages 8.3 Digital Radiography - Principles, Processing,	✓			10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
		Equipments, advantages and disadvantages					
Unit IX	5hrs	**Unit 9: The Radiographic Image:** 9.1 The emergent beam related to densities on film contrast –objective and subjective 9.2 Radiation contrast, film contrast and Radiographic contrast 9.3 Density 9.4 Sharpness and Unsharpness	✓			5%	LE, SE, SA
Unit X	4hrs	**Unit 10: Resolution:** 10.1 Factors affecting resolution 10.2 Choice of Kilo Voltage 10.3 Milliamperage 10.4 Choice of Short Focus and Broad Focus 10.5 selection of Focus to Film Distance and Object to Film Distance selection of cassettes	✓			5%	LE, SE, SA
Unit XI	3hrs	**Unit 11: Reproduction of Radiographs:**		✓		5%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
		11.1Copying Radiographs 11.2Magnification and Minification Radiography					
Unit XII	4hrs	**Unit 12: Imaging Communication:** 12.1 Hospital Information System 12.2 Radiology Information System 12.3 PACS 12.4 DICOM	✓			5%	LE, SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books

1. Christensen EE, Curry TS, Dowdey JE. An introduction to physics of diagnostic radiology. 4th ed. Philadelphia: Lea &Febiger.
2. **Chesney DN, Chesney MO.***Radiographic Imaging*. 4th ed. New Delhi: CBS Publishers & Distributors; 2004. ISBN: 9788123909974.
3. **International Commission on Radiological Protection (ICRP).***Protection of the Patient in Diagnostic Radiology*. ICRP Publication 34. Ann ICRP. 1982.
4. **Bushong SC.***Radiologic Science for Technologists: Physics, Biology, and Protection*. 12th ed. St. Louis (MO): Mosby/Elsevier; 2021. ISBN: 9780323661348.

GENERAL PHARMACOLOGY

Course:Core

Credits:4 NoofHours: 60 Hours

- **Course Outcomes:**

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

  CO1. Know the basics of Pharmacology like, sources of drugs, routes of drug Administration and general principles

  CO2. Describe the principles of pharmacokinetics and pharmacodynamics

  CO3. To appreciate various adverse drug reactions

  CO4. To have a basic knowledge of drugs affecting various body systems

- **COURSECONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOOD TO KNOW	DESIRABLE TO KNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	8	**General Pharmacology** 1.1Introduction to Pharmacology 1.2 Routes of drug Administration 1.3Absorption & Distribution Metabolism Excretion 1.4 Pharmacodynamics - Mechanism of drug action- receptors 1.5 Factors modifying drug actions 1.6 Adverse drug reactions	√			15	LE, SE, SA
Unit II	6	**Autonomic Nervous System drugs** 2.1 Sympathomimetics 2.2 Alpha blockers 2.3 Beta-blockers 2.4 Cholinomimetics 2.5 Anticholinergics 2.6 Skeletal muscle relaxants	√			15	LE, SE, SA
Unit III	11	**Central Nervous System** **3.1** Opioid analgesics 3.2 Non-opioid analgesics (Prostaglandins) 3.3 NSAIDs	√			20	LE, SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOOD TO KNOW	DESIRABLE TO KNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		3.4 Ethyl alcohol 3.5 Sedative hypnotics 3.6 Antiepileptic drugs 3.7 Local anesthetics-1 3.8 Local anesthetics-2 3.9 General anesthetics- I 3.10 G A – II (PAM) 3.11 CNS stimulants					
Unit IV	9	**Cardio Vascular System Drugs** 4.1 Diuretics 4.2 Vasodilators (CCB's, Drugs acting on RAS) 4.3 Antihypertensives 4.4 Antianginal drugs 4.5 Pharmacotherapy of shocks 4.6 Cardiac glycosides 4.7 Cardioplegic drugs 4.8 Antiarrhythmic drugs 4.9 Primary solutions	√			15	LE, SE, SA
Unit V	6	**Blood** 5.1 Anaemia, erythropoietin 5.2 Anticoagulants 5.3 Anti platelet drugs 5.4 Fibrinolytics, 5.5 Lipid lowering drugs 5.6 Vit.D and calcium,			√	5	SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOOD TO KNOW	DESIRABLE TO KNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		folic acid, phosphate binders					
Unit VI	1	**Endocrines** 6.1 Corticosteroids			√	5	SE, SA
Unit VII	9	**Chemotherapy** 7.1 General Principles of Chemotherapy 7.2 Sulfonamides 7.3 Penicillins 7.4 Cephalosporins 7.5 Broad spectrum antibiotics 7.6 Macrolides 7.7 Aminoglycosides 7.8 Chemotherapy of UTI 7.9 Drug Therapy of Tuberculosis	√			15	LE, SE, SA
Unit VIII	10	**Miscellaneous topics** 8.1 Antihistamines 8.2 Antiemetics 8.3 Drugs used in bronchial asthma 8.4 Drugs used in bronchial asthma-2 8.5 Cough 8.6 Inhalational gases and emergency drugs 8.7 I V fluids 8.8 Metabolic and		√		10	SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOOD TO KNOW	DESIRABLE TO KNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		electrolyte imbalance 8.9 Immunosuppressants 8.10 Antiseptics and disinfectants					

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Course Outcomes:

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

- Define and describe the principles of pharmacology and pharmacotherapeutics
- Define absorption, distribution, metabolism and excretion of drugs
- Define, identify and describe the adverse drug reactions
- Define and describe the pharmacological actions and therapeutic uses of drugs affecting systems- autonomic nervous system, cardiovascular system, blood, endocrine etc.
- To have a basic knowledge of drugs used in the treatment of various infections
- To have a basic knowledge on miscellaneous drugs

Recommended Books:

1. ShanBhag T V, Shenoy S& Nayak V.PharmacologyFor Nurses, Elesever; 3rd edition.2023.
2. Udaykumar P. Textbook of Pharmacology for Dental and Allied Sciences. Jaypee Brothers Publishers; 4th edition. 2017.

RADIOGRAPHIC POSITIONING – 1

Course: Core

Credits: 04 **Number of hours: 60**

- **Course Outcomes:**

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

CO1: • To be aware of routine and supplementary views for each anatomical region

CO2: • To apply special positioning skills for different pathological and physical conditions

CO3: • To use essential aids to reduce radiation dose and to improve image quality

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	5hrs	**Principlesof Radiography** 1.1.1 Preparation of the Rooms and Instruments 1.1.2 Positions of the Patient: Erect Sitting, Supine, Prone, Lateral, Oblique, Decubitus Etc. Relative position of X-Ray tube and patient, relevant exposure factors. 1.1.3 Use of accessories such as radiographic cones, grid and positioning aids. 1.1.4 Radiation protection, use of gonad shield, practical methods of reducing radiation dose to the patient . 1.1.5 Brief introduction to anatomy before each positioning classes.			✓	10%	LE, SE, SA
Unit II	15hrs	Upper Limb 2.1 Routine projections for 2.1.1 Whole hand 2.1.2 Fingers 2.1.3 Wrist joint 2.1.4 Forearm 2.1.5 Elbow joint 2.1.6 Humerus. 2.2 Supplementary projections 2.2.1 Scaphoid	√			30%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
		2.2.2 Carpal tunnel 2.2.3Ball Catchers projections 2.2.4 Head of the Radius 2.2.5 Supracondylar fracture 2.2.6 Olecranon process.					
Unit III	10hrs	Shoulder Girdle and Thorax Routine projections for 3.1.1 The shoulder joint 3.1.2 Scapula 3.1.3Acromio-clavicular joint. 3.1.4Clavicle, sternoclavicular joint 3.1.5 • Sternum and ribs Supplementary projections for 3.2.1 The axial projection of Clavicle 3.2.2 Bicipital groove 3.2.3 Coracoid process		√		15%	LE, SE, SA
Unit IV	15hrs	Lower limb: Routine projections for 4.1.1 The whole foot 4.1.2 Toes 4.1.3 Calcaneum 4.1.4 Ankle joint 4.1.5 Leg, knee- joint 4.1.6 Patella and femurs Supplementary projections for	√			30%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
		4.2.1 Talo-Calcaneal joint 4.2.2 Forced projections for torn ligaments 4.2.3 Flat Feet 4.2.4 Club Feet 4.2.5Intercondylar projections for loose bodies in the knee 4.2.6 Axial projection for Patella.					
Unit V	15hrs	Pelvic girdle and hip region: Routine projections for 5.1.1 The whole pelvis, 5.1.2Sacro-ileac joints, 5.1.3Hip joint 5.1.4 Neck of femur. Supplementary projections for 5.2.1 The greater and lesser trochanters of Femur. 5.2.2 Frog leg projection, 5.2.3 Ischeum, 5.2.3 Symphysis Pubis, 5.2.4 Ileum, 5.2.4 Acetabulum 5.2.5 Congenital Dislocation of Hip 5.2.6 Arthrodesis.	√			15%	LE, SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

- **Recommended books:**

1. Swallow RA, Naylor E, Roebuck EJ, Whitley AS, Sloane C, Anderson C, Hoadley G.*Clark's Positioning in Radiography*. 13th ed. London: CRC Press; 2015. ISBN: 9781444122350.
2. Ross JA, Galloway RW.*Handbook of Radiography*. London: Hodder Arnold; 1998. ISBN: 0718604008.
3. Bryan GJ.*Diagnostic Radiography: A Concise Practical Manual*. 4th ed. Edinburgh: Churchill Livingstone/Elsevier; 1987. ISBN: 9780443011238. A practical guide for diagnostic radiographers.

RADIATION PROTECTION

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

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

  CO1: To outline the biological effects of radiation

  CO2: To determine the primary and secondary barriers of radiation

  CO3: To implement radiation surveys effectively

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
Unit I	10hrs	**Biological Effects of radiation** 1.1 Ionization, excitation and free radical formation, hydrolysis of water, action of radiation on cell. 1.2 Chromosomal aberration and its application for the biological dosimetry. 1.3 Effects of whole body and acute irradiation, dose fractionation, effects of ionizing radiation on each of major organ system including fetus 1.4 Somatic effects and hereditary effects, stochastic and deterministic effects. 1.5 Acute exposure and chronic exposure: factors affecting radio-sensitivity. 1.6 Biological effects of non-ionizing radiation like ultrasound, lasers, IR, UV and magnetic fields.	✓			25%	LE, SE, SA
Unit II	15hrs	**Radiation detection and Measurements** 2.1 Ionization of gases-Fluorescence and	✓			35%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
		Phosphorescence -Effects on photographic emulsion. Ionization Chambers-proportional counters-G.M counters scintillation detectors-liquid semiconductor detectors-Gamma ray spectrometer. 2.2 Measuring systems: Free air ionization chamber, thimble ion chamber, condenser chamber, standard dosimeters, film dosimeter & chemical dosimeter, thermoluminescent dosimeter & Pocket dosimeter. 2.3 Radiation survey meters: wide range survey meter –zone monitor-contamination monitor-their principle-function and uses. 2.4 Advantages & disadvantages of various detectors & its appropriateness of different detectors for different type of radiation measurement.					

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
Unit III	10hrs	**Radiation protection** 3.1 Radiation protection of self and patient. 3.2 Principles of radiation protection, time - distance and shielding, shielding, calculation and radiation survey. 3.3 ALARA- personnel dosimeters (TLD and film batches) 3.4 Occupational exposure	✓			25%	LE, SE, SA
Unit IV	10hrs	**Radiation Hazard evaluation and control** 4.1 Philosophy of Radiation protection, effects of time, Distance & Shielding. 4.2 Calculation of Work load, weekly calculated dose to radiation worker & General public 4.3 Good work practice in Diagnostic Radiology. 4.4 Planning consideration for radiology, including Use factor, occupancy factors, and different shielding material	✓			25%	LE, SE, SA

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

Recommended Books:

1. Christensen EE, Curry TS, Dowdey JE. An introduction to physics of diagnostic radiology. 4th ed. Philadelphia: Lea &Febiger

HUMANRIGHTSANDGENDEREQUITY

Course:VAC

Credits:2 **NoofHours:30Hours**

- **Course Outcome:**

  At the end of this course, students will gain knowledge on,

  Basic Knowledge of Human Rights and its function and authorities in society and industry women's status, issues and gender equity.

- **COURSE CONTENT:**

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
Unit I	5	Human Rights 1.1 Human Rights – Meaning 1.2 Universal declaration of Human Rights	√			20	SE, SA
Unit II	5	Human Rights Advocacy 2.1 Global Advocacy of Human Rights; Amnesty International and Other Organisations 2.2 People's Union for Civil Liberty (PUCL) 2.3 Human Rights Commission in India 2.4 Minority Commission in India 2.5 Remedies Against Violation of Human	√			25	SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		Rights in India					
Unit III	5	Gender Equity Key Concepts- 3.1 Sex and Gender 3.2 Masculinity and Femininity 3.3 Patriarchy, Matriarchy 3.4 Gender roles and Attributes,Gender Division of Labour 3.5 Gender Bias 3.6 Gender Stereotypes 3.7 Need for Gender Sensitization	√			20	SA
Unit IV	5	Women's Status in India 4.1 Important indicators-Sex Ratio,Education,Health, Nutrition, Maternal and Infant Mortality,Work Participation Rate,And Political Participation.	√			15	SE, SA
Unit V	5	Contemporary Women's Issues 5.1 Discrimination Against Girl Child 5.2 Violence Against Women 5.3 Problems of health	√			15	SE, SA

UNIT	NO. OF HOURS	CONTENT	MUST KNOW	GOODTO KNOW	DESIRABLE TOKNOW	WEIGHTAGE %	TYPE OF QUESTIONS
		and nutrition 5.4 Women's Education and Gender Bias in Education 5.5 Trafficking in women 5.6 Globalization and Impact on Women					
Unit VI	5	State Initiatives for Gender Equity 6.1 Constitutional Rights of Women 6.2 Laws Pertaining to Women 6.3 The National and State Commissions for Women		√		05	SE

- **SE-** Short Essay**, SA-** Short Answer

Recommended Books:

1. Parvathy Appaiah,Human Rights, Gender Equity and Environmental Studies, Jai BharathPrakashan publishers, 2018-19.
2. NirmalChiranjivi:Human Rights in India,New Delhi,OUP,2001.

CLINICAL RADIOLOGY - 1

Course: SEC

Credits: 5 **No of Hours: 120 Hours**

Course Outcome

CO 1: To annotate, positioning landmarks and terminology in X-ray

CO 2: To perform positioning without technical and manual errors to avoid repeat exposure

CO 3: To be aware of routine and supplementary views for each anatomical region

CO 4: To apply special positioning skills for different pathological and physical conditions.

CO 5: To use essential aids to reduce radiation dose and to improve image quality

CO 6: To identify the protective measures to be taken in the department

CO 7: To determine the primary and secondary barriers of radiation

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
I	35	**Unit 1** 1. Positioning 1.1 Landmarks 1.2 Terminology	√			30%

	Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage
II	35		Unit 2 2. Errors in Radiography 2.1 Technical Error 2.2 Manual Error 2.3 Repeat exposure	√			30%
III	20		Unit 3 3. To know all routine and supplementary views for each anatomical region			√	20%
IV	30		4.Primary & Secondary barriers 4.1 To reduce radiation dose and to improve image quality		√		20%

SEMESTER-IV

RADIOLOGICAL POSITIONING-2

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

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

CO1:To annotate positioning landmarks and terminology

CO2: To perform positioning without technical and manual errors to avoid repeat exposure

CO3 : To be aware of routine and supplementary views for each anatomical region

CO4 : To apply special positioning skills for different pathological and physical conditions.

CO5: To use essential aids to reduce radiation dose and to improve image quality

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	12hrs	**Vertebral Column:** 1.1 Routine projections for 1.1.1 Atlanto -Occipital joint 1.1.2 Cervical spine 1.1.3 Cervico- thoracic Junction 1.1.4 Thoracic Spine 1.1.5 Lumbar Spine 1.1.6 Lumbo Sacral Region 1.1.7 Sacrum and Coccyx 1.2 Supplementary projections for 1.2.1 The inter vertebral foramina 1.2.2 Posterior arch of atlas 1.2.3 Flexion and extension of cervical spine 1.2.4 Scoliosis and Kyphosis 1.2.5 Sacro Ileac Joint	√			20%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit II	6hrs	**Chest :** 2.1Routine projections and Supplementary projections for 2.1.1 Thoracic inlet 2.1.2 soft tissue Neck, 2.1.3 Decubitus, 2.1.4 Apicograms 2.1.5 paediatric cases	√			15%	LE, SE, SA
Unit III	6 hrs	**Abdomen** 3.1 KUB 3.2 Erect abdomen and Decubitus projection 3.3 Supplementary projections for acute abdomen		√		10%	LE, SE, SA
Unit IV	6 hrs	**Mammography** 4.1 Routine views Supplementary views Magnification view.	√			15%	LE, SE, SA
Unit V	12hrs	**Respiratory system** 5.1.1 Skull Routine projections for cranium and facial bones. Supplementary projections for	√			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
		5.2.1 Trauma 5.2.2 Towne's method 5.2.3 Sellaturcica 5.2.4 Optic foramina 5.2.5 Jugular foramina 5.2.6 Temporal bones 5.2.7 Mastoids 5.2.8 Petrous bone 5.2.9 Zygomatic arches 5.2.10 Orbits, maxillae 5.2.11 Nasal bones 5.2.12 Mandible 5.2.13Temporomandibular joints.					
Unit VI	4hrs	**Nasal Sinuses** 6.1 Techniques for Frontal, Maxillary, Ethmoidal and Sphenoid Sinuses, erect and horizontal projections for fluid levels.	√			5%	LE, SE, SA
Unit VII	6hrs	**Dental Radiography** 7.1 Routine projections of all teeth - Intra Oral and Extra Oral Projections. 7.2 Supplementary projections, Occlusals and Bitewings,	√			10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
		Orthopantomography.					
Unit VIII	4hrs	**Skeletal Survey** 8.1 Skeletal survey for Metabolic Bone Diseases, Metastases, Hormonal Disorders, Renal Disorders.			√	5%	LE, SE, SA
Unit IX	4hrs	**Different Radiographic Techniques** 9.1.1 Theatre radiography 9.1.2 Trauma radiography 9.1.3 Ward radiography 9.1.4 High kV technique 9.1.5 Soft tissue radiography 9.1.6 Macro and Micro radiography		√		5%	LE, SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1. **Swallow RA, Naylor E.***Clark's Positioning in Radiography*. 13th ed. London: CRC Press; 2015.0
2. **Ross JA, Galloway RW.***A Handbook of Radiography*. London: Lewis Publishers; 1998.
3. **Bryan GJ.***Diagnostic Radiography: A Concise Practical Manual*. 4th ed. Edinburgh: Churchill Livingstone; 1987.
4. **Long BW, Rollins JH, Smith BJ, editors.***Merrill's Atlas of Radiographic Positioning and Procedures*. 12th ed. St. Louis (MO): Mosby; 2012.

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RADIOLOGICAL PROCEDURE - I

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcome:**

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

CO1: To have an idea of basic anatomy and related procedures to perform.

CO2: To position patients accurately for appropriate procedures.

CO3: To distinguish indications and contra indications for procedure based on patient history.

CO4: To classify the contrast media based on solubility, physiology of excretion and the procedure to perform.

CO5: To assist radiologist by setting the equipment required for the procedures.

- **COURSE CONTENT:**

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	15hrs	Introduction to Radiological Procedures 1.1 General Approach to Special Radiographic Procedures 1.2 Room Layout of Interventional Radiology & Fluoroscopy 1.3 Responsibility of Radiologic Technologist 1.4 Preparation of Patient for different Procedures			√	15%	LE, SE, SA

	Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit II	20hrs	Contrast Media 2.1 Introduction to Contrast Media 2.2.Types of Contrast Media 2.3 Adverse Reactions of Contrast Media 2.4 Patient Management 2.5.EmergencyEquipments in Radiology Department	√			30%	LE, SE, SA
Unit III	15hrs	Gastro Intestinal Tract 3.1 Barium Swallow 3.2 Barium Meal 3.3 Barium Meal Follow Through (BMFT) 3.4 Small Bowel Enema (Enteroclysis) 3.5. Barium Enema	√			30%	LE, SE, SA
Unit IV	10hrs	Control of secondary radiation 4.1 Percutaneous Transhepatic Cholangiography (PTC) 4.2Percutaneous Transhepatic Biliary Drainage (PTBD) 4.3 Endoscopic Retrograde Cholangio-		√		25%	LE, SE, SA

	Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
			Pancreatography (ERCP)					

- **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

Recommended Books

1. Thayalan K.*Basic Radiological Physics*. 2nd ed. New Delhi: Jaypee Brothers Medical Publishers; 2017.
2. Curry TS, Dowdey JE, Murry RC Jr.*Christensen's Physics of Diagnostic Radiology*. 4th ed. Philadelphia (PA): Lea &Febiger; 1990.
3. Chesney DN, Chesney MO.*X-ray Equipment for Student Radiographers*. Oxford: Blackwell Scientific Publications; 1971.

USG & DOPPLER

Course: Core

Credits: 4 **No of Hours: 60 Hours**

Course Outcome:

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

CO1: To outline the importance of ultrasound.

CO2: To categorize and choose transducers according to their use.

CO3: To infer different protocols used for various anatomical regions to memorize physics beyond ultrasound imaging

CO4: To define the advancements in ultrasound and Doppler imaging.

- **COURSE CONTENT:**

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	10hrs	Introduction 1.1 Basic principle and physics of ultrasound 1.2 Characteristics of ultrasound 1.3 Interaction of ultrasound with matter	√			25%	LE, SE, SA

	Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit II	15hrs	Instrumentation 2.1 Instrumentation and focusing 2.2 Piezoelectric effect 2.3 Transducers 2.4 Ultrasound display modes 2.5 Ultrasound controls 2.6 Ultrasound artifacts	√			25%	LE, SE, SA	
Unit III	15hrs	Doppler 3.1 Doppler- Principle and physics 3.2 Doppler Instrumentation 3.3 Doppler – types, uses, advantages, disadvantages and comparison 3.4 Doppler artifacts	√			20%	LE, SE, SA	
Unit IV	10hrs	Ultrasound Procedures			√	15%	LE, SE,	

	Unit	Hours	Content		Must Know	Good to Know	Desirable to Know	Weightage	Types of question
			4.1 Ultrasound protocol for different body parts 4.2 Patient preparation for Doppler studies 4.3 Vascular sonography						SA
	Unit V	10hrs	Safety Consideration 5.1 Biological effects of ultrasound and safety considerations 5.2 PNDT Act 5.3 Quality assurance in ultrasound		√			15%	LE, SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1. Curry TS, Dowdey JE, Murry RC Jr.*Christensen's Physics of Diagnostic Radiology*. 4th ed. Philadelphia (PA): Lea &Febiger; 1990.
2. Bushberg JT, Seibert JA, Leidholdt EM Jr, Boone JM.*The Essential Physics of Medical Imaging*. 2nd ed. Philadelphia (PA): Lippincott Williams & Wilkins; 2002.

CLINICAL RADIOLOGY-2

Course: SEC

Credits: 5 **No of Hours: 120 Hours**

Course Outcomes:

CO 1: To distinguish indications and contra indications for procedure based on patient history

CO 2: To classify the contrast media based on solubility, physiology of excretion and the procedure to be perform

CO 3: To assist radiologist by setting the equipment required for procedure

CO 4: To be aware of routine and supplementary views for each anatomical region

CO 5: To apply special positioning skills for different pathological and physical conditions.

CO 6: To use essential aids to reduce radiation dose and to improve image quality

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage %
I	30	**Unit 1** 1. Radiological Procedures 1.1 Indications and contra indications 1.2 Patient history	√			25%
II	30	Unit 2 2. Contrast Media 2.1 Classification 2.2 Procedures	√			25%

	Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage %
III	10	Unit 3 3. Technical Skills 3.1 setting the equipment required for radiological procedure			√		10%
IV	30	**Unit 4** 4. To know all routine and supplementary views for each anatomical region	√				25%
V	20	**Unit 5** 5.Radiation protection 5.1 essential aids to reduce radiation dose and to improve image quality		√			15%

SEMESTER-V

RADIOLOGICAL PROCEDURES - II

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcome:**

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

CO1: To have an idea of basic anatomy and related procedures to perform

CO2: To position patients accurately for the appropriate procedure

CO3: To distinguish indications and contraindications for procedure based on patient history

CO4: To classify the contrast media based on solubility and physiology of excretion

CO5: To assist the radiologist by setting the equipment required for the procedure

- **COURSE CONTENT:**

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	20 hrs	**Genito Urinary system:** 1.1 Intravenousurography 1.2 Retrograde pyelography 1.3 Antegrade pyelography 1.4 Cystography and micturating cystouresthrography 1.5 Urethrography(ascending) 1.6 Hysterosalpingography 1.7 Fallopian tuberecanalization 1.8 Sonosalpingography	√			20%	LE, SE, SA

Unit	Hours	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit II	8 hrs	**Mammography:** 2.1 Basicviews 2.2 Specialviews 2.3 BIRADS	√			20%	LE, SE, SA
Unit III	2 hrs	**Respiratory System:** 3.1Bronchography			√	20%	LE, SE, SA
Unit IV	10 hrs	**Other procedures:** 4.1 Sinography 4.2 Fistulography 4.3 Dacrocystography 4.4 Sailography		√		20%	LE, SE, SA
Unit V	20 hrs	**Diagnosticimage-guided interventional procedures:** 5.1 Biopsy 5.2 FNAC (Fine needle aspiration cytology) 5.3 Drainage procedures 5.4 RF Ablation 5.5 HIUF 5.6 Lumbar Myelography 5.7 Cervical Myelography	√			20%	LE, SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books

1. Chapman S, Nakielny R. *Chapman & Nakielny's Guide to Radiological Procedures*. 6th ed. Edinburgh: Elsevier Saunders; 2014.
2. Lakhkar BN. *Radiological Procedures*. New Delhi: Jaypee Brothers Medical Publishers; 2008.

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NUCLEAR MEDICINE &INTERVENTIONAL RADIOLOGY

Course: Core

Credits: 4 **No of Hours: 60 Hours**

- **Course Outcomes:**

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

CO1: To have an idea on uses and hazards of radioactive materials

CO2: To have knowledge of proper handling of radioactive sources

CO3: To know how the radiation will be detected by radiation detection devices

CO4: To have an idea on vascular anatomy

CO5: To distinguish the types of catheters and their uses

- **Course Content:**

Nuclear medicine

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	2hrs	1.1 History		✓		5%	SE
Unit II	3hrs	**Isotopes and Radionuclides** 2.1 Production of Radionuclides 2.2 Transport of Radionuclides	✓			5%	LE, SE, SA
Unit III	3hrs	**Radio Activity** 3.1 Radio Active transformations 3.2 Specific Activity	✓			5%	SA,SE
Unit IV	4hrs	**Radiopharmaceuticals** 4.1 Cold kits	✓			5%	LE, SE, SA

	Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
			4.2 Preparation 4.3 Precautions while handling, storage and transportation					
	Unit V	3hrs	**Gamma Camera instrumentation** 5.1 Collimator- classification and types	✓			5%	LE, SE, SA
	Unit VI	4hrs	**Single Photon Emission Computed Tomography(SPECT)**	✓			5%	LE, SE, SA
	Unit VII	4hrs	**Positron Emission Tomography(PET)**	✓			5%	LE, SE, SA
	Unit VIII	3hrs	**Advanced techniques in NM** 8.1 SPECT-CT 8.2 PET-CT 8.3 PET-MRI			✓	5%	LE, SE, SA
	Unit IX	4hrs	**Safety Considerations & Radiation Dose in Nuclear Medicine** 9.1 Room layout in nuclear medicine 9.2 waste management in nuclear medicine 9.3 Radiation signages and placards used in nuclear medicine department	✓			10%	LE, SE, SA

Interventional Radiography

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	9hrs	**Basic angiography and DSA** 1.1 History , technique, patient care 1.2 Percutaneous catherisation, catheterization sites, Asepsis 1.3 Guidewire, catheters, pressure injectors, accessories 1.4 Use of digital subtraction- single plane and bi-plane all forms of diagnostic procedures including angiography, angioplasty, bilary examination, renal evaluation and drainage procedure.	✓			15%	LE, SE, SA
Unit II	4hrs	**Central Nervous System** 2.1 Myelography 2.2 Cerebral studies 2.3 Ventriculography	✓			5%	LE, SE, SA
Unit III	3hrs	**Arthrography** 3.1 Shoulder 3.2 Hip 3.3 Knee 3.4 Elbow		✓		5%	LE, SE, SA
Unit IV	4hrs	**Angiography** 4.1 Carotid Angiography (4 Vessel angiography) 4.2 Thoracic and Arch Aortography	✓			5%	LE, SE, SA

	Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
			4.3 Selective studies: Renal, SMA, Coeliacaxis 4.4 Vertebral angiography 4.5 Femoral arteriography 4.6 Angiocardiography					
	Unit V	4hrs	**Venography** 5.1 Peripheral venography 5.2 Cerebral venography 5.3 Inferior and superior venocavography 5.4 Relevant visceral phlebography	✓			5%	LE, SE, SA
	Unit VI	4hrs	**Cardiac catheterization procedures:** 6.1 PTCA 6.2 BMV 6.3 CAG 6.4 Pacemaker 6.5 Electrophysiology	✓			10%	LE, SE, SA
	Unit VII	2hrs	**Embolizing agents, embolization procedures** 7.1 UAE 7.2 TACE			✓	5%	LE, SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books**

1. Saha GB.*Fundamentals of Nuclear Pharmacy*. 7th ed. New York: Springer; 2018.
2. Bushberg JT, Seibert JA, Leidholdt EM Jr, Boone JM.*The Essential Physics of Medical Imaging*. 2nd ed. Philadelphia (PA): Lippincott Williams & Wilkins; 2002.

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PATIENT CARE IN MEDICAL IMAGING

Course: Core

Credits: 4 **No of Hours: 60 Hours**

Course Outcomes:

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

CO1: Know precautions to handle emergency patients of different pathology

CO2: To be able to perform basic and advanced life support to the patient in case of emergency Importance of consent form and documentation

CO3: To know the emergency drugs used in the department

CO4: To prepare sterile environment and equipment to perform procedure

Course Content

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	5hrs	1.1 Professional attitude of the technologist to patients and other members of the staff 1.2 Management of chair and stretcher patients and aids 1.3 Management of the unconscious patient 1.4 Elementary hygiene 1.5 Personal cleanliness 1.6 Hygiene in relation to patients	✓			10%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit II	5hrs	2.1 First aid 2.2 Wounds and bleeding, dressing and bandages 2.3 Pressure and splints, supports 2.4 Shock 2.5 Insensibility 2.6 Asphyxia 2.7 Convulsions 2.8 Resuscitation 2.9 Use of suction apparatus			✓	10%	LE, SE, SA
Unit III	5hrs	Basic and Advanced life support 3.1 Emergency crash carts		✓		10%	LE, SE, SA
Unit IV	10hrs	4.1 Drugs in the department: 4.2 Storage, classification 4.3 Labelling and checking 4.4 Regulations regarding dangerous and other drugs 4.5 units of measurement, special drugs, anti-depressive, anti-hypertensive etc 4.6 Drug reactions; prophylactic measures	✓			15%	LE, SE, SA
Unit V	5hrs	5.1 Fractures 5.2 Splints 5.3 Bandaging	✓			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
		5.4 Dressing, 5.5 Foreign bodies; poisons					
Unit VI	15hrs	6.1 Infection: Bacteria, their nature and appearance spread of infections 6.2 Auto-infection or cross-infection 6.3 The inflammatory process 6.4 local tissue reaction, general body reaction 6.5 Ulceration;asepsis and antisepsis. 6.6 Universal precautions, 6.7 Hospitalacquired infections 6.8 HIV, Hepatitis B, C, and MRSA	✓			20%	LE, SE, SA
Unit VII	15hrs	7.1 Principles of asepsis 7.2 Sterilization - methods of sterilization; use of central sterile supply department 7.3 Care of identification of instruments, surgical dressings in common use, including filamented swabs 7.4 Setting of trays and trolleys in the medical imaging department	✓			20%	LE, SE, SA

❖ **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

Recommended Books

1. Bushberg JT, Seibert JA, Leidholdt EM Jr, Boone JM. *The Essential Physics of Medical*

Imaging. 2nd ed. Philadelphia (PA): Lippincott Williams & Wilkins; 2002.

2. Curry TS, Dowdey JE, Murry RC Jr. *Christensen's Physics of Diagnostic Radiology*. 4th ed. Philadelphia (PA): Lea &Febiger; 1990.

BIOSTATISTICS

Course: AEC

Credits: 2 **No of Hours: 30 Hours**

Course Outcomes:

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

CO 1: Understand the concepts of Statistics in the field of Health Professionals.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Nice to Know	Weightage	Types of Question
Unit I	3 hours	**Introduction** 1.1 Meaning, definition of statistics. 1.2 Importance of the study of statistics. 1.3 Branches of statistics. 1.4 Statistics and health science including nursing. 1.5 Parameters and estimates. 1.6 Descriptive and inferential statistics. 1.7 Variables and their types. 1.8 Measurement scales		✓		15%	SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Nice to Know	Weightage	Types of Question
Unit II	3 hours	**Tabulation of Data** 2.1 Raw data, the array, frequency distribution 2.2 Basic principles of graphical representation 2.3 Types of diagrams - histograms, frequency polygons, smooth frequency polygon, cumulative frequency curve, ogive. 2.4 Normal probability curve.	√			15%	SE, SA
Unit III	4 hours	**Measure of Central Tendency** 3.1 Need for measures of central tendency 3.2 Definition and calculation of mean - ungrouped and grouped 3.3 Meaning, interpretation and calculation of median ungrouped and grouped 3.4 Meaning and calculation of mode. 3.5 Comparison of the mean, and mode.	√			15%	LE, SE
Unit IV	6 hours	**Measure of Variability** 4.1 Need for measure of	√			15%	LE, SE

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Types of Question
		dispersion. The range, the average deviation. 4.2 The variance and standard deviation. 4.3 Calculation of variance and standard deviation ungrouped and grouped. 4.4 Properties and uses of variance					
Unit V	6 hours	**Probability and Standard Distributions** 5.1 Meaning of probability of standard distribution. 5.2 The Binominal distribution. 5.3 The normal distribution. 5.4 Divergence from normality - skewness, kurtosis.	√			15%	SE, SA
Unit VI	5 hours	**Sampling Techniques** 6.1 Need for sampling - Criteria for good samples. 6.2 Various sampling designs. 6.3 Procedures of sampling and sampling designs errors. 6.4 Sampling variation. 6.5 Tests of significance.	√			15%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Types of Question
Unit VII	3 hours	**Health Indicator** 7.1 Importance of health Indicator. 7.2 Indicators of population, morbidity, mortality, health services. 7.3 Calculation of rates and rations of health.		√		10%	SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

ENVIRONMENTAL SCIENCE

Course: VAC

Credits: 2 **No of Hours: 30 Hours**

- **Course outcomes:**

CO 1: Students will be able to learn about environment, factors affecting it, environmental ethics and its protection.

CO 2: Students will be able to describe a system, component, or process to meet desired needs within realistic constrains such as economic, environmental, social, political, ethical and sustainability.

CO 3: Students will be able to critically analyze technical subject matter for scientific merit apply learned environmental knowledge and understanding to solve technical/ research problems in new context.

- **COURSE CONTENT:**

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Question type

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Question type
Unit I	2 hrs	**Multidisciplinary nature of Environmental Studies** • Multidisciplinary nature of Environmental Studies Environment definition, Components of environment, Scope of environmental studies. Four spheres of earth (Hydrosphere, Atmosphere, Lithosphere and Biosphere) • Concept of sustainability and sustainable development (Brundtland Commission), pillars of sustainability; Sustainable Development Goals (SDGs). • International Agreements: Montreal protocol, Kyoto protocol, Convention on Biological Diversity (CBD)	✓			**5%**	**SE, SA**
Unit II	6 hrs	**Ecosystems** • What is an ecosystem? Ecological units. Structure of an ecosystem; biotic and abiotic components, and function of an ecosystem; energy flow in the ecosystem; biogeochemical	✓			10%	**SE, SA**

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Question type
		cycle, biological interactions, food chains, food webs, ecological pyramids and ecological succession. • Types of ecosystems: a. Terrestrial • Forest ecosystem – tropical evergreen, tropical deciduous, temperate evergreen, temperate deciduous and Taiga/Boreal • Grassland ecosystem – Savannas and Temperate grasslands (Steppes, Pampas, Prairies, Veldt and Downs. • Desert ecosystem – hot and dry, semi-arid, coastal and cold. Plant and animal adaptations. b. Aquatic ecosystems –					

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Question type
		Marine, Freshwater (lentic and lotic) and Estuarine; Pond as an ecosystem. • Ecosystem services					
Unit III	7 hrs	**Natural Resources** • Classification of natural resources - Renewable and Non-renewable resources • Forest resources: Uses (timber, medicinal, food, economic importance, prevent soil erosion, control floods, religious and cultural practices) and overexploitation (Deforestation, timber extraction, mining, construction of dams). • Water resources: Uses (domestic, agricultural, industrial, electricity and transport) and over utilization of surface and ground water (drying of wells, lakes and ponds, extraction of groundwater, decrease in water table, deterioration of water	✓			15%	**SE, SA**

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Question type
		quality and land subsidence). Floods, Drought, dams – benefits and problems, conflicts over water (state and international) • Land resources: Land as a resource; Land degradation, earthquake, landslides, soil erosion and desertification. • Energy resources: Renewable and non-renewable energy sources, growing energy needs, use of alternate energy sources, case studies (Kochi – first solar powered airport, Tamilnadu – windmills, Gujarat – tidal energy) • Conservation of forest, water, land and energy resources.					
Unit IV	7 hrs	**Biodiversity and its conservation** • Introduction; Levels of biological diversity: genetic, species and ecosystem diversity; Biogeographic zones of India; Global	✓			15%	**SE, SA**

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Question type
		biodiversity hotspots • India as a mega-biodiversity nation; Endangered and endemic species of India • Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. • Ecosystem and biodiversity services: ecological, economic, social, ethical, aesthetic and informational value. • Human wildlife conflicts in Indian – People and wildlife					
Unit V	8 hrs	**Environmental Pollution** Definition • Cause, effects and control measures/management of: - a. Air pollution b. Water pollution c. Soil pollution d. Light pollution e. Noise pollution	✓			15%	**SE, SA**

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Question type
		f. Thermal pollution g. Radiation pollution • Pollution case studies (London smog, Bhopal gas tragedy, Beijing/Delhi air pollution, Eutrophication, Minamata disease, Exxon Valdez oil spill, Love canal tragedy, Chernobyl disaster) • Climate change, Greenhouse effect, Global warming, Acid rain, Ozone layer depletion. • Solid waste management: control measures of urban and industrial wastes. • Carbon footprint – How to calculate carbon footprint and ways to reduce your carbon footprint. • Human Population growth – impacts on environment • Environmental movements: Chipko					

Unit	Hrs	Content	Must Know	Good to Know	e to Know	Weightage	Question type
		movement, Bishnois of Rajasthan, Silent Valley, Narmada bachaoandolan					

❖ **LE**- Long Essay**, SE**- Short Essay**, SA**- Short Answer

➢ **Recommended Books:**

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
3. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
4. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
5. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
6. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
7. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
8. Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.

CLINICAL RADIOLOGY-3

Course: SEC

Credits: 4 **No of Hours: 120 Hours**

Course Outcomes:

CO 1: To have an idea on uses and hazards of radioactive materials

CO 2: To have knowledge of proper handling of radioactive resources

CO 3: To have an idea of basic anatomy and related procedures to perform

CO 4: To position patients accurately for appropriate procedure

- To distinguish indications and contra indications for procedure based on patient history

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage %
I	70	**Unit 1** 1. Radioactive Materials 1.1 Handling 1.2 Uses 1.3 Hazards	√			60%
II	20	Unit 2 2. Procedures 2.1 Appropriate Anatomy 2.2 Patient positioning			√	15%
III	30	Unit 3 3. Special radiological procedure 3.1 Specific Indication & Contraindication		√		25%

SEMESTER-VI

BASIC AND ADVANCED INSTRUMENTATION OF COMPUTED TOMOGRAPHY

Course: Core

Credits: 5 **No of Hours: 60 Hours**

Course Outcomes:

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

CO1:Understand the working principle of computed tomography

CO2:To have an idea of components of CT and its relation in image formation Complete knowledge about the protocols done in CT

CO3:Must know post processing techniques and related cross sectional anatomy

CO4:To have knowledge about the tools and parameters to be used for specific procedure

COURSE CONTENT

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	15	**Unit 1** 1.1 Introduction and history 1.2 CT principle 1.3 CT generations 1.4 CT Instrumentation 1.5 CT detectors 1.6 Axial & Helical CT – Slip ring technology	√			20%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit II	15	**Unit 2** 2.1 Data acquisition 2.2 Image pre-processing/reconstruction techniques 2.3 Algorithms for image reconstruction 2.4 Image display 2.5 Image post-processing techniques 2.6 C T artifacts 2.7 Image quality	√			20%	LE, SE, SA
Unit III	10	**Unit 3** 3.1 CT Dosimetry 3.2 Dose optimization techniques in CT 3.3 Basic concepts of 3DCT 3.4 HRCT, Isotropic imaging		√		20%	LE, SE, SA
Unit IV	15	**Unit 4** 4.1 CT contrast media and administration 4.2 CT imaging protocols 4.3 CT pediatric protocols	√			20%	LE, SE, SA
Unit V	05	**Unit 5** 5.1 Safety consideration			√	20%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
		5.2 Documentation in CT 5.3 Role of Medical Imaging technologist in CT scan procedures 5.4 Quality assurance in CT					

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books

1. Curry TS, Dowdey JE, Murry RC Jr. *Christensen's Introduction to the Physics of Diagnostic Radiology*. Philadelphia (PA): Lea &Febiger; 1984.
2. Romans LE. *Computed Tomography for Technologists: A Comprehensive Text*. 2nd ed. Philadelphia (PA): Wolters Kluwer; 2018.
3. Bushberg JT, Seibert JA, Leidholdt EM Jr, Boone JM. *The Essential Physics of Medical Imaging*. 2nd ed. Philadelphia (PA): Lippincott Williams & Wilkins; 2002.

BASIC AND ADVANCED INSTRUMENTATION OF MAGNETIC RESONANCE IMAGING

Course: Core

Credits: 5 **No of Hours: 60 Hours**

Course Outcomes:

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

CO1:To understand the working principle of MRI

CO2:To have knowledge about the things restricted in MRI to carry Proper handling of the equipment and RF coils

CO3:Distinguish the different zones in MRI To perform scans with ideal sequences

COURSE CONTENT

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
Unit I	10	**Unit 1** 1.1 Introduction to MRI 1.2 Basic principle 1.3 Image weighting and contrast in MRI 1.4 Instrumentation of MRI 1.4.1 Magnets- classification, types, advantages, disadvantages 1.4.2 Gradient & Body Coils 1.4.3 R Fcoils 1.4.4 Shimcoils 1.4.5 Ramping 1.4.6 Cryogen 1.4.7 RF shielding 1.4.8 Computer	√			20%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
Unit II	15	**Unit 2** 2.1 Encoding and Image formation 2.1.1 Encoding 2.1.2 K-Space 2.2 Parameters and Trade-offs 2.3 MRI Pulse sequences 2.3.1 Spin Echo pulse sequence 2.3.2 Gradient Echo pulse sequence Fast imaging sequences	√			20%	LE, SE, SA
Unit III	10	**Unit 3** 3.1 Vascular Imaging 3.1.1 Digital Subtraction MRA 3.1.2 MR-Angiogram 3.1.3 MR-Venogram	√			10%	LE, SE, SA
Unit IV	10	**Unit 4** 4.1 MRI Artifacts and their compensation MRI contrast agents 4.1.1 T1 contrast agent 4.1.2 T2 contrast agent	√			10%	LE, SE, SA
Unit V	10	**Unit 5** 5.1 Advanced MRI techniques 5.2 DWI&DTI 5.3 Perfusion 5.4 Spectroscopy 5.5 Functional MRI 5.6 Interventional MRI		√		20%	LE, SE, SA

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weigh tage	Types of question
Unit VI	05	**Unit 6** 6.1 MRI safety 6.2 Documentation 6.3 Quality assurance in MRI			√	20%	LE, SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

Recommended Books

4. Curry TS, Dowdey JE, Murry RC Jr.*Christensen's Introduction to the Physics of Diagnostic Radiology*. Philadelphia (PA): Lea &Febiger; 1984.
5. Bushberg JT, Seibert JA, Leidholdt EM Jr, Boone JM. *The Essential Physics of Medical Imaging*. 2nd ed. Philadelphia (PA): Lippincott Williams & Wilkins; 2002.
6. Westbrook C, Kaut Roth C. *MRI in Practice*. 4th ed. Oxford: Wiley-Blackwell; 2011.

CLINICAL RADIOLOGY- 4

Course: SEC

Credits: 5 **No of Hours: 120 Hours**

Course Outcomes:

CO 1: To understand the working principle of MRI

CO 2: Proper handling of the equipment and RF coils

CO 3: Distinguish the different zones in MRI

CO 4: To perform scans with ideal sequences

CO 5: To have an idea of components of CT and its relation in image formation

CO 6: Complete knowledge about the protocols done in CT

CO 7: Must know post processing techniques and related cross-sectional anatomy

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage %
I	35	**Unit 1** 1. Working principle of MRI & CT	√			30%
II	35	Unit 2 2. Proper handling of the equipment 2.1 CT 2.2 MRI		√		20%
III	10	Unit 3 3. MRI Zones			√	10%
IV	40	Unit 4 4. Protocols & Post processing Techniques 4.1 CT 4.2 MRI	√			40%

MEDICAL ETHICS

Course: VAC

Credits: 2 **No of Hours: 30 Hours**

Course Outcomes:

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

CO1: Increasing the awareness and knowledge of students of the value dimensions of interactions with the patients, colleagues, relations andpublic.

CO2: Fostering the development of skills of analysis, decision making and judgment.

CO3: Making the students aware of the need to respect the rights of the patient.

COURSE CONTENT:

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit I	3hr	**Introduction to ethics** What is ethics, what are values and norms, freedom and personal responsibility?				15%	SE, SA
Unit II	4hrs	**Definition of medical ethics** Major principles of medic ethics.	√			20%	LA, SA
Unit III	4hrs	**Perspective of medical ethics** The Hippocratic oath, The Declaration of Helsinki, The WHO Declaration of Geneva, International code of Medical Ethics (1993), Medical Council of India Code of Ethics (2002).	√			15%	LE, SE, SA
Unit IV	4hrs	**Ethics of the individual**Truth and confidentiality, the concept of disease, health and healing, the Rightto health.	√			15%	SE

Unit	Hrs	Content	Must Know	Good to Know	Desirable to Know	Weightage	Types of question
Unit V	3hrs	**The ethics of human life** Prenatal sex determination.	√			15%	SE, SA
Unit VI	4hrs	**The family and society in medical ethics** Euthanasia, cancer and terminal care.		√		10%	LA, SA
Unit VII	4hrs	**Death and dying** Use of life-support systems, the right to die with dignity, suicide–the Ethical outlook.		√		05%	LE, SE, SA
Unit VIII	4hrs	**Professional Ethics** Contract and confidentiality, malpractice and negligence.		√		05%	SE, SA

- **LE-** Long Essay**, SE-** Short Essay**, SA-** Short Answer

- **Recommended Books:**

1. Tsai DF. The WMA medical ethics manual. Journal of Medical Ethics. 2006 Mar 1;32(3):163
2. Loewy EE, Loewy RS. Textbook of healthcare ethics. Springer Science & Business Media; 2004 Jun 29.

INTERNSHIP (SEMESTER VII &VIII)

Eligibility:

Acandidateshouldhavepassedinallthecourses(Core, AEC, VAC and Multidisciplinary Electives)amountingto120 numberof credits beforeentering in to internship.

Duration:

A candidate has to mandatorily complete 1 year (2 semesters) of internship. The totalcreditper semester is 18and fortwo semesters it is 36.

Objectives:

1. Shouldhavebasicknowledgeall Radiologicalmodalities
2. ShouldknowtoimplyALARAprinciple
3. Totransferpatientswithproperpatienttransfertechniques
4. Shouldknowalltheportablecases withcarefulpatienthandlingtechnique
5. Should have a knowledge of BIRADS and also should know all the mammographicroutineand Special views
6. Toperformscanswithideal sequencesandadequateradiationdose
7. Completeknowledgeabouttheprotocols doneinCT
8. Shouldhaveaknowledgeof Dose reduction
9. MustknowpostprocessingtechniquesandrelatedcrosssectionalanatomyMaintains patient confidence and protects hospital operations by keeping informationconfidential.
10. Demonstratesdisciplinebymaintaining safeandcleanworkingenvironmentandbycomplyingwith procedures, rules andregulations.
11. Be able to understand and learn the preparation, operation and maintenance MRI,CT andotheradvancedmodalities
12. **Clinicaldutyinvariousmodalities**

- ConventionalX-Ray
- MobileX-Ray
- ComputerizedRadiography
- CTscan
- MRIscan
- C-Arm
- Mammography
- Fluoroscopy

LearningOutcomes

S. no.	Learning outcomes	Knowledge/comprehension	Applications/synthesis /evaluation	Hours
1	Be able tointerpret andevaluate aprescription	Identifytheareafortreatment.	Determiningx-ray,CTscan OrMRIscanneedsofpati ent	200
		Quantifythepracticalproblemsa ssociatedwithmachine and accessoryequipmentlimitations	Understand and interpretInstructions andrequirementsdocumented bythephysicianinthepatient's prescription	
2	Operateandseeop eration ofradiologicequi pment	Selectingandperformingbasicviews(proj ections) andconventionalcontrast Studies using appropriateradiographicparame tersandequipment	Reliablyperformanon-Contrast plainRadiography,conventi onal contrastStudiesandnon-contrastplainradiographyin specialsituations	200
		Carryingoutroutineproceduresfortro ubleshootingandmaintenanceofima ging Andprocessingsystems	ControlandmanipulateParam eters associatedwith exposure andprocessing Toproducearequired imageofdesirablequality	

S. no.	Learning outcomes	Knowledge/comprehension	Applications/synthesis /evaluation	Hours
			Apply quality controlproceduresforallradiologicequipment	
3	Be able totransfer allrelevantinformationandcompleteaccuratedocumentation	Recognize the importance ofaccurate transfer of information toallow for accurate treatment set-upaccordingtothetreatmentplanandprescription	Construct the mostappropriate device for theindividualpatientwithinthecontextof theprotocol	100
		Knowwhatshouldbeincluded	Apply the necessaryprecautionsinproduction	
		Know to whom or where thedocumentationandinformation shouldbesent Beawareofthelegalissuesrelatingto documentation	Implement correct QC,storage and handlingproceduresforshieldingdevices	
4	Be able toprepare thediagnosticmachinery	Know the shieldingdevices/methodsavailable	Construct the mostappropriate device for theindividualpatientwithinthecontextof theprotocol	100
		Knowhow touse these devices	Apply the necessaryprecautionsinproduction	
		Recognize the associated health andsafetyissues	Implement correct QC,storage and handlingprocedures forimmobilizationdevices	
5	Beabletocarryout the	Recognizetheimportanceofteaminteractions	Participate in theorganizationofthedailyworkscheduletomaximizeefficiency	

	dailyorganization ofthe treatmentunit	Explaintheprinciplesofeffectivecommunication Reviewtheindividualpatientrequirements	Informthepatientabouttheprocedure	50
6	Be able toaccurately andconsistentlyset-upandproducea goodqualityradiological image	Able to interpret the set-upinformation Applyknowledgeofradiographicimaging to the production ofradiographs andtheassessment ofimagequality	Interpret the diagnostic planand set-up the patientaccordingly Carryingoutqualitycontroltests onimagesobtained	200
7	Be able toprepare andposition thepatientforth eprocedure	Befamiliarwiththetreatmentplan	Explain the anatomic andphysiologicalbasisofthe proceduretobeundertaken	200
		Identifypreparatoryprocedures	Identify and explain thepossiblesideeffectstoeachpatient	
			Check all preparatoryprocedures have beencompleted	
		Befamiliarwiththediagnosticplans for all patients on thetreatmentunit	Identify the patient inaccordance with recognizedprocedures and consistentwiththedepartmentprotocol	
		Recognizethesignsandsymptomsassociated with treatmentindifferentsites	Analyzetheinformationandintegrate to define theoptimalpatientposition	
		Discuss the importance ofpatientidentificationandhowitshouldbecarriedout	Interpret the diagnostic planand use the equipmentaccordingly	

8	Be able tocompleteaccurateTreatmentdocumentation	Recognizetheimportanceofaccuratedocumentation	Complete the treatmentdocumentationaccurately	50
		Knowwhatshouldbeincluded	Ensurealllegalrequirementshavebeenmet	
		Beawareofthelegalissuesrelatingto treatmentdocumentation		
		Listsupportgroupsthatmightbenefitpatients		
9	AdvisepatientonAppropriatenutrition, sexualfunction, rest,skincare,nauseaand othersymptoms	Explain the impact ofnutritional status on patienttoleranceoftreatment	Assessthepatient'snutritional status	50
10	Monitor andassurequality	Monitortreatmentprocess/outcomes	Identifyneedsandexpectations ofpatient/health careprofessionals	50
		Identifyproblemsintreatmentprocess/outcomes	Solve treatmentprocess/outcomeproblems	
		Knowwhatpatientcareisrelevantforthe procedure	Evaluatepotentialsolutionsthoroughly	
11	Be able to carryoutthenecessarydata transferchecks	Defineandexplainthe datathatmustbetransferred	Checkandverifyallparameters	50
			Confirmapprovalandsignatures	

12	Beableto	Applyknowledgeofradiographicimaging to the production ofradiographs andtheassessment ofimagequality	PerformX-rayfilm/imageprocessingtechniques(including dark roomtechniques)	50
	processradiographicimages	Controlandmanipulateparametersassociated with exposure andprocessing toproducearequiredimageofdesirablequality	Acquire an appropriateimageasperinstructions	
13	Recognizecontrastinducedadverseractions	Promptly recognize and assess thereactions	Know the correctmedicationsandothertreatmentoptions	50
		Takingprecautionarymeasurestoavoidthe reactions	Recognise thecontraindications of allergicreactions	
14	Beabletocarryoutcorrectiveactions as perinstructions	Recognize the criticalstructuresontheverificationimages	Make corrections inaccordancewiththeprotocol	50
		Identify the correct imagingprotocol	Recordany corrections	
15	Be able toImplementhealthand safetyprocedures	Explainthehealthandsafetyissuesforpatientsand staff	Assess the safety features toensure they are in place andadheredto	50
16	Be able tointerpret,applyand disseminateinformation as amember of themedical imagingteam	Defineandexplainthe datathatmustbedisseminated	Identify the appropriatepersonneltowhom specificinformation should bedisseminated	50
			Communicate the correct,relevant and appropriateinformation	

17	Be able todemonstrateprofessional behaviour	Explain the legal and ethicalguidelinesrelatedtotheprofession	Practice in accordance withlegislation regulations andethicalguidelines	100

		Beawareofyourowncompetency levels	Promotecollaborativepractice	
		Identifythe elementsthatreflectprofessional appearance andmanner		
18	Be able todemonstrateasensitive andcaringattitudetopatients	Explain the components ofgoodcommunication	Self-awarenessoftheirownpersonalitytraits	50
		Describethe mainpersonalitytypes	Analyzehowthedifferencesin personality influenceapproach	
		Beawareofthepatient'gender,age,culturalbackground,educational levelandsocialsituation		
19	Be able to ensureradiationprotectionlegislation isadheredto	Describetheradiation hazardsand howtheyaremanaged	Routinelyinspecttheareatoensure that radiationprotection measures are inplaceandfunctional	50
		Explainthelegislationrelatingtoradiation protection		
20	Be able to carryout thedaily/weeklyQualityControl(QC)checks	Explain Quality ManagementSystem(QMS),QualityAssurance(QA)andQualityControl(QC	Perform thedaily/weekly/monthlyQCprocedures	50
21	Be able toreview theliterature	Definesearchtermsforspecifictreatmentsites	Identifytheappropriatelitterature in the area ofinterest	30

22	BeabletosuggestImplementationof researchfindings	Identify relevant sources ofResearch	Evaluateresearchwithrespect to currentdepartmentalpractice	10
23	Be able tosuggest/initiate topics formedicalimagingresearch	Identifyliteraturetosupportresearch Proposal Define the necessary steps in preparing and carrying out research Formulate a research question	Reviewtheliteratureinthearea Formulatearesearchquestion	10

INTERNSHIP TRAINING RULES AND CODE OF CONDUCT

1. The duration of the internship shall be a minimum of one year or 2 semesters (8 hours of practice a day, totaling to 36 credits).

2. The Interns shall be entitled for 12 day total leave on any account during the entire period of Internship and no other leave shall be permissible.

3. The candidate is expected to work for minimum 8 hours per day and this may be more depending on the need and the healthcare setting.

4. If the period of leave exceeds the sanctioned limit, Internship is liable to be extended at the discretion of the authority. In case of Emergency any additional leave asked for shall be discretion of the authority and will be doubled.

5. The attendance of all the interns shall be marked/monitored by the respective Clinical coordinator and concerned HOD, by maintaining the intern's attendance register. All the interns are directed to mark their attendance, by putting their full initials (specimen signature to be given to the Clinical coordinator).

6. Interns shall observe duties as per the roaster devised by the department, and no change in duty shall be permissible without the permission of clinical coordinators. Interns shall be courteous, polite, respectful and sympathetic towards the patients, their accompanying attenders, hospital staff and their colleagues.

7. Intern shall maintain decorum and commitment and discipline of the profession and show keen interest in patient care.

8. The interns will be entrusted with clinical responsibilities under supervision of the senior Technician/Technologist and are expected to discharge the duties assigned to them sincerely & effectively.

9. Aprons/scrubs & ID is mandatory while reporting to the Hospital and always carry the required articles needed for examination of the patients. A fine of Rs.500/- will be charged from the interns not using white coat/scrubs and identification card during their duty in the Hospital.

10. Scrubs should be worn inside the campus only. If found outside, a fine of Rs 500/- will be charged.

11. The performance shall be assessed based on the assessment sheet provided in the Log Book.

Components of Exit Exam

SI.No.	Components	Marks
1	Spotters	30
2	Case scenario/Stations	30
3	Viva Voice	40
Total Marks		100

Exit Exam shall be conducted by the College and the marks shall be sent to the COE for needful.

PARTICULARS OF PRACTICAL, VIVA-VOCE

- Practical examination will be aimed at examination of clinical skills and competence of the candidates for undertaking independent work as a specialist.
- Viva- Voce examination shall aim at assessing, i.e., depth of knowledge, logical reasoning, confidence &oral communication skills.
- OSCE/OSPE- shall have minimum of 3 stations.

INTERNSHIPCOMPLETION

Thestudent shouldscore aminimum 50%marks tobeeligibleforthe Internship completioncertificate.

Acknowledgement:

TheCurriculumDevelopmentCommitteeofIndianAssociationofRespiratoryCare(IARC).

ANNEXURES

List of Annexures:

- ANNEXURE – I: Question Paper Layout for theory of Internal Assessment and semester end examination (Core)
- ANNEXURE – II: Question Paper Layout for theory of Internal Assessment and semester end examination (AEC/VAC)
- ANNEXURE – III: Internship Competency Checklist
- ANNEXURE – IV: Internship Assessment and Evaluation Format
- ANNEXURE – V: Logbook Format

ANNEXURE – I: Question paper layout Internal Assessment (Core)

Model Question Paper

I Semester B.Sc. Medical Imaging Technology

Time: 2 Hours Max. Marks: 50 Marks

SUBJECT NAME:

Your answer shall be specific to question asked.

Draw neat and labeled diagrams wherever necessary.

LONG ESSAY (Answer any One) **(1x10=10Marks)**

1.

2.

SHORT ESSAY (Answer any Five) **(5x4=20Marks)**

3.

4.

5.

6.

7.

8.

9.

SHORT ANSWERS (Answer any Ten) **(10x2=20Marks)**

10.

11.

12.

13.

14.

15

16.

17.

18.

19.

ANNEXURE – II: Question paper layout University exam (AEC/VAC)

Model Question Paper

I Semester B.Sc. Medical Imaging Technology

Time: 2 Hours Max. Marks: 25 Marks

SUBJECT NAME:

Q.P Code:

Your answer shall be specific to question asked.

Draw neat and labeled diagrams wherever necessary.

LONG ESSAY (Answer any One) **(1x 10 =10Marks)**

1.

2.

SHORT ESSAY (Answer any one) **(1 x 5 = 5Marks)**

3.

4.

SHORT ANSWERS (Answer any five) **(5 x 2=10Marks)**

5.

6.

7.

8.

9.

10.

11.

ANNEXURE – III: Internship Competency Checklist

Programme: B.Sc. Medical Imaging Technology

Clinical Posting Area:

Clinical Coordinator:

Duration: From _____ To _____

Student Name:

Register Number:

General Patient Care & Safety

Clinical Skill	Complete	Incomplete	NA
Participation / Observation record			
Patient identification & verification procedures			
Informed consent & patient instruction			
Patient positioning & immobilization techniques			
Infection control & universal precautions			
Handling emergency situations in imaging suite			

Radiography (X-ray & Fluoroscopy)

Clinical Skill	Complete	Incomplete	NA
Operation of X-ray equipment			
Selection of exposure factors (kVp, mAs)			
Chest X-ray positioning & image acquisition			
Skeletal radiography			
Spine radiography			
Mobile radiography			
Fluoroscopy assistance			

Computed Tomography (CT)

Clinical Skill	Complete	Incomplete	NA
CT room preparation & safety checks			
Patient positioning for CT			
Protocol selection			
Contrast handling (supervised)			
Image reconstruction & post-processing			
CT artifacts identification			

Radiation dose awareness			

Magnetic Resonance Imaging (MRI)

Clinical Skill	Complete	Incomplete	NA
MRI safety screening			
Patient positioning & coil selection			
Basic MRI protocols			
Contrast safety awareness			
MRI artifacts recognition			
Emergency procedures in MRI			

Ultrasound & Doppler

Clinical Skill	Complete	Incomplete	NA
Machine handling & probe care			
Patient preparation			
Abdominal & pelvic ultrasound observation			
Doppler study observation			
Image optimization			

Radiation Protection & QA

Clinical Skill	Complete	Incomplete	NA
Use of protective devices			
Radiation monitoring badge awareness			
ALARA principles			
Basic QC checks awareness			

Professionalism & Communication

Clinical Skill	Complete	Incomplete	NA
Professional conduct			
Patient communication			
Teamwork			
Logbook maintenance			

Remarks by Clinical Coordinator:

_____

Signature: _____ Date: _____

ANNEXURE – IV: Internship Assessment and Evaluation Format

CLINICALEVALUATION:

QualityandQuantity ofWork:

QualityandQuantityofwork	Poor (1)	Good (2)	VeryGood (3)	Excellent (4)	Remarks
1.Towhatextenthasthequalityofintern'swork matchedtheresponsibilitiesgiven?					
2.Howthoroughandcompletehastheintern'sworkbeen?					
3. How successful has the intern been in meetingthe requirements with respect to the amount ofworkwithinthetimeallocated?					
4.Define in quantity (list) work done: 1. 2. 3. 4.					

Knowledgeofworkandworkingabilitiesevaluation:

Knowledgeofwork andworkingabilities	Poor (1)	Good (2)	VeryGood (3)	Excellent (4)	Remarks
1.Towhatextentdoestheinterndemonstratecapabilityofusingscientificfactsandskillsasa basis forhis performance?					
2.Towhatextentdoestheinterndemonstrateadesire tolearnmorethanjustroutineaspectsof theprescribedwork?					
3.Towhatextentdoestheinternadjusttonewwork methods andconditions?					
4.Howeffectivehastheinternbeeninplanning andorganizinghis work?					
5.How effectively does the Interncommunicateinspeechandwriting					
6.Towhatextentdoestheinternacceptthemaximumresponsibilitiesforhisworkand volunteerfornewassignments?					
7.Howeffectivehastheinternbeenin establishingaworkingrelationship?					
8.Towhatextentistheinternreceptivetonew ideasandinformation?					

GeneralPerformance:

GeneralPerformance	Poor (1)	Good (2)	Very Good (3)	Excellent (4)	Remarks
1.Towhatextenthastheinternbeenpunctualandcompliedwiththeworkinghoursofthe institution?					
2.Howeffectivehastheinternbeeninfollowingdepartmentalpolicies and procedures?					
3.How effective were the intern's attitudestowards othermembers ofthehealth careteam?					

ClinicalEvaluation

Thetotalpointsacquiredwillbecalculatedforthe15componentsandthepointsacquiredoutof60markswillbenormalizedto 50 marks for grading.

CasePresentation

Slidepreparationandexplanationskill	5marks
Protocol	10marks
Reasoningskills/newupdates	10marks
TotalMarks	25marks

Log Book

- Documentationofone clinicalcaseperdayandtobeverifiedbytherespectiveclinicalIncharge.
- Submissionoflogbook tobedonefortnightly andverified bythecoordinator.

YENEPOYA
(DEEMED TO BE UNIVERSITY)

YENEPOYA
(Deemed to be University)
Recognized under Sec 3(A) of the UGC Act 1956
Accredited by NAAC with 'A' Grade

Yenepoya School of Allied Health Sciences

Constituent college of
Yenepoya (Deemed to be University)
University Road, Deralakatte
Mangaluru – 575018

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

LOG BOOK

Academic Details

Name of the Student: _____

Campus ID: _____

Register ID: _____

E mail ID: _____

Ph. Number: _____

CERTIFICATE

This is to certify that the candidate Mr/ Ms …….,

Reg No. …….., admitted in the year 2021 - 22 in the Yenepoya School of Allied Health Sciences, a constituent college of Yenepoya (Deemed to be University) has satisfactorily completed the requirements mentioned in this logbook for B.Sc. Medical ImagingTechnology during the period from …… to…….

Signature of Clinical Coordinator

Name and Designation

Countersigned by Program Coordinator

Principal/Dean of the College

Place:

Date:

GENERAL INSTRUCTIONS

1) The logbook is a record of the clinical activities of the designated student, who would be responsible for maintaining his/her logbook.

2) The student is responsible for getting the entries in the logbook verified by the clinical coordinator regularly.

3) Entries in the logbook will reflect the clinical activities in the department & have to be scrutinized by the program coordinator.

4) The logbook is a record of various activities by the student like:

- Overall participation & performance
- Attendance
- Participation in clinical activates
- Acquisition of selected competencies

5) The logbook is the record of work done by the candidate in that department / specialty and should be verified by the clinical coordinator.

By the end of the semester, the students should be able to:

IIIrd semester

3.1 To annotate, positioning landmarks and terminology in X-ray.

3.2 To perform positioning without technical and manual errors to avoid repeat exposure.

3.3 To be aware of routine and supplementary views for each anatomical region.

3.4 To apply special positioning skills for different pathological and physical conditions.

3.5 To use essential aids to reduce radiation dose and to improve image quality.

3.6 To identify the protective measures to be taken in the department.

3.7 To determine the primary and secondary barriers of radiation.

IVth semester

4.1 To distinguish indications and contra indications for procedure based on patient

history.

4.2 To classify the contrast media based on solubility, physiology of excretion and the procedure to be perform.

4.3 To be aware of routine and supplementary views for each anatomical region.

4.4 To apply special positioning skills for different pathological and physical conditions.

4.5 To use essential aids to reduce radiation dose and to improve image quality.

Vth semester

5.1 To have an idea on uses and hazards of radioactive materials.

5.2 To have knowledge of proper handling of radioactive sources.

5.3 To have an idea of basic anatomy and related procedures to be performed

5.4 To position patients accurately for appropriate procedure

5.5 To distinguish indications and contra indications for procedures based on patient history.

5.6 Should have good communication skills with patients

5.7 To know the emergency drugs used in the department

5.8 To know importance of consent form and documentation.

VIthsemester

6.1 To understand the working principle of MRI & CT.

6.2 Proper handling of an equipment and RF coils.

6.3 To have knowledge on different zones in MRI.

6.4 To perform scans with ideal sequences.

6.5 To have an idea of components of CT and its relation in image formation.

6.6 Complete knowledge about the protocols done in CT and MRI.

6.7 To know different techniques of reducing dose in CT

6.7 Must know post processing techniques and related cross sectional anatomy.

<table>
<tr><td>Sl.No:</td><td>Modality:</td><td colspan="2">Name of the procedure:</td><td colspan="3">Day:

Date:</td></tr>
<tr><td colspan="3"><u>Detailed Patient History</u>

Age: Sex: IP/OP number:</td><td>Contrast:

RFT:</td><td colspan="3" rowspan="2">Sequences/ Protocol:</td></tr>
<tr><td colspan="4">Findings/ Diagnosis/ Essential image criteria:</td></tr>
<tr><td>Initial of faculty</td><td>Remarks</td><td colspan="2">Rating</td><td colspan="2">Skills Acquired</td></tr>
<tr><td rowspan="3"></td><td rowspan="3"></td><td>Exceeds € Expectations</td><td></td><td colspan="2" rowspan="3"></td></tr>
<tr><td>Meets (M) expectations</td><td></td></tr>
<tr><td>Below (B) Expectations</td><td></td></tr>
</table>

- RUBRICSFORCLINICALEVALUATION:

Skills	Marks
ClinicalEvaluation	50marks
CasePresentation	25marks
Log Book	25marks
TotalMarks	100marks