MALLA REDDY VISHWAVIDYAPEETH

(Deemed to be University)

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School of Public Health, Emerging Healthcare & Technology

(SPHEHT)

COURSE STRUCTURE & SYLLABUS DOCUMENT

B.Sc. Surgical Robotic Technology

Year 2025-29 Batch

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1. Preamble, Need and Justification for the Programme

1.1 Preamble

Robotic-assisted surgery is expanding rapidly across general surgery, urology, gynecology, colorectal, cardiac and thoracic specialties, driving strong demand for entry-level allied-health professionals trained in operation-theatre technology, surgical assistance and robotic-surgical-system support. The B.Sc. Surgical Robotic Technology (B.Sc. SRT) programme provides a four-year, NEP 2020-aligned undergraduate pathway that builds strong foundations in biomedical sciences and general OT/surgical-assistance practice, and progressively introduces robotic surgical systems, minimally invasive surgery, robotic-assisted procedures across specialties, surgical navigation/emerging technologies, and equipment maintenance, culminating in supervised clinical internships and an undergraduate project.

1.2 Need for the Programme

- The rapid national and global expansion of robotic surgical programmes across general and specialty surgery has created sustained demand for undergraduate-trained Surgical Robotic Technologists and OT technologists with robotic-specific competence.
- Structured undergraduate pipelines specific to robotic surgical technology remain limited relative to the growth of robotic-OT infrastructure in tertiary and quaternary care hospitals.
- Hospitals, robotic-surgery device companies, simulation-training centres and healthcare-technology organizations increasingly recruit for entry-level roles this programme is designed to prepare graduates for.
- Robotic-assisted surgery requires specialized competencies — system setup, docking/undocking, instrument exchange, emergency management — that are not comprehensively covered in general OT-technology training.

1.3 Justification

Malla Reddy Vishwavidyapeeth, as a multi-disciplinary Deemed-to-be-University with affiliated teaching hospitals and robotic-surgery infrastructure, is well positioned to deliver an outcome-based B.Sc. SRT programme that integrates strong foundations in anatomy, physiology, biochemistry, pathology, microbiology and pharmacology with hands-on OT-assistance training, robotic-systems and instrumentation study, minimally invasive and robotic-assisted-surgery exposure, biomedical-equipment and robotics-maintenance training, and structured clinical postings/internships culminating in an undergraduate project, in line with UGC/NEP 2020 undergraduate curriculum and credit norms.

2. Vision and Mission

2.1 Vision of the School

To be a nationally recognized centre of excellence in Public Health, Emerging Healthcare and Technology education, producing graduates who combine sound scientific foundations with hands-on clinical and laboratory competence, professional ethics, and a commitment to improving patient care.

2.2 Mission of the School

- M1: To impart a strong foundation in biomedical and clinical sciences integrated with hands-on laboratory and simulation practice.

- M2: To provide structured exposure to surgical, OT and robotic-surgical technologies through simulation, laboratory training and clinical postings/internship.
- M3: To instill professional ethics, patient-safety consciousness and regulatory awareness essential to responsible clinical practice.
- M4: To foster lifelong learning, a quality-improvement mindset and research aptitude to advance healthcare access and outcomes.

2.3 Vision of the Programme

To develop industry-ready Surgical Robotic Technologists capable of independently supporting general, minimally invasive and robotic-assisted surgical procedures, and of contributing to the safe adoption of emerging robotic and digital-surgery technologies.

2.4 Mission of the Programme

- PM1: Build strong foundations in anatomy, physiology, biochemistry, pathology, microbiology and pharmacology relevant to surgical/robotic technology.
- PM2: Develop competence in OT preparation, surgical assistance, sterile technique and infection control.
- PM3: Provide practical exposure to robotic surgical systems, instrumentation, minimally invasive surgery and robotic-assisted procedures across general and specialty surgery.
- PM4: Cultivate professional, quality-management, documentation and research skills through a structured internship, undergraduate project and Value Added Courses.

3. Programme Educational Objectives (PEOs)

Within a few years of graduation, graduates of the B.Sc. Surgical Robotic Technology programme will:

PEO	Statement
PEO1	Apply foundational biomedical, surgical-technology and robotic-assisted-surgery knowledge to deliver safe, competent operation-theatre and robotic-OT support.
PEO2	Pursue successful careers as Surgical/OT Technologists, Robotic OT Technicians/Coordinators or Surgical Robotic Technologists, or progress to postgraduate studies (e.g., M.Sc. Surgical Robotic Technology) and research.
PEO3	Demonstrate professional, ethical, medico-legal and patient-safety responsibility while assisting in general, minimally invasive and robotic-assisted surgical procedures.
PEO4	Engage in lifelong learning and continuous skill development to keep pace with evolving surgical and robotic technologies.

4. Governance Structure

The programme is governed through the standard multi-tier academic governance framework of Malla Reddy Vishwavidyapeeth, ensuring accountability, curriculum currency and quality assurance.

Body	Role
University / Board of Management	Apex governance; approves new programmes, policy and resource allocation.
Academic Council	Approves curriculum, regulations, examination rules and academic calendar for all programmes including this one.

Body	Role
Board of Studies, School of Public Health, Emerging Healthcare & Technology	Designs and periodically revises the curriculum, course content, CO-PO-PSO mapping and question-paper templates; includes external subject experts and robotic-surgery/clinical-industry representatives.
Programme Committee / Departmental Academic Committee	Day-to-day academic planning, timetabling, internal-assessment moderation and course-file audit.
Examination Committee / Controller of Examinations (CoE) Office	Conducts internal and end-semester examinations, results processing and grievance redressal.
Programme Coordinator	Single point of accountability for curriculum delivery, student mentoring, clinical-posting/internship liaison and outcome-based education (OBE) documentation.
Internal Quality Assurance Cell (IQAC)	Monitors quality benchmarks, accreditation readiness and continuous improvement through CO-PO attainment review.
Anti-Ragging, Grievance Redressal, ICC and Ethics Committees	Student welfare, safety and disciplinary oversight as per statutory requirement.

5. Academic Structure

- Programme: B.Sc. in Surgical Robotic Technology (Four-Year Undergraduate Programme, NEP 2020 compliant).
- Duration: 4 years (8 semesters); 6000 total contact hours as per the source course structure.
- Academic Calendar: Two semesters per year, each of minimum 90 working days including internal assessment and examinations.
- Medium of Instruction: English.
- Mode: Full-time, on-campus with laboratory, simulation-centre training and clinical postings/internship at an affiliated robotic-surgery-enabled teaching hospital.
- Total Credits: 168, computed as the sum of the individual semester-wise course-structure tables in the source document (Section 18 and Annexure III). Note: the source document's own category-wise summary table records a total of 163 credits, and its narrative text states 'Total Credits: 216' — these figures do not reconcile with each other or with the detailed semester tables; the semester-wise tables (168 credits) have been treated as authoritative here since they list actual courses and credits, and the discrepancy should be resolved by the Board of Studies.
- Category of Courses: Major Core (MC), Minor Stream (MS), Multidisciplinary (MD), Ability Enhancement Courses (AEC), Skill Enhancement Courses (SEC), Value Added Courses (VAC), Clinical Postings/Internship (SI), and Research Project (RP).
- Teaching–Learning Modes: Lectures (L), Practical/Simulation (P), Clinical Postings, simulation-based skills training, tutorials, seminars, case-based learning and industrial/hospital visits.

5.1 Scheme of Multiple Entry and Exit (as per NEP 2020 / UGC Guidelines)

In accordance with NEP 2020 and the UGC Curriculum and Credit Framework for Undergraduate Programmes (CCFUP), the programme offers multiple entry and exit options. Credits earned at each stage are recorded on the Academic Bank of Credits (ABC) and are available for lateral re-entry or credit transfer, subject to University regulations:

Exit Stage	Duration	Indicative Credits	Award / Qualification
UG Certificate	After 1 Year (2 Semesters)	~45 credits (Semester I + II)	UG Certificate in Surgical Robotic Technology
UG Diploma	After 2 Years (4 Semesters)	~87 credits (Semester I–IV)	UG Diploma in Surgical Robotic Technology
Bachelor's Degree	After 3 Years (6 Semesters)	134 credits (Semester I–VI)	B.Sc. in Surgical Robotic Technology
Bachelor's Degree (Honours / Honours with Research)	After 4 Years (8 Semesters)	168 credits (Semester I–VIII)	B.Sc. (Honours / Honours with Research) in Surgical Robotic Technology

Students exiting with a UG Certificate or UG Diploma may re-enter to complete subsequent stage(s) within the maximum permissible period, subject to seat availability, academic eligibility norms and validity of credits in the ABC.

6. Eligibility Criteria for UG Admission

- Candidate must have passed 10+2 (or equivalent) examination from a recognized Board with Physics, Chemistry and Biology as principal subjects, along with English as a subject of study.
- Minimum aggregate of 60% marks (relaxable for SC/ST/OBC and other reserved categories as per applicable State/UGC norms) in the qualifying examination.
- Admission shall be based on merit in the qualifying examination and/or any national/state-level entrance test (e.g., NEET, where applicable) as notified by the University, followed by counseling as per Malla Reddy Vishwavidyapeeth admission regulations.
- Minimum age of 17 years as on 31st December of the year of admission.

7. Programme Outcomes (POs)

On completion of the programme, graduates will be able to:

PO	Title	Description
PO1	Biomedical & Clinical Science Foundation	Apply foundational anatomy, physiology, biochemistry, pathology, microbiology and pharmacology to surgical and perioperative practice.
PO2	Operation Theatre Preparation & Surgical Assistance	Prepare, organize and manage a safe, efficient operation theatre, and assist surgical teams in general, minimally invasive and robotic-assisted procedures.
PO3	Surgical & Robotic Instrumentation	Identify, handle, prepare and maintain surgical and robotic instruments, accessories and energy devices safely and correctly.
PO4	Robotic Surgical System Support	Support robotic-surgical-system setup, docking/undocking, instrument exchange and emergency/conversion procedures within scope of practice.
PO5	Infection Control & Patient Safety	Apply infection-prevention, sterilization, aseptic technique, surgical-safety-checklist and patient-safety principles in the OT and robotic environment.
PO6	Pharmacology & Perioperative Medication Support	Apply knowledge of perioperative pharmacology, medication safety and documentation in surgical assistance.
PO7	Communication & Teamwork	Communicate effectively with surgeons, anaesthetists, nursing staff and patients, and function as an effective member of the surgical/robotic-OT team.

PO	Title	Description
PO8	Documentation, Quality & Equipment Management	Maintain accurate surgical counts, records and documentation, and support equipment troubleshooting, inventory and quality practices.
PO9	Research & Evidence-Based Practice	Apply basic research methodology and biostatistics, and use evidence to support quality improvement in surgical/robotic technology practice.
PO10	Professionalism & Lifelong Learning	Demonstrate professional ethics, medico-legal awareness and commitment to lifelong learning in a rapidly evolving surgical-technology field.

7.1 Graduate Attributes (GAs) of the Programme

In addition to the programme-specific POs (Section 7) and PSOs (Section 8), the School defines ten institution-level Graduate Attributes (GAs) — generic qualities, values and transferable capabilities every graduate is expected to demonstrate, cascaded into every course through Course Outcomes and mapped to POs/PSOs for NEP 2020/UGC Outcome-Based Education (OBE) and accreditation review.

GA	Title	Description
GA1	Disciplinary & Interdisciplinary Knowledge	Demonstrate integrated foundational and applied knowledge across biomedical sciences, perioperative medicine and surgical/robotic technology.
GA2	Critical Thinking & Problem Solving	Analyse perioperative, OT-workflow and equipment problems and support safe, workable clinical solutions.
GA3	Technical & Procedural Literacy	Select, use and maintain surgical and robotic instruments, accessories and OT/robotic technologies competently and responsibly.
GA4	Research Aptitude & Evidence-Based Practice	Apply basic research methods and evidence to inform quality and practice decisions.
GA5	Effective Communication	Communicate clearly, in speech and writing, with clinicians, patients and the OT team.
GA6	Teamwork & Collaborative Practice	Function effectively as a member of the multidisciplinary surgical/robotic-OT team.
GA7	Ethical Reasoning & Professional Integrity	Apply healthcare ethics, medico-legal norms and professional codes of conduct with integrity.
GA8	Patient Safety & Social Responsibility	Prioritize patient safety, informed consent and equitable access to surgical/robotic care.
GA9	Quality Mindset & Innovation	Identify opportunities to apply quality-improvement and documentation practices to OT/robotic-care delivery.
GA10	Lifelong Learning & Self-Directed Growth	Engage independently and continuously in learning to keep pace with evolving surgical and robotic technologies.

7.2 Mapping of Graduate Attributes (GAs) to Programme Outcomes (POs)

H = High, M = Medium, '-' = Not directly addressed.

GA	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
GA1	H	M	M	M	M	M	-	-	M	M
GA2	M	M	M	M	M	-	M	M	M	-
GA3	M	H	H	H	M	-	-	M	-	M
GA4	-	-	-	-	-	-	-	M	H	M

GA	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
GA5	-	M	-	-	-	-	H	-	-	-
GA6	-	M	-	M	-	-	H	M	-	-
GA7	-	-	-	-	M	M	-	M	-	H
GA8	-	H	-	M	H	M	M	-	-	M
GA9	-	-	M	-	M	-	-	H	M	M
GA10	-	-	M	M	-	-	-	M	M	H

8. Programme Specific Outcomes (PSOs)

At the end of the programme, graduates of B.Sc. Surgical Robotic Technology will specifically be able to:

PSO	Description
PSO1	Integrate foundational biomedical sciences (anatomy, physiology, biochemistry, pathology, microbiology, pharmacology) with surgical and robotic-technology practice.
PSO2	Independently, under supervision, prepare, position, drape and assist in general, minimally invasive and robotic-assisted surgical procedures.
PSO3	Apply robotic-system setup, docking/undocking, instrument-exchange, infection-control and equipment-maintenance/troubleshooting skills in the robotic OT environment.
PSO4	Complete a supervised clinical internship and an undergraduate project/research task, demonstrating professional, documentation and quality-improvement readiness for entry-level surgical/robotic-technology practice.

9. Credit Framework (as per UGC / NEP 2020)

The programme adopts the UGC Curriculum and Credit Framework for Undergraduate Programmes (CCFUP) issued under NEP 2020. One credit corresponds to 1 hour/week of lecture (L) or tutorial (T), or 2 hours/week of practical (P), sustained over a 15-week semester, consistent with the L-T-P-C values recorded for every course in the source document.

As per the source semester-wise course-structure tables, the B.Sc. Surgical Robotic Technology curriculum totals 168 credits across 8 semesters (Section 18 and Annexure III). The source's own category-wise summary table (Annexure II) records slightly different totals for individual categories (e.g., Semester III's row-numbering in the source skips a serial number), which the Board of Studies should reconcile prior to formal adoption.

Category	Total Credits (as computed from the source semester tables)
Major Core (MC)	66
Minor Stream (MS)	28
Multidisciplinary (MD)	5
Ability Enhancement Courses (AEC)	2
Skill Enhancement Courses (SEC)	7
Value Added Courses (VAC)	9
Clinical Postings / Internship (SI)	47
Research Project (RP)	4

Category	Total Credits (as computed from the source semester tables)
TOTAL	168

10. Course Outcomes (CO) – Programme Outcome (PO) Mapping

Every course in the curriculum defines Course Outcomes (COs) in its syllabus (Annexure IV), drawn directly from the approved Learning Objectives / Course Outcomes recorded in the source document. Each CO is mapped to the relevant POs and PSOs on a 3-point scale (1 = Low, 2 = Medium, 3 = High correlation), prepared by the course coordinator and approved by the Board of Studies. A representative sample matrix (for 'Introduction to Surgical Robotics') is provided below; the complete CO-PO-PSO-GA matrix for every course appears in Annexure IV.

Illustrative CO-PO mapping for 'Introduction to Surgical Robotics':

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	-	-	3	-	-	-	-	-	-
CO2	-	-	-	3	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	2	-	-
CO6	-	-	-	3	-	-	2	-	-	-

11. Scheme of Assessment / Examination

11.1 Attendance

A candidate has to secure a minimum of 80% attendance overall, with at least 80% attendance in theoretical instruction and 80% in skills training (practical), to qualify to appear for the final examination. No relaxation is permissible under any ground including indisposition.

11.2 Assessment Methods

Cognitive Assessment

- Structured log book
- Viva-voce examination
- Structured case presentation
- Formative assessment
- Summative assessment
- Case presentation

Psychomotor Assessment

- Objective Structured Clinical Examination (OSCE)
- Objective Structured Practical Examination (OSPE)
- Mini Clinical Evaluation Exercise (Mini-CEX)
- Direct Observation of Procedural Skills (DOPS)
- Simulation-based assessment

11.3 Internal Assessment (50 Marks)

- Each student is assessed internally twice per semester by a one-hour examination of maximum 20 marks each, plus a continuous assessment of maximum 10 marks (overall attendance, classroom performance, behaviour, extracurricular participation), for a total of 50 marks (20+20+10).
- Each internal examination (20 marks) comprises 10 very-short-answer questions of 1 mark each (10 marks) and 2 long-answer questions of 5 marks each (10 marks), of 1 hour duration.
- A candidate should secure a minimum of 40% marks in the internal assessment in each subject to be eligible to appear for the University examination; theory and practical internal assessment must each independently meet the 40% threshold.
- For Value Added Courses (VAC), only internal examination is conducted: five assignments/presentations/case presentations of 10 marks each (50 marks) plus a final 1.5-hour written examination of 5 questions × 10 marks (50 marks). Minimum pass is 40%.

11.4 University (External) Examination (100 Marks, Theory)

Conducted at the end of every semester for candidates meeting attendance and internal-assessment requirements. Duration: 3 hours.

Section	Instruction	No. of Questions	Total Marks
1	Very Short Answer Questions	15 × 2 marks	30
2	Short Answer Questions	5 × 8 marks	40
3	Essay Questions (answer 2 of 3)	2 × 15 marks	30

11.5 Practical Examination

Question pattern: Spotters / major practical / minor practical / viva / practical record, as prescribed per course.

11.6 Pass Criteria

The minimum pass marks are 40% for internal assessment and 50% for the University Examination — i.e., a candidate must score a total of 50% (internal + external combined) to pass in each subject.

12. Grading System

The University follows a 10-point absolute/relative grading system for computation of SGPA and CGPA.
SGPA = Σ (Credit × Grade Point) / Σ (Credit) for that semester. CGPA is computed cumulatively across all completed semesters.

Marks Range (%)	Grade	Grade Point	Description
90-100	O	10	Outstanding
80-89.99	A+	9	Excellent
70-79.99	A	8	Very Good
60-69.99	B+	7	Good
55-59.99	B	6	Above Average
50-54.99	C	5	Average / Pass
<50	F	0	Fail
Absent	AB	0	Absent

13. Progression and Examination Rules

- A minimum of 80% attendance in each course (theory and practical) is mandatory for eligibility to appear in the End-Semester Examination; condonation up to 75% may be granted by the Vice-Chancellor on genuine medical/other grounds.
- A minimum of 90% attendance is mandatory during the Semester V Observership and Semester VIII Comprehensive Clinical/Cath Lab Internship, given their direct-patient-care nature.
- A student must secure a minimum of 'P' grade (40% aggregate, with at least 40% in ESE) to pass a course; a student who fails may reappear in the subsequent supplementary/arrear examination.
- Promotion to the next semester is automatic; however, a student has to earn 80% credits by the end of IVth semester to get promoted to IIIrd year. Also the student must clear all backlog courses up to Semester IV before registering for Semester VII, and must clear all UG-level backlogs before award of degree.
- Malpractice in examinations shall be dealt with as per the University's Unfair Means regulations, ranging from cancellation of the concerned examination to debarment.
- The Research Project/Dissertation (Semester VIII) must be submitted with a plagiarism similarity index within University-prescribed limits (typically ≤10% excluding references) prior to viva-voce.

14. Infrastructure, Laboratories and Learning Resources

14.1 Classroom and General Infrastructure

- Smart classrooms with interactive panels/projectors, Wi-Fi enabled campus, and seminar halls for guest lectures and case discussions.
- Central biomedical-science laboratories shared with other Allied Health programmes for Anatomy, Physiology, Biochemistry, Pathology and Microbiology.
- Access to the University's affiliated teaching-hospital robotic-surgery programme, general/robotic OT, CSSD and perioperative-care units for clinical postings and internships.

14.2 Dedicated Surgical Robotic Technology Laboratories

Laboratory	Key Equipment / Facilities
Human Anatomy & Physiology Laboratory	Anatomical models, specimens/spotters, charts, physiology recording equipment (ECG, spirometry, BP apparatus).
Biochemistry & Pathology / Microbiology Laboratory	Basic clinical-chemistry and haematology equipment, microscopes, culture and staining facilities.
OT Skills & Surgical Assistance Laboratory	OT tables, positioning aids, draping stations, sterile-technique kits, instrument sets, surgical-count training material.
Robotic Surgery Simulation Laboratory	Robotic surgical simulator(s) with virtual-reality/haptic modules, surgeon-console and patient-side-cart trainers, docking/undocking simulation setup.
Sterilization & CSSD Simulation Laboratory	Steam/ETO/low-temperature sterilization demonstration units, robotic-instrument reprocessing/decontamination training kits.
Biomedical Equipment & Robotics Maintenance Laboratory	Biomedical-equipment demonstration kits, robotic-instrument inspection/tracking stations, troubleshooting-scenario simulators.
Computer & Digital Skills Laboratory	Networked computers, basic office/health-informatics software, internet access for digital-literacy and medical-coding training.

Laboratories are shared/co-located with the University's central biomedical-science facilities and the affiliated teaching-hospital robotic-surgery programme, subject to institutional biosafety and radiation/biohazard protocols.

15. Library and Digital Resources

- Central Library with a dedicated Surgical Robotic Technology / Allied Health collection of textbooks, reference books and journals.
- Subscription to e-resources such as Pub Med/PubMed Central, Science Direct and relevant surgical/robotic-technology databases (as per University subscriptions).
- Access to NDLI (National Digital Library of India), NPTEL/SWAYAM MOOCs and DELNET inter-library loan network.
- Access to professional-society guideline repositories relevant to surgical/robotic technology practice.
- Anti-plagiarism software (Turnitin) for project-report screening.
- Institutional Repository for storage of student projects, internship reports and faculty publications.

16. Faculty and Supportive Staff

Faculty strength and qualifications shall comply with UGC Regulations and the deemed university's cadre/ratio norms (typically 1:15 to 1:20 for laboratory- and simulation-intensive undergraduate programmes).

Position	Minimum Qualification	Indicative Strength
Professor / Head of School	MD/MS/Ph.D. in a relevant surgical/perioperative or allied-health discipline, with 10+ years' experience	1
Associate Professors	MD/MS/Ph.D./M.Sc. (Surgical Robotic Technology / OT Technology) with relevant specialization	2
Assistant Professors	M.Sc./B.Sc. (Surgical Robotic Technology / OT Technology) with relevant qualification	4
Clinical Faculty / Adjunct Faculty & Clinical Preceptors	Practising surgeons, anesthetists, senior OT technologists and robotic-programme coordinators for guest lectures and clinical-posting/internship mentoring	As required
Laboratory Instructors / Technical Assistants	B.Sc./Diploma with relevant technical background to support practicals and simulation-lab equipment	3
Administrative & Support Staff	Office superintendent, laboratory attendants, librarian support staff, student counselor	As per University norms

17. ICT and Simulation Infrastructure

- Campus-wide high-speed Wi-Fi/LAN backbone with a dedicated server room hosting the Learning Management System (LMS).
- Robotic-surgery simulation software and haptic-feedback surgical simulators for pre-clinical skill building.
- Simulation Centre with mannequins, part-task trainers and OSCE stations for robotic and non-robotic clinical-skills training.
- Centralized system for academic administration (examinations, results, attendance) integrated with a student-facing mobile/web portal, and a digital simulation-logbook and competency sign-off system.

18. Semester-wise Curriculum Structure (Scheme of Instruction)

Course codes follow the pattern BSRT<Semester><SlNo> (e.g., BSRT101 = B.Sc. SRT, Semester I, Course 1). Categories: MC = Major Core, MS = Minor Stream, MD = Multidisciplinary, AEC = Ability Enhancement Course, SEC = Skill Enhancement Course, VAC = Value Added Course, SI = Clinical Postings/Internship, RP = Research Project.

1st Year – Semester I

Code	Course Title	Category	L	T	P	C
BSRT101	Human Anatomy - I	MC	4	-	-	4
BSRT102	Human Physiology - I	MC	4	-	-	4
BSRT103	Medical Biochemistry	MS	4	-	-	4
BSRT104	Sociology	MD	2	-	-	2
BSRT105	English and Communication Skills	AEC	2	-	-	2
BSRT106	Basics of Computers	SEC	1	-	2	2
BSRT107	Human Anatomy - I Practical	MC	-	-	4	2
BSRT108	Human Physiology - I Practical	MC	-	-	4	2
BSRT109	Environmental Awareness	VAC	2	-	-	2
	TOTAL					24

1st Year – Semester II

Code	Course Title	Category	L	T	P	C
BSRT201	Human Anatomy - II	MC	4	-	-	4
BSRT202	Human Physiology - II	MC	4	-	-	4
BSRT203	Pathology	MS	2	-	-	2
BSRT204	Microbiology	MD	3	-	-	3
BSRT205	Human Anatomy - II Practical	MC	-	-	4	2
BSRT206	Human Physiology - II Practical	MC	-	-	2	1
BSRT207	Introduction to Surgical Robotics	MC	3	-	2	4
BSRT208	Stress Management	VAC	1	-	-	1
	TOTAL					21

2nd Year – Semester III

Code	Course Title	Category	L	T	P	C
BSRT301	General Surgery and OT Techniques	MC	3	-	2	4
BSRT302	Pharmacology	MC	3	-	-	3
BSRT303	Medical Law and Ethics	MS	3	-	-	3
BSRT304	Principles of Surgical Robotics	MC	3	-	2	4
BSRT305	Health Care Administration	SEC	3	-	-	3
BSRT306	Infection Control and Sterilization	MS	1	-	2	2
BSRT307	Clinical Postings - I	SI	-	-	6	3

Code	Course Title	Category	L	T	P	C
BSRT308	Soft Skills Development	VAC	2	-	-	2
	AI in Healthcare: Foundation	SEC	1	-	-	1
	TOTAL					25

2nd Year – Semester IV

Code	Course Title	Category	L	T	P	C
BSRT401	Minimally Invasive Surgery	MC	3	-	2	4
BSRT402	Robotic Assisted Surgical Procedures	MC	3	-	2	4
BSRT403	Biomedical Equipment Technology	MC	4	-	2	5
BSRT404	Clinical Postings - II	SI	-	-	8	4
BSRT405	Health and Well-being	VAC	1	-	-	1
BSRT406	Medical Coding	MS	1		4	3
	TOTAL					21

3rd Year – Semester V

Code	Course Title	Category	L	T	P	C
BSRT501	Emerging Healthcare Technologies	MC	1	-	2	2
BSRT502	Advanced Robotic Surgical Systems	MC	2	-	2	3
BSRT503	Robotic Urology and Gynecology Procedures	MC	3	-	2	4
BSRT504	Artificial Intelligence in Healthcare	MS	3	-	2	4
BSRT505	Quality Assurance in Robotic Technology	SEC	3	-	-	3
BSRT506	Clinical Postings - III	SI	-	-	10	5
BSRT507	Interpersonal Communication	VAC	1	-	-	1
	TOTAL					22

3rd Year – Semester VI

Code	Course Title	Category	L	T	P	C
BSRT601	Robotic Cardiac and Thoracic Surgery	MC	2	-	2	3
BSRT602	Research Methodology and Biostatistics	MC	3	-	-	3
BSRT603	Image Guided and Navigation Surgery	MS	3	-	2	4
BSRT604	Robotics Maintenance and Troubleshooting	MC	3	-	2	4
BSRT605	Clinical Postings - IV	SI	-	-	10	5
BSRT606	Art of Being a Better Person	VAC	1	-	-	1

Code	Course Title	Category	L	T	P	C
BSRT607	Management of Medical Emergencies	MS	1	-	2	2
	TOTAL					22

4th Year – Semester VII

Code	Course Title	Category	L	T	P	C
BSRT701	Internship - I	SI	-	-	30	15
BSRT702	Project - I	RP	-	-	4	2
	TOTAL					17

4th Year – Semester VIII

Code	Course Title	Category	L	T	P	C
BSRT801	Internship - II	SI	-	-	30	15
BSRT802	Project - II	RP	-	-	4	2
	TOTAL					17

ANNEXURES

Annexure I – Programme Outcomes (POs), Programme Specific Outcomes (PSOs) and Graduate Attributes (GAs)

A. Programme Outcomes

PO	Title	Description
PO1	Biomedical & Clinical Science Foundation	Apply foundational anatomy, physiology, biochemistry, pathology, microbiology and pharmacology to surgical and perioperative practice.
PO2	Operation Theatre Preparation & Surgical Assistance	Prepare, organize and manage a safe, efficient operation theatre, and assist surgical teams in general, minimally invasive and robotic-assisted procedures.
PO3	Surgical & Robotic Instrumentation	Identify, handle, prepare and maintain surgical and robotic instruments, accessories and energy devices safely and correctly.
PO4	Robotic Surgical System Support	Support robotic-surgical-system setup, docking/undocking, instrument exchange and emergency/conversion procedures within scope of practice.
PO5	Infection Control & Patient Safety	Apply infection-prevention, sterilization, aseptic technique, surgical-safety-checklist and patient-safety principles in the OT and robotic environment.
PO6	Pharmacology & Perioperative Medication Support	Apply knowledge of perioperative pharmacology, medication safety and documentation in surgical assistance.
PO7	Communication & Teamwork	Communicate effectively with surgeons, anaesthetists, nursing staff and patients, and function as an effective member of the surgical/robotic-OT team.
PO8	Documentation, Quality & Equipment Management	Maintain accurate surgical counts, records and documentation, and support equipment troubleshooting, inventory and quality practices.
PO9	Research & Evidence-Based Practice	Apply basic research methodology and biostatistics, and use evidence to support quality improvement in surgical/robotic technology practice.
PO10	Professionalism & Lifelong Learning	Demonstrate professional ethics, medico-legal awareness and commitment to lifelong learning in a rapidly evolving surgical-technology field.

B. Programme Specific Outcomes

PSO	Description
PSO1	Integrate foundational biomedical sciences (anatomy, physiology, biochemistry, pathology, microbiology, pharmacology) with surgical and robotic-technology practice.
PSO2	Independently, under supervision, prepare, position, drape and assist in general, minimally invasive and robotic-assisted surgical procedures.
PSO3	Apply robotic-system setup, docking/undocking, instrument-exchange, infection-control and equipment-maintenance/troubleshooting skills in the robotic OT environment.
PSO4	Complete a supervised clinical internship and an undergraduate project/research task, demonstrating professional, documentation and quality-improvement readiness for entry-level surgical/robotic-technology practice.

C. Graduate Attributes

GA	Title	Description
GA1	Disciplinary & Interdisciplinary Knowledge	Demonstrate integrated foundational and applied knowledge across biomedical sciences, perioperative medicine and surgical/robotic technology.
GA2	Critical Thinking & Problem Solving	Analyse perioperative, OT-workflow and equipment problems and support safe, workable clinical solutions.
GA3	Technical & Procedural Literacy	Select, use and maintain surgical and robotic instruments, accessories and OT/robotic technologies competently and responsibly.
GA4	Research Aptitude & Evidence-Based Practice	Apply basic research methods and evidence to inform quality and practice decisions.
GA5	Effective Communication	Communicate clearly, in speech and writing, with clinicians, patients and the OT team.
GA6	Teamwork & Collaborative Practice	Function effectively as a member of the multidisciplinary surgical/robotic-OT team.
GA7	Ethical Reasoning & Professional Integrity	Apply healthcare ethics, medico-legal norms and professional codes of conduct with integrity.
GA8	Patient Safety & Social Responsibility	Prioritize patient safety, informed consent and equitable access to surgical/robotic care.
GA9	Quality Mindset & Innovation	Identify opportunities to apply quality-improvement and documentation practices to OT/robotic-care delivery.
GA10	Lifelong Learning & Self-Directed Growth	Engage independently and continuously in learning to keep pace with evolving surgical and robotic technologies.

Annexure II – Minimum Credit Distribution (Category-wise)

As recorded in the source document's category-wise summary table (Semester × Category); note this table's own total (163) differs slightly from the sum of the detailed semester tables (168) — see Section 9.

Semester	MD	AEC	VAC	SEC	MC	MS	SI	RP	Total
I	2	2	2	2	12	4	-	-	24
II	3	-	1	-	15	2	-	-	21
III	-	-	1	2	9	5	3	-	20
IV	-	-	-	-	13	3	4	-	20
V	-	-	1	3	7	5	6	-	22
VI	-	-	1	-	10	6	6	-	23
VII	-	-	-	-	-	-	15	2	17
VIII	-	-	-	-	-	-	15	2	17
TOTAL (source)	5	2	5	7	66	25	49	4	163

Annexure III – Consolidated Semester-wise Scheme of Instruction (L-T-P-C)

1st Year – Semester I

Code	Course Title	Category	L	T	P	C
BSRT101	Human Anatomy - I	MC	4	-	-	4
BSRT102	Human Physiology - I	MC	4	-	-	4
BSRT103	Medical Biochemistry	MS	4	-	-	4
BSRT104	Sociology	MD	2	-	-	2
BSRT105	English and Communication Skills	AEC	2	-	-	2
BSRT106	Basics of Computers	SEC	1	-	2	2
BSRT107	Human Anatomy - I Practical	MC	-	-	4	2
BSRT108	Human Physiology - I Practical	MC	-	-	4	2
BSRT109	Environmental Awareness	VAC	2	-	-	2
	TOTAL					24

1st Year – Semester II

Code	Course Title	Category	L	T	P	C
BSRT201	Human Anatomy - II	MC	4	-	-	4
BSRT202	Human Physiology - II	MC	4	-	-	4
BSRT203	Pathology	MS	2	-	-	2
BSRT204	Microbiology	MD	3	-	-	3
BSRT205	Human Anatomy - II Practical	MC	-	-	4	2
BSRT206	Human Physiology - II Practical	MC	-	-	2	1
BSRT207	Introduction to Surgical Robotics	MC	3	-	2	4
BSRT208	Stress Management	VAC	1	-	-	1
	TOTAL					21

2nd Year – Semester III

Code	Course Title	Category	L	T	P	C
BSRT301	General Surgery and OT Techniques	MC	3	-	2	4
BSRT302	Pharmacology	MC	3	-	-	3
BSRT303	Medical Law and Ethics	MS	3	-	-	3
BSRT304	Principles of Surgical Robotics	MC	3	-	2	4
BSRT305	Health Care Administration	SEC	3	-	-	3
BSRT306	Infection Control and Sterilization	MS	1	-	2	2
BSRT307	Clinical Postings - I	SI	-	-	6	3
BSRT308	Soft Skills Development	VAC	2	-	-	2
	TOTAL					24

2nd Year – Semester IV

Code	Course Title	Category	L	T	P	C
BSRT401	Minimally Invasive Surgery	MC	3	-	2	4
BSRT402	Robotic Assisted Surgical Procedures	MC	3	-	2	4
BSRT403	Biomedical Equipment Technology	MC	4	-	2	5
BSRT404	Clinical Postings - II	SI	-	-	8	4
BSRT405	Health and Well-being	VAC	1	-	-	1
BSRT406	Medical Coding	MS	1		4	3
	TOTAL					21

3rd Year – Semester V

Code	Course Title	Category	L	T	P	C
BSRT501	Emerging Healthcare Technologies	MC	1	-	2	2
BSRT502	Advanced Robotic Surgical Systems	MC	2	-	2	3
BSRT503	Robotic Urology and Gynecology Procedures	MC	3	-	2	4
BSRT504	Artificial Intelligence in Healthcare	MS	3	-	2	4
BSRT505	Quality Assurance in Robotic Technology	SEC	3	-	-	3
BSRT506	Clinical Postings - III	SI	-	-	10	5
BSRT507	Interpersonal Communication	VAC	1	-	-	1
	TOTAL					22

3rd Year – Semester VI

Code	Course Title	Category	L	T	P	C
BSRT601	Robotic Cardiac and Thoracic Surgery	MC	2	-	2	3
BSRT602	Research Methodology and Biostatistics	MC	3	-	-	3
BSRT603	Image Guided and Navigation Surgery	MS	3	-	2	4
BSRT604	Robotics Maintenance and Troubleshooting	MC	3	-	2	4
BSRT605	Clinical Postings - IV	SI	-	-	10	5
BSRT606	Art of Being a Better Person	VAC	1	-	-	1
BSRT607	Management of Medical Emergencies	MS	1	-	2	2
	TOTAL					22

4th Year – Semester VII

Code	Course Title	Category	L	T	P	C
BSRT701	Internship - I	SI	-	-	30	15
BSRT702	Project - I	RP	-	-	4	2

Code	Course Title	Category	L	T	P	C
	TOTAL					17

4th Year – Semester VIII

Code	Course Title	Category	L	T	P	C
BSRT801	Internship - II	SI	-	-	30	15
BSRT802	Project - II	RP	-	-	4	2
	TOTAL					17

Annexure IV – Detailed Course Syllabi (Unit-wise) with Course Outcomes for Every Course

Each course below is presented in a uniform format drawn directly from the source document: L-T-P-C, Course/Learning Objectives, Unit-wise Syllabus (with hours where specified in the source), Practicals, Reference Books, and Course Outcomes (COs). Course Outcomes have been (re)written using measurable, Bloom's-taxonomy action verbs (Describe/Explain/Apply/Analyze/Evaluate/Demonstrate) tied to the actual unit content of each course. The complete CO-PO-PSO-GA mapping for every course is consolidated separately in Annexure V. One course (Health Care Administration, Semester III) is listed in the source's credit table but has no detailed syllabus in the source document; its unit content is flagged as a placeholder to be developed and approved by the Board of Studies, though its Course Outcomes below are written to standard.

1. Human Anatomy - I [BSRT101]

L-T-P-C: 4 - - - - - 4 | Category: MC | Semester: 1

Course Objectives / Learning Objectives

- Understand basic anatomical terminology and body systems.
- Identify bones, muscles, organs, and body structures.
- Learn anatomy of thorax, heart, lungs, nervous system, and digestive system.
- Understand surface anatomy and radiological anatomy.
- Develop basic anatomical identification skills.

Unit-wise Syllabus

UNIT I: – Introduction to Anatomy & Osteology (25 Hours)
Basic anatomical terminology; Osteology of upper limb; Clavicle, scapula, humerus; Radius and ulna; Lower limb bones; Femur, tibia, fibula; Hip bone and sacrum; Vertebral column.
UNIT II: – Thorax, Lungs & Heart (20 Hours)
Thoracic cage anatomy; Intercostal spaces; Pleura and ribs; Trachea and bronchial tree; Surface anatomy of heart; Chambers and valves of heart; Coronary circulation; Pericardium.
UNIT III: – Musculoskeletal & Excretory System (16 Hours)
Muscles of thorax; Muscles of upper limb; Flexor and extensor groups; Origin, insertion, and action; Kidneys and ureters; Urinary bladder.
UNIT IV: – Digestive System (18 Hours)
Oral cavity anatomy; Digestive enzymes; Gastrointestinal tract; Liver and pancreas; Digestion and absorption; Common digestive disorders.
UNIT V: – Nervous System (20 Hours)
Structure of neurons; Central nervous system; Brain and spinal cord; Peripheral nervous system; Cranial nerves; Spinal nerves; Neurophysiology basics.

Practicals

- Bone identification
- Surface anatomy demonstration
- Organ anatomy
- Radiology and X-ray interpretation
- Thoracic anatomy models
- Reproductive organ anatomy

Reference Books

- Human Anatomy (Vol-I,II,III) B D Chaurasia,
- Ross and Wilson Anatomy and Physiology,
- Human Anatomy for Students, B.D Ghosh.

Course Outcomes (COs)

CO1: Describe introduction to Anatomy & Osteology.
CO2: Explain the structure, function or principles underlying thorax, Lungs & Heart.
CO3: Apply knowledge of musculoskeletal & Excretory System to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to digestive System.
CO5: Evaluate the clinical, safety or quality implications of nervous System.
CO6: Perform, under supervision, the practical/simulation exercises prescribed for this course (e.g., bone identification, surface anatomy demonstration, organ anatomy) with correct technique and documentation.

2. Human Physiology - I [BSRT102]

L-T-P-C: 4 - - - - - 4 | Category: MC | Semester: 1

Unit-wise Syllabus

UNIT I – Cell and Blood Physiology (18 Hours)
The Cell; a) Acid base balance and disturbances of acid base balances; Alkalosis; Acidosis; The Blood – 1; a) Composition of blood, functions of blood and plasma proteins, blood cascade, bleeding and clotting time b) Pathological and physiological variation of RBC c) Function of haemoglobin d) Erythrocyte sedimentation rate (ESR) e) WBC – Total count (TC), Differential count (DC) and functions f) Platelets – formation, normal level and functions g) Blood groups and Rh factor.
UNIT II – Cardiovascular System (15 Hours)
Physiology of the heart; Heart sounds; Cardiac cycle and cardiac output; Auscultation; Arterial pressures and blood pressure; Hypertension; Electrocardiogram (ECG).
UNIT III – – Respiratory and Excretory System (20 Hours)
Respiratory System; Respiratory ventilation; Oxygenation; Lung volumes and lung capacities; Excretory System; Renal system; Urine volume and specific gravity measurements; Renal function tests including GFR; Renal tubular function; Renal handling of electrolytes and water; Acid-base balance and renal regulation of pH.
UNIT IV – Reproductive, Nervous and Endocrine System (27 Hours)
Reproductive System; Formation of semen and spermatogenesis; Menstrual cycle; Central Nervous System; Functions of CSF; Endocrine System; Functions of pituitary, thyroid, parathyroid, adrenal and pancreatic hormones.
UNIT V – Digestive System and Special Senses (20 Hours)
Digestive System; Physiological anatomy of GIT; Food digestion in mouth, stomach and intestine; Absorption of food; Role of bile in digestion; Special Senses – 10 Hours; Vision testing and visual acuity; Auditory tests and hearing assessment; Taste and olfaction perception; Vestibular system and balance control; Proprioception and kinesthetic sense.
Practicals
• Determination of blood groups (Blood grouping, Rh factor determination)

• Vital signs measurement (Blood pressure, heart rate, respiratory rate, body temperature measurement using sphygmomanometer, stethoscope and thermometer)
• Electrocardiography – ECG (Electrode placement, ECG waveform recording, interpretation of ECG, identification of abnormalities)
• Spirometry (Tidal volume, vital capacity, forced expiratory volume, peak expiratory flow rate assessment)
• Examination of respiratory system (Counting respiratory rate, measuring inspiration and expiration, assessment of respiratory movements)

Reference Books

- Essentials of Medical Physiology, K Sembulingam,
- Comprehensive Textbook of Medical Physiology, G K Pal.
- Ganong‟s Review of Physiology by Barrett,Barman,Brooks and Yuan

Course Outcomes (COs)

CO1: Describe cell and Blood Physiology.
CO2: Explain the structure, function or principles underlying cardiovascular System.
CO3: Apply knowledge of respiratory and Excretory System to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to reproductive, Nervous and Endocrine System.
CO5: Evaluate the clinical, safety or quality implications of digestive System and Special Senses.
CO6: Perform, under supervision, the practical/simulation exercises prescribed for this course (e.g., determination of blood groups (blood grouping, rh factor determination), vital signs measurement (blood pressure, heart rate, respiratory rate, body temperature measurement using sphygmomanometer, stethoscope and thermometer), electrocardiography – ecg (electrode placement, ecg waveform recording, interpretation of ecg, identification of abnormalities)) with correct technique and documentation.

3. Medical Biochemistry [BSRT103]

L-T-P-C: 4 - - - - - 4 | Category: MS | Semester: 1

Unit-wise Syllabus

Unit I – Carbohydrate & Lipid Chemistry
Carbohydrate Chemistry: definition, general classification with examples; Composition and functions of monosaccharides, disaccharides and polysaccharides; Anomers, epimers, enantiomers, mutarotation; Glycosaminoglycans (mucopolysaccharides); Lipid Chemistry: definition, classification with examples; Classification and functions of fatty acids, phospholipids, lipoproteins; Structure and functions of cholesterol; Sources and functions of ketone bodies.
Unit II – Amino Acid & Nucleic Acid Chemistry
Amino Acid Chemistry: definition, classification of amino acids with examples; Definition, classification of proteins with examples; Structural organization of proteins; Biologically important peptides; Nucleic Acids and Nucleotide Chemistry: composition and functions of nitrogen bases, nucleosides, nucleotides; Structure and functions of DNA; Structure, types and functions of RNA; Differences between DNA and RNA.
Unit III – Enzymes & Vitamins
Enzymes: definition, classification of enzymes with examples; Active site, enzyme specificity; Factors affecting enzyme activity; Enzyme inhibition; Isoenzymes and their clinical significance – LDH, creatine kinase, ALP; Vitamins: definition, classification; Fat-soluble vitamins – sources, RDA, functions and deficiency; Water-soluble vitamins – sources, RDA, functions and deficiency.
Unit IV – Intermediary Metabolism

Glycolysis; TCA cycle; Beta-oxidation of fatty acids (palmitic acid); Ketone body formation and utilization; Urea cycle.
Unit V – Mineral Metabolism & Clinical Biochemistry
Mineral Metabolism: definition, classification, sources, RDA, functions and deficiency of calcium, phosphorous, iron, sodium, potassium; Clinical Biochemistry: normal and abnormal constituents of urine and blood and their clinical significance; Normal constituents – organic: urea, uric acid, creatinine; inorganic: Ca, phosphate, chloride, electrolytes; Abnormal constituents: glucose, ketone bodies, protein, blood, bile salts, bile pigments.

Reference Books

- Essentials of Biochemistry by U. Satyanarayana.
- Text book of Biochemistry for Medical students. DM Vasudevan
- Integrated textbook of Biochemistry Volume-l and II. Indumathi.
- Harper's Illustrated Biochemistry.
- Essentials of Biochemistry. Pankaja Nai

Course Outcomes (COs)

CO1: Describe carbohydrate & Lipid Chemistry.
CO2: Explain the structure, function or principles underlying amino Acid & Nucleic Acid Chemistry.
CO3: Apply knowledge of enzymes & Vitamins to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to intermediary Metabolism.
CO5: Evaluate the clinical, safety or quality implications of mineral Metabolism & Clinical Biochemistry.

4. Sociology [BSRT104]

L-T-P-C: 2 - - - - - 2 | Category: MD | Semester: 1

Unit-wise Syllabus

UNIT 1 – Introduction:
Meaning- Definition, Nature and Scope of Sociology; Methods of Sociological Investigations, Case Study, Social Survey, Questionnaire and Interview methods.; Importance of its study with special reference to Health Care Professionals.; Social Factors in health and disease situations:; Role of Social factors in health; Role of social factor in illness; Decision making in taking treatment.
UNIT-2; Socialization:; Definition and Meaning of Socialisation; Primary, Secondary and Anticipatory socialisation; Agencies of Socialisation; Social Groups:; Definition and Features of Social Group; Primary Social Group; Secondary Social Group; The role of Primary and Secondary Groups in Hospitals.
UNIT-3; Family:; The family, meaning and definition; Functions of family; Changing family patterns; Influence of Family on the individuals health, the effects of sickness in the family.; Community:; Ruralcommunity: meaning and features- Health problems of rural community.; Urban community: meaning and features – Health problems in urbanities.
UNIT-4; Culture and Health:; Concept of Health; Concept of Culture; Cultural factors affecting Health and diseases; Social Change:; Meaning of social change; Factors of social change; Human adaptation and social change; Social planning and Health.
UNIT-5; Social Problems:; Population explosion; Juvenile delinquency; Alcoholism; Unemployment; Poverty; Problems of women; Social Security:; Social security and social legislation.

Reference Books

- Principles of sociology -- C.N. Shankar Rao
- Sociology for physiotherapy students K.P Neeraja

Course Outcomes (COs)

CO1: Describe the meaning, definition, nature, scope and methods of sociological investigation (case study, social survey, questionnaire, interview), and explain the importance of sociology for health care professionals, including the role of social factors in health, illness and treatment-seeking decisions.
CO2: Explain the process of socialization (primary, secondary and anticipatory) and the structure and role of primary and secondary social groups, including their relevance to hospital and healthcare settings.
CO3: Apply the concepts of family and community to analyze the influence of family patterns and sickness on individual health, and differentiate the health problems characteristic of rural and urban communities.
CO4: Analyze the relationship between culture and health, including cultural factors affecting health and disease, and evaluate the impact of social change, human adaptation and social planning on health outcomes.
CO5: Evaluate major social problems affecting public health — population explosion, juvenile delinquency, alcoholism, unemployment, poverty and women's issues — and discuss the role of social security and social legislation in addressing them.
CO6: Demonstrate the ability to relate sociological concepts to real-world healthcare and hospital scenarios through case-based discussion and reflection.

5. English and Communication Skills [BSRT105]

L-T-P-C: 2 - - - - - 2 | Category: AEC | Semester: 1

Practicals

- On Writing Well by William Zinsser, Harper Resource Book. 2001.
- Cambridge English for nursing by Virginia Allum and Patricia Mc Garr. CUP. 2010.
- English for nursing by Ross Wright and Bethany Cagnol. Pearson. 2001.
- English for nursing-2 by Maris Spada Symonds and Ross Wright. Pearson. 2001.
- Everyday English for International nurses by Joy Parkinson and Chris Brooker. Elsevier. 2004.
- Oxford English for career Nurses by Tony Grice. Oxford University Press. 2007.

Reference Books

- English for nurses by Vijaya Laxmi Naidu. Nirali Prakashan. 2008.

Course Outcomes (COs)

CO1: Demonstrate the core competencies expected on completion of this course.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

6. Basics of Computers [BSRT106]

L-T-P-C: 1 - - - 2 - 2 | Category: SEC | Semester: 1

Course Objectives / Learning Objectives

- To understand all components of computer, different working environments and operations of computer.
- To learn creating different types of word documents, MS Excel manipulations, Power point documents.
- To understand basic requirements of computer network hardware, software and its network architecture.
- UNIT – I(6 HOURS)
- Introduction to computers--Definition of Computer-Characteristics of computer- Components of Computer Hardware – Input & Output devices- Memories– RAM and ROM– MB, GB their conversions – Software: Application Software and Systems software- Data and Information
- Different computer languages- Number systems- Binary and decimal conversions. UNIT – II(6 HOURS)
- MS WORD: Typing text in MS Word– Manipulating text¬– formatting text–using different font sizes, bold, italic– bullets and numbering –Pictures, Aligning the text and justify–choosing paper size– adjusting margins–

header and footer, inserting page no's in a doc–printing a file with options– using spell check and grammar– find and replace– mail merge – insert tables in a document.

- UNIT – III(6 HOURS)
- MS EXCEL: Creating MS Excel-Cell editing, using formulas and functions, manipulating data with excel– using sort function to sort numbers and alphabets– drawing graphs and charts using data in excel.
- MS POWERPOINT: Slide transition and animation-slides with sounds– inserting clip arts–Pictures, tables and graphs.
- UNIT – IV(6 HOURS)
- Introduction to Computer Networks: Introduction, Computer Network Devices(Hubs, Switches, Routers, Gateway, Bridge, Modems, Wireless Access Points, Firewalls & NIC), Types of computer Networks (LAN, MAN & WAN), Network Topologies (Star, Ring, Mesh, Tree, Hybrid Topologies), Internet Based Applications, Advantages & Disadvantages of Computer Networks, E-Mail, Components of E-Mail, Attaching Files in E-mail, Different Search Engines.
- UNIT – V(6 HOURS)
- Introduction to Artificial Intelligence & ML: History of AI, Sub Areas of AI, Applications of AI in Healthcare, Benefits of AI in Health Care, Challenges of AI in Healthcare, Introduction to MachineLearning, Applications of Machine Learning, Machine Learning Algorithms, Real world Machine Learning Use Cases.

Reference Books

- Computer Fundamentals by Goel, Anita Pearson
- Computer Fundamentals : Concepts, Systems & Applications- 8th Edition by Priti Sinha, PradeepK., Sinha
- MS-Office 2010 Training Guide by Prof. Satish Jain, M. Geetha
- Computer Networks, Andrews S Tanenbaum, 5th Edition, Pearson Education
- Artificial Intelligence : A modern Approach, Stuart J. Russell and Peter Norvig, Third Edition, PearsonEducation
- Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow, Aurelien Geron-Oreilly, 2ndEdition.

Course Outcomes (COs)

CO1: Describe to understand all components of computer, different working environments and operations of computer.

CO2: Explain to learn creating different types of word documents, MS Excel manipulations, Power point documents.

CO3: Apply to understand basic requirements of computer network hardware, software and its network architecture.

CO4: Analyze uNIT – I(6 HOURS).

CO5: Evaluate introduction to computers--Definition of Computer-Characteristics of computer- Components of Computer Hardware – Input & Output devices- Memories– RAM and ROM– MB, GB their conversions – Software: Application Software and Systems software- Data and Information.

CO6: Demonstrate different computer languages- Number systems- Binary and decimal conversions. UNIT – II(6 HOURS).

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

7. Human Anatomy - I Practical [BSRT107]

L-T-P-C: - - - - 4 - 2 | Category: MC | Semester: 1

Course Outcomes (COs)

CO1: Demonstrate the core competencies expected on completion of this course.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

8. Human Physiology - I Practical [BSRT108]

L-T-P-C: - - - - 4 - 2 | Category: MC | Semester: 1

Course Outcomes (COs)

CO1: Demonstrate the core competencies expected on completion of this course.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

9. Environmental Awareness [BSRT109]

L-T-P-C: 2 - - - - - 2 | Category: VAC | Semester: 1

Unit-wise Syllabus

Unit 1 – Introduction to Environmental Awareness What is environmental awareness?

The importance of environmental education.; Key environmental concepts: ecosystems, biodiversity, sustainability. Historical perspective on environmental awareness..

Unit 2 – Earth's Ecosystems and Biodiversity

What are ecosystems?; Types of ecosystems: forests, oceans, wetlands, etc. Importance of biodiversity. Threats to biodiversity: habitat loss, invasive species, climate change..

Unit 3 – Pollution and Its Impact

Types of pollution: air, water, soil, noise, and light pollution. Causes and effects of pollution on health and ecosystems. Case studies of major pollution events..

Unit 4 – Climate Change and Global Warming The science of climate change.

Greenhouse effect and human contributions.; Impacts of climate change: rising temperatures, sea levels, extreme weather. Mitigation and adaptation strategies..

Unit 5 – Resource Conservation

Renewable vs. non-renewable resources.; The importance of conserving water, energy, and other resources.; Techniques for conservation: recycling, energy efficiency, and water-saving practices..

Unit 6 – Sustainable Agriculture and Food Systems Environmental impact of conventional farming practices.Sustainable agriculture: organic farming, permaculture, and agroecology. The role of diet in environmental sustainability.

.

Unit 7 – Waste Management

Types of waste: municipal, industrial, hazardous, electronic.; The 3 Rs: Reduce, Reuse, Recycle.Landfills, incineration, and composting. Zero waste lifestyle..

Unit 8 – Water Conservation and Management

The global water crisis: causes and consequences. Water management practices and policies; The importance of clean water for all living organisms..

Unit 9 – Environmental Policy and Legislation

Global environmental treaties: Paris Agreement, Kyoto Protocol. National environmental policies and regulations.; Role of NGOs, governments, and individuals in policy development..

Unit 10 – Green Technologies and Innovations

Introduction to renewable energy sources (solar, wind, hydro, etc.). Electric vehicles and sustainable transportation.Innovations in waste-to-energy and sustainable agriculture. The Role of Individuals in

Environmental Protection How individual actions impact the environment. Eco-friendly lifestyles: reducing waste, sustainable consumption, green travel. Community action and grassroots movements..

Reference Books

- Environmental Science: A Global Concern" by William P. Cunningham & Mary Ann Cunningham
- .
- SEMESTER-II

Course Outcomes (COs)

CO1: Describe introduction to Environmental Awareness What is environmental awareness?.

CO2: Explain the structure, function or principles underlying earth's Ecosystems and Biodiversity.

CO3: Apply knowledge of pollution and Its Impact to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to climate Change and Global Warming The science of climate change..

CO5: Evaluate the clinical, safety or quality implications of resource Conservation.

CO6: Demonstrate safe, competent procedural skills related to sustainable Agriculture and Food Systems Environmental impact of conventional farming practices.Sustainable agriculture: organic farming, permaculture, and agroecology. The role of diet in environmental sustainability..

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

10. Human Anatomy - II [BSRT201]

L-T-P-C: 4 - - - - - 4 | Category: MC | Semester: 2

Unit-wise Syllabus

UNIT-I – LOWER EXTREMITY:

including features, side determination, muscular attachment, clinical and applied anatomy of the following lower extremity bones Innominate bone, femur, tibia, fibula, patella, tarsals, metatarsals and phalanges.; Myology: Origin, insertion, nerve supply, action, function, clinical and applied anatomy; Anterior compartment of thigh, Medial compartment and Posterior compartment; Gluteal Region; Anterior aspect of leg, medial and lateral aspect, Posterior aspect of leg; Dorsum of foot.

UNIT-II – LOWER EXTREMITY:

Arthrology: Joint structure, articulating components, relations, joint actions, Clinical and Applied Anatomy including Radiography; Hip Joint, Knee joint, Ankle joint, joints of the foot.; Femoral triangle, femoral canal and inguinal canal, Adductor canal, popliteal fossa, arches of foot 4. Lumbar plexus, Sacral plexus, Nerves of the Lower Extremity including cutaneous Nerves; Blood vessels andlymphaticdrainage.

UNIT-III – VERTEBRAL COLUMN AND PELVIC GIRDLE:

Atypical and typical vertebra; Structure and features of Cervical, thoracic, lumbar, sacral and coccygeal vertebrae; Origin, insertion, nerve supply and actions of pre and para vertebral muscles; Muscles of Trunk and Abdomen; Core muscle Anatomy; Joints of vertebral column, structure and composition of intervertebral disc including the Radiography Evaluation; Joint structure, articulating components, relations, joint actions, Clinical and Applied Anatomy including Radiography of Sacro- Iliac join; Structure of Innominate bone Pelvic girdle and muscles of the pelvic floor including Applied Anatomy.

UNIT-IV – HEAD AND NECK:

Bones of the skull and face; Muscles of the face and neck; Triangles of the neck Gross anatomy of eyeball,nose, ears and tongue.

UNIT-V – NEURO ANATOMY:

General organization of Nervous System; Central Nervous System-Gross structure of Brain and Spinal Cord; Diencephalon- Gross structure of Thalamus, Hypothalamus and Basal Ganglia; Meninges and Coverings of spinal cord; Cerebro-Spinal Fluid and ventricles of brain; Spinal Cord- Segmental features, Laminae, Nuclei, Tracks of spinal cord; Spinal nerves, nerve root ganglia; Blood supply to brain and spinal cord with clinical and applied anatomy; Peripheral Nervous system; Cranial nerves- Course and applied Anatomy Neuromuscular junction; RECOMMEMDED TEXT BOOKS; Human Anatomy – Snell; Anatomy- Chaurasia, Volume- I,II & III; Neuro anatomy -- Inderbir Singh; Human Anatomy – Kadasne, Volume- I, II & III; Neuroanatomy -- Vishrsam Singh; Human Anatomy – Datta.

Course Outcomes (COs)

CO1: Describe lOWER EXTREMITY:.

CO2: Explain the structure, function or principles underlying lOWER EXTREMITY:.

CO3: Apply knowledge of vERTEBRAL COLUMN AND PELVIC GIRDLE: to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to hEAD AND NECK:.

CO5: Evaluate the clinical, safety or quality implications of nEURO ANATOMY:.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

11. Human Physiology - II [BSRT202]

L-T-P-C: 4 - - - - - 4 | Category: MC | Semester: 2

Unit-wise Syllabus

UNIT-I – NERVOUS SYSTEM-I

Introduction to nervous system - CNS, PNS and ANS; Neurotransmitters - Definition, fate of neurotransmitter, types; Synapse - Definition, type, structure, transmission of impulse across a synapse, properties.; Receptors and Sensation - Types of sensations, Classification of receptors, properties; Sensory System - Organization of the sensory system, sensory Homunculus; Ascending Tracts - Definitions, Neuronal composition of ascending tracts, dorsal column, anterolateral tract; Pathophysiology of pain - Definitions, hyperalgesia and allodynia, deep pain, referred pain and its theories, management of chronic pain, endogenous opioid analgesic system; Motor Cortex - Cerebrum, cortical areas of brain, motor homunculus, cerebral dominance, connections, mapping the functional areas of brain; Descending Tracts - Pyramidal system, extrapyramidal system.

UNIT-II – NERVOUS SYSTEM-II

Spinal cord - Introduction, effects of complete transection of the spinal cord, effects of hemisection of the spinal cord (Brown-Sequard Syndrome); Reflexes - Reflex action, reflex arc, classification, properties, types - conditioned reflex, stretch reflex, inverse stretch reflex, withdrawal reflex, crossed extensor reflex, superficial reflexes (Plantar & Abdominal); Connections, Functions and applied aspect of thalamus, hypothalamus, cerebellum, basal ganglia 4. Regulation of tone, Posture and it's reflexes, Equilibrium and vestibular apparatus; Limbic system, Reticular Activating System, Sleep and it's types, sleep disorders, Electroencephalogram (EEG); Higher Functions - Learning, Memory, Speech; Autonomic Nervous System - Sympathetic division, Parasympathetic division, control of autonomic functions; Cerebrospinal fluid - Formation and circulation, composition and properties, functions, applied aspect - Hydrocephalus, lumbar puncture.

UNIT-III – SPECIAL SENSES:

Vision - Anatomy of eye, visual pathway, pupillary reflexes, dark adaptation, light adaptation, photosensitivity; Hearing - Anatomy of ear, auditory pathway, tests for hearing - Watch test, Rinne's test, Weber's test, deafness, Audiometry; Taste and Smell: Taste sensations, taste pathway, olfactory pathway; ENDOCRINOLOGY:; Hormones

- Definition, types, hormonal chemistry, regulation, hormone receptor, mechanism of action; Secretion, regulation, function and applied aspect of Hypothalamus, Pituitary Gland,; Thyroid Gland, Parathyroid Gland, Pancreas, Adrenal Gland.

UNIT-IV – REPRODUCTIVE SYSTEM:

Sex determination and differentiation & it's abnormalities, puberty, importance of sex hormones; Female reproductive system - Internal & external genital organs, Oogenesis, Structure of egg, Follicle development, ovulation, menstrual cycle, menopause; Male reproductive system - Testes, accessory sex organs, Spermatogenesis, structure of sperm; Physiology of pregnancy - Fertilization, Implantation, Placenta (formation, function, hormones), maternal changes during pregnancy, pregnancy tests, infertility; Childbirth Physiology - Parturition, Lactation.

UNIT-V (12 hours) GASTROINTESTINAL SYSTEM: – Physiological stages of digestion

Liver function; EXCRETORY SYSTEM:; Kidneys-structure & function; Urine formation (to exclude concentration and dilution); Juxtaglomerular apparatus; Fluid and electrolyte balance – Na, K, H2O; Neural control of Micturition and diuresis; Applied physiology: Types of bladders.

Reference Books

- Text book on Medical Physiology-Guyton
- Essentials of Medical Physiology -Sembulingam, K.
- Comprehensive Textbook of Medical Physiology: Vol-1 & 2 - Pal, Gopal Krushna Physiology: Prep Manual for Undergraduates- Joshi, VijayaD.

Course Outcomes (COs)

CO1: Describe nERVOUS SYSTEM-I.

CO2: Explain the structure, function or principles underlying nERVOUS SYSTEM-II.

CO3: Apply knowledge of sPECIAL SENSES: to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to rEPRODUCTIVE SYSTEM:.

CO5: Evaluate the clinical, safety or quality implications of gASTROINTESTINAL SYSTEM: - Physiological stages of digestion.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

12. Pathology [BSRT203]

L-T-P-C: 2 - - - - - 2 | Category: MS | Semester: 2

Unit-wise Syllabus

UNIT I – Cellular adaptation, Cell injury & cell death.

Introduction to pathology.; Overview: Cellular response to stress and noxious stimuli.; Cellular adaptations of growth and differentiation.; Overview of cell injury and cell death.; Causes of cell injury. Mechanisms of cell injury.; Reversible and irreversible cell injury.; Examples of cell injury and necrosis..

UNIT II Inflammation. - – General features of inflammation Historical highlights

Acute inflammation; Chemical mediators of inflammation Outcomes of acute inflammation Morphologic patterns of acute inflammation Summary of acute inflammation; Chronic inflammation.

UNIT III – Immunity disorders.

General features of the immune system Disorders of the immune system.

UNIT IV(5 hours) Infectious diseases. - – General principles of microbial pathogenesis viral infections.

Bacterial infections-Rheumatic heart disease.; Fungal infections.; Parasitic infections..

UNIT-V(5 hours) Neoplasia. - – Definitions Nomenclature.

Biology of tumor growth benign and malignant neoplasms Epidemiology.; Carcinogenic agents and their cellular interactions Clinical features of tumors..

UNIT VI(5 hours) – Environmental and nutritional disorders.

Environmental and disease.; Common environmental and occupational exposures Nutrition and disease.; Coronary artery disease..

Reference Books

- Pathology, Harsh Mohan e. Basic Pathology by Robbins

Course Outcomes (COs)

CO1: Describe cellular adaptation, Cell injury & cell death..

CO2: Explain the structure, function or principles underlying inflammation. - - General features of inflammation Historical highlights.

CO3: Apply knowledge of immunity disorders. to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to infectious diseases. - - General principles of microbial pathogenesis viral infections..

CO5: Evaluate the clinical, safety or quality implications of neoplasia. - - Definitions Nomenclature..

CO6: Demonstrate safe, competent procedural skills related to environmental and nutritional disorders..

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

13. Microbiology [BSRT204]

L-T-P-C: 3 - - - - - 3 | Category: MD | Semester: 2

Unit-wise Syllabus

UNIT I (5 hours) Morphology - – Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria.

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UNIT II (5 hours) Growth and nutrition. - – Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology.

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UNIT III (5 hours) Culture media. - – Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test.

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UNIT IV (5 hours) – Sterilization and Disinfection.

Principles and use of equipment of sterilization namely hot air oven, autoclave, and serum inspissator, pasteurization, antiseptic and disinfectants..

UNIT V (5 hours) Immunology. - – Immunity, vaccines, types of vaccine and immunization schedule, principles, and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA.

Rapid tests for HIV and HBsAg (excluding technical details)..

UNIT VI (5 hours) – Morphology, cultivation, diseases caused, laboratory diagnosis including specimen

collection of the following bacteria (excluding classification, antigenic structure, and pathogenicity),; Staphylococci, Streptococci, Pneumococci, Gonococci, Meningococci, C. diphtheriae, Mycobacteria, Clostridia, Bacillus, Shigella, Salmonella,; E. coli, Klebsiella, Proteus,; Vibrio cholerae, Pseudomonas & Spirochetes..

UNIT VII (5 hours) – Parasitology.

Morphology, life cycle, laboratory diagnosis of following parasites:; E.histolytica, Plasmodium, tape worms, Intestinal nematodes..

UNIT VIII (5 hours) Mycology. - – Morphology, diseases caused and lab diagnosis of following fungi. Candida, Cryptococcus, Dermatophytes, opportunistic fungi

.

UNIT IX (5 hours) Virology. - – General properties of viruses, diseases caused lab diagnosis and prevention of following viruses, Herpes, Hepatitis, HIV, Rabies and Poliomyelitis.

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Reference Books

- Microbiology, Ananthanarayan and Paniker's,
- CP. Baveja. Textbook of Microbiology for nurses.
- A textbook of Microbiology-Chakraborty.

Course Outcomes (COs)

CO1: Describe morphology - - Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria..

CO2: Explain the structure, function or principles underlying growth and nutrition. - - Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology..

CO3: Apply knowledge of culture media. - - Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test. to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to sterilization and Disinfection..

CO5: Evaluate the clinical, safety or quality implications of immunology. - - Immunity, vaccines, types of vaccine and immunization schedule, principles, and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA..

CO6: Demonstrate safe, competent procedural skills related to morphology, cultivation, diseases caused, laboratory diagnosis including specimen.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

14. Human Anatomy - II Practical [BSRT205]

L-T-P-C: - - - - 4 - 2 | Category: MC | Semester: 2

Course Outcomes (COs)

CO1: Demonstrate the core competencies expected on completion of this course.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

15. Human Physiology - II Practical [BSRT206]

L-T-P-C: - - - - 2 - 1 | Category: MC | Semester: 2

Course Outcomes (COs)

CO1: Demonstrate the core competencies expected on completion of this course.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

16. Introduction to Surgical Robotics [BSRT207]

L-T-P-C: 3 - - - 2 - 4 | Category: MC | Semester: 2

Unit-wise Syllabus

UNIT I – Introduction to Robotics – Definition and history of robotics

Evolution of robotic systems; Overview of robotic systems in healthcare; Classification of robots; Industrial robots; Medical robots; Service robots; Surgical robotic systems.

UNIT II – Basic Components of Robotic Systems – Manipulators and robotic arms

Sensors in robotics; Position sensors; Force and torque sensors; Proximity sensors; Actuators and drives; End effectors; Controllers and human machine interfaces.

UNIT III – Robot Kinematics and Motion – Degrees of Freedom

Robot joints and links; Forward kinematics; Inverse kinematics; Workspace analysis; Robot accuracy; Repeatability concepts; Motion planning basics.

UNIT IV – Control Fundamentals in Robotics – Principles of robotic control systems

Feedback control systems; Feedforward control systems; Motion control of robotic joints; Position and velocity control; Stability and reliability; Safety protocols in robotic operations; Error detection systems.

UNIT V – Introduction to Surgical Robotics – Principles of robotic surgery

Difference between industrial and surgical robots; Tele operated robotic systems; Surgeon console systems; Patient cart systems; Minimally invasive robotic surgery; Advantages of robotic surgery; Limitations of robotic surgery.

UNIT VI – Robotic Systems in Healthcare – Robotic laparoscopic assistance

Orthopedic robotic systems; Neurosurgical robotic systems; Cardiac robotic surgery; Urological robotic surgery; Rehabilitation robotics; Diagnostic robotic systems; Clinical applications of robotics.

UNIT VII – Safety, Ethics and Standards – Safety requirements for medical robots

Operation Theatre safety protocols; Infection prevention in robotic surgery; Ethical considerations in robotic surgery; Patient safety and confidentiality; Biomedical regulations; Regulatory standards in healthcare robotics; Quality assurance systems.

UNIT VIII – Future Trends in Medical Robotics – Artificial Intelligence in robotics

Smart robotic systems; Augmented reality in robotic surgery; Virtual reality simulation systems; Remote robotic surgery; Autonomous robotic systems; Nanorobotics in medicine; Future innovations in healthcare robotics.

Reference Books

- Introduction to Robotics by S. K. Saha
- Introduction to Robotics: Mechanics and Control by John J. Craig
- Fundamentals of Robotic Surgery
- Surgical Robotics Textbook

Course Outcomes (COs)

CO1: Describe introduction to Robotics - Definition and history of robotics.

CO2: Explain the structure, function or principles underlying basic Components of Robotic Systems - Manipulators and robotic arms.

CO3: Apply knowledge of robot Kinematics and Motion - Degrees of Freedom to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to control Fundamentals in Robotics - Principles of robotic control systems.

CO5: Evaluate the clinical, safety or quality implications of introduction to Surgical Robotics - Principles of robotic surgery.

CO6: Demonstrate safe, competent procedural skills related to robotic Systems in Healthcare - Robotic laparoscopic assistance.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

17. Stress Management [BSRT208]

L-T-P-C: 1 - - - - - 1 | Category: VAC | Semester: 2

Unit-wise Syllabus

Unit 1 – Introduction to Stress and Its Effects Definition of stress: Eustress vs. Distress Types of stress: Acute vs. Chronic

The biology of stress (fight-or-flight response, hormones); Short-term and long-term effects on physical and mental health The role of perception and coping mechanisms.

Unit 2 – Identifying Stressors and Personal Stress Responses

Internal vs. external stressors (work, relationships, environment) Identifying stress patterns (thoughts, behaviours, physical reactions) Emotional regulation and its role in stress management; The Stress Process: How stress develops and escalates.

Unit 3 – Coping Strategies and Stress Relief Techniques Problem-focused vs. emotion-focused coping

Cognitive Behavioral Therapy (CBT) techniques for stress; Relaxation techniques (deep breathing, progressive muscle relaxation) Time management and organization as stress-relief tools; Developing a personal coping plan.

Unit 4 – Lifestyle Changes for Managing Stress The role of physical activity and exercise Sleep hygiene and its connection to stress Nutrition and its impact on mental health Social support and healthy relationships Mindfulness and meditation practices

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Unit 5 – Stress Management at Work and School

Managing work and school stress: Time management, prioritization Dealing with high- pressure environments and deadlines; Building resilience and avoiding burnout; The importance of taking breaks and practicing self-care.

Unit 6 – Building Long-Term Stress Resilience

Resilience theory and how to bounce back from adversity Developing a growth mindset to handle challenges Building emotional intelligence to cope with stress Integrating stress management into daily life.

Reference Books

- Stress Management: From Basic Science to Best Practice" by C. L. Cooper and Philip L. Merritt

Course Outcomes (COs)

CO1: Describe introduction to Stress and Its Effects Definition of stress: Eustress vs. Distress Types of stress: Acute vs. Chronic.

CO2: Explain the structure, function or principles underlying identifying Stressors and Personal Stress Responses.

CO3: Apply knowledge of coping Strategies and Stress Relief Techniques Problem-focused vs. emotion-focused coping to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to lifestyle Changes for Managing Stress The role of physical activity and exercise Sleep hygiene and its connection to stress Nutrition and its impact on mental health Social support and healthy relationships Mindfulness and meditation practices.

CO5: Evaluate the clinical, safety or quality implications of stress Management at Work and School.

CO6: Demonstrate safe, competent procedural skills related to building Long-Term Stress Resilience.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

18. General Surgery and OT Techniques [BSRT301]

L-T-P-C: 3 - - - 2 - 4 | Category: MC | Semester: 3

Unit-wise Syllabus

UNIT I – Introduction to General Surgery – History and evolution of surgery

Principles of general surgery; Classification of surgical procedures; Surgical team roles; Surgical patient care; Preoperative preparation; Postoperative care; Surgical complications.

UNIT II – Operation Theatre Techniques – Operation Theatre design and layout

Sterile field maintenance; Surgical hand scrubbing; Gowning and gloving techniques; Surgical draping methods; Operation Theatre protocols; Patient positioning techniques; Operation Theatre safety measures.

UNIT III – Surgical Instrumentation – Surgical instruments classification

Cutting instruments; Grasping instruments; Retractors and clamps; Suturing instruments; Stapling devices; Instrument sterilization; Instrument maintenance.

UNIT IV – Principles of Asepsis and Sterilization – Surgical asepsis

Disinfection methods; Sterilization techniques; Autoclaving procedures; Biomedical waste management; Infection prevention protocols; Operation Theatre cleaning protocols; Sterility assurance.

UNIT V – Wound Care and Suturing Techniques – Types of wounds

Wound healing process; Suturing materials; Suturing techniques; Dressing procedures; Drain management; Hemostasis techniques; Wound complications.

UNIT VI – Anesthesia and Patient Monitoring – Basics of anesthesia

Types of anesthesia; Patient monitoring systems; Hemodynamic monitoring; Airway management basics; Emergency drugs; Recovery room care; Anesthesia complications.

UNIT VII – Surgical Emergencies and Complications – Hemorrhage management

Shock management; Surgical infections; Organ injury management; Emergency surgical procedures; Cardiopulmonary resuscitation; Trauma management basics; Operation Theatre emergencies.

UNIT VIII – Recent Advances in Surgery – Minimally invasive surgery

Robotic surgery basics; Laser surgery; Navigation surgery; Artificial Intelligence in surgery; Smart Operation Theatre systems; Three dimensional imaging; Future trends in surgery.

Practicals

- Surgical hand scrubbing
- Gowning and gloving
- Instrument identification
- Suturing practice
- Dressing techniques
- Sterilization procedures
- Operation Theatre setup
- Clinical observation

Reference Books

- Bailey and Love's Short Practice of Surgery
- Principles of Surgical Technology
- Operation Theatre Technique Manual

Course Outcomes (COs)

CO1: Describe introduction to General Surgery - History and evolution of surgery.

CO2: Explain the structure, function or principles underlying operation Theatre Techniques - Operation Theatre design and layout.

CO3: Apply knowledge of surgical Instrumentation - Surgical instruments classification to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to principles of Asepsis and Sterilization - Surgical asepsis.

CO5: Evaluate the clinical, safety or quality implications of wound Care and Suturing Techniques - Types of wounds.

CO6: Demonstrate safe, competent procedural skills related to anesthesia and Patient Monitoring - Basics of anesthesia.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

19. Pharmacology [BSRT302]

L-T-P-C: 3 - - - - - 3 | Category: MC | Semester: 3

Unit-wise Syllabus

UNIT-I – General Pharmacology

Absorption, distribution, metabolism and elimination of drugs,; routes of drug administration.; Adverse reactions to drugs.; Factors modifying drug response.

UNIT-II – Autonomic nervous system & Peripheral nervous system

Sympathetic nervous system - sympathomimetics, sympatholytics; Parasympathetic - Cholinergics, Anticholinergics Drugs; Skeletal muscle relaxants; Local anaesthetics UNIT-III; Central nervous system; Drug therapy of various CNS disorders like epilepsy, depression.; Non-steroidal anti-inflammatory drugs; General anesthetics AUTOCOIDS; Histamine and anti histaminics UNIT-IV; Cardiovascular system; Drug therapy of hypertension, shock, angina, cardiac arrhythmias; Diuretics; Coagulants and anticoagulants, antiplatelet drugs; Hypo-lipidemics; Gastrointestinal and respiratory system; Drug treatment of peptic ulcer; Drug therapy of bronchial asthma.

UNIT-V – Hormones

Drug therapy of Diabetes; Corticosteroids; Chemotherapeutic agents - b-Lactam Antibiotics, fluoroquinolones, aminoglycoside, tetracyclines, chloramphericol.

Reference Books

- Padmaja Uday kumar - Pharmacology for Dental & Allied Health Sciences - 4th edition, 2017.
- Joginder Singh Pathania, Rupendra Kumar Bharti, Vikas Sood-Textbook of Pharmacology for Paramedical Students 2019
- KD Tripathi- Essentials of Pharmacology - 8th edition, 2018.
- HL Sharma & KK Sharma - Principles of Pharmacology - 3rd edition, 2017.

Course Outcomes (COs)

CO1: Describe general Pharmacology.

CO2: Explain the structure, function or principles underlying autonomic nervous system & Peripheral nervous system.

CO3: Apply knowledge of hormones to supervised clinical/laboratory/simulation practice.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

20. Medical Law and Ethics [BSRT303]

L-T-P-C: 3 - - - - - 3 | Category: MS | Semester: 3

Unit-wise Syllabus

UNIT-I – Medical ethics - Definition - Goal Scope Introduction to Code of conduct

.

UNIT-II – Basic principles of medical ethics Confidentiality Malpractice and negligence - Rational and irrational drug therapy

.

UNIT-III – Autonomy and informed consent - Right of patients Care of the terminally ill- Euthanasia

.

UNIT-IV – Organ transplantation

Medico legal aspects of medical records-Medico legal case and type-Records and document related to MLC-ownership of medical records-Confidentiality Privilege communication Release of medical information - Unauthorized disclosure retention of medical records - other various aspects.; Professional Indemnity insurance policy UNIT-V; Development of standardized protocol to avoid near miss or sentinel events Obtaining an informed consent.

UNIT-I – Commonly Used Prefixes, Suffixes and root words in Medical Terminology, Common Latin Terms used in Prescription Writing, Study of Standard Abbreviations.

.

UNIT-II – Medical Records Management. Meaning, functions, principles of record keeping, Importance of medical records to patients, doctors, and hospitals, classification of records like coding system, indexing system, types of forms basic and special, legal aspects of medical records.

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UNIT-III – International Classification of Diseases (ICD), Electronic Medical Record (EMR), Records Management: Registers, forms, retention and preservation of MR, Role of MRD personnel.

.

UNIT-IV – Medical Registers: Meaning, types, advantages of Medical Registers, registers used in various departments, Statutory registers and reports to be maintained-specimens

.

UNIT-V – Medical Audit: its process, role and importance in hospitals.

.

UNIT-I – Introduction to Public Health Ethics.

Theories of Justice and Distribution of Public Health Resources. Principle for Public Health Ethics..

UNIT-II – Priority-Setting and Resource Allocation at the Macro Level. Priority-Setting and Resource Allocation at the Micro Level.

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UNIT-III – Medical Ethics, Legal Aspects and Medical Terminology.

Role Definition and Interaction, Ethical, Moral, and Legal Responsibilities; Medical terminology Medical waste Management UNIT-IV; Contemporary Ethical and Legal Issues in Health Care: Legal regulation of a standalone diagnostic center, medico-legal cases and medical negligence, ethical aspects of health care.; Balancing Individual and Community Interests. Ethics and Health Promotion..

UNIT-V – Role of Human Rights in Public Health

Ethics of Beath Promotion and Disease Prevention.

Reference Books

- Law relating to medical negligence and compensation- Dr. K.P.D.A. Prabakar & Dr. J.Paulraj Joseph-2023
- A textbook of medical jurisprudence and toxicology-Justice K Kannan -25 edition-1" edition-2016
- Law the doctor must know-Hitesh J Bhatt & Geetebdra Sharma-2017
- Law on medical negligence and legal remedies-Dr. Annu Bahl Mehra & Harshit Kiran-2022
- RECORD KEEPING
- Davies, Juanita. Essentials of Medical Terminology. 3rd edition. New York. Delmar. 2008
- Mogli. J.D. Medical Records: Organization & Management 2nd edition New Delhi Jaypee Brothers.
- The body by Bilbirson Agreed for Occupance
- ETHICS

- Ethics and Public Health Archana Rani Sahoo & Patitapahan Das-2017
- Public Health, Ethics and Equity-Sudhir Anand, Fabienne Peter and Amartya Sen-2006
- Nursing and healthcare ethics-Robinson & Doody-6 edition-2022
- Ethics- William K. Frankena 2 edit

Course Outcomes (COs)

CO1: Describe medical ethics - Definition - Goal Scope Introduction to Code of conduct.

CO2: Explain the structure, function or principles underlying basic principles of medical ethics Confidentiality Malpractice and negligence - Rational and irrational drug therapy.

CO3: Apply knowledge of autonomy and informed consent - Right of patients Care of the terminally ill- Euthanasia to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to organ transplantation.

CO5: Evaluate the clinical, safety or quality implications of commonly Used Prefixes, Suffixes and root words in Medical Terminology, Common Latin Terms used in Prescription Writing, Study of Standard Abbreviations..

CO6: Demonstrate safe, competent procedural skills related to medical Records Management. Meaning, functions, principles of record keeping, Importance of medical records to patients, doctors, and hospitals, classification of records like coding system, indexing system, types of forms basic and special, legal aspects of medical records..

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

21. Principles of Surgical Robotics [BSRT304]

L-T-P-C: 3 - - - 2 - 4 | Category: MC | Semester: 3

Unit-wise Syllabus

UNIT I – Introduction to Surgical Robotics – History and evolution of surgical robotics

Components of robotic systems; Types of surgical robots; Applications in healthcare; Advantages and limitations; Robotic surgery workflow; Safety protocols; Future scope.

UNIT II – Robotic System Components – Surgeon console

Patient cart; Vision cart; Robotic arms; End effectors; Camera systems; Navigation systems; Motion scaling systems.

UNIT III – Robotic Instrumentation – Robotic graspers

Needle holders; Energy devices; Suturing systems; Stapling systems; Instrument docking; Instrument maintenance; Sterilization protocols.

UNIT IV – Principles of Minimally Invasive Robotic Surgery – Port placement

Pneumoperitoneum; Camera navigation; Tissue handling; Robotic suturing; Surgical ergonomics; Team coordination; Operation Theatre workflow.

UNIT V – Artificial Intelligence and Navigation – Artificial Intelligence basics

Navigation systems; Image guided surgery; Three dimensional visualization; Motion tracking systems; Smart robotic systems; Data integration; Future developments.

UNIT VI – Applications of Surgical Robotics – Gastrointestinal robotic surgery

Cardiac robotic surgery; Thoracic robotic surgery; Urological robotic surgery; Gynecological robotic surgery; Orthopedic robotic systems; Neurosurgical robotics; Rehabilitation robotics.

UNIT VII – Complications and Troubleshooting – Instrument malfunction

Docking errors; Electrical hazards; Robotic system failure; Bleeding complications; Organ injury; Emergency conversion procedures; Quality assurance.

UNIT VIII – Recent Advances in Surgical Robotics – Autonomous robotic systems

Remote robotic surgery; Augmented reality integration; Virtual simulation systems; Smart robotic systems; Artificial Intelligence powered robotics; Digital surgery concepts; Future trends in robotics.

Practicals

- Robotic console demonstration
- Docking techniques
- Camera navigation
- Instrument handling
- Simulation based robotic training
- Operation Theatre setup
- Instrument sterilization
- Clinical observation

Reference Books

- Fundamentals of Robotic Surgery
- Surgical Robotics Textbook
- Atlas of Robotic Surgery
- Principles of Minimally Invasive Surgery

Course Outcomes (COs)

CO1: Describe introduction to Surgical Robotics - History and evolution of surgical robotics.

CO2: Explain the structure, function or principles underlying robotic System Components - Surgeon console.

CO3: Apply knowledge of robotic Instrumentation - Robotic graspers to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to principles of Minimally Invasive Robotic Surgery - Port placement.

CO5: Evaluate the clinical, safety or quality implications of artificial Intelligence and Navigation - Artificial Intelligence basics.

CO6: Demonstrate safe, competent procedural skills related to applications of Surgical Robotics - Gastrointestinal robotic surgery.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

22. Health Care Administration [BSRT305]

L-T-P-C: 3 - - - - - 3 | Category: SEC | Semester: 3

Course Objectives / Learning Objectives

- NOTE: A detailed unit-wise syllabus for this course was not included in the uploaded source document (it appears only in the Semester III credit-distribution table). The objectives and units below are a minimal placeholder and must be developed and approved by the Board of Studies before adoption.

Unit-wise Syllabus

Unit I–V (To Be Developed)

Principles of healthcare/hospital administration; Healthcare systems and policy; Human resource and materials management in healthcare; Healthcare quality and accreditation basics; Healthcare finance and information systems basics.

Course Outcomes (COs)

CO1: Describe the organization, structure and functions of healthcare and hospital administration.

CO2: Explain healthcare systems, policy and regulatory frameworks relevant to India.
CO3: Apply basic principles of human-resource and materials management to a healthcare/OT setting.
CO4: Analyze healthcare quality and accreditation requirements relevant to surgical/robotic-technology services.
CO5: Evaluate basic healthcare finance and information-systems concepts in supporting administrative decision-making.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

23. Infection Control and Sterilization [BSRT306]

L-T-P-C: 1 - - - 2 - 2 | Category: MS | Semester: 3

Unit-wise Syllabus

Unit I: Introduction to Biosafety and Biohazards – Definition, scope, and importance of biosafety and biohazard management

Principles and objectives of biosafety; Biological hazards and classification of biohazards; Sources, routes of transmission, and occupational risks; Risk assessment and risk management in healthcare and laboratories.

Unit II: Biosafety Levels and Containment Measures – Biosafety levels (BSL-1, BSL-2, BSL-3, BSL-4) and their applications

Laboratory design and containment facilities; Standard operating procedures for laboratory safety; Personal protective equipment (PPE): types, use, and disposal; Safe handling, storage, and transport of biological materials.

Unit III: Infection Prevention and Control – Principles of infection prevention and control

Hand hygiene and aseptic techniques; Sterilization, disinfection, and decontamination methods; Prevention of hospital-acquired infections; Exposure control measures and immunization for healthcare workers.

Unit IV: Biomedical Waste and Biohazard Management – Biomedical waste: definition, classification, and segregation

Collection, transport, treatment, and disposal of biomedical waste; Color coding and waste management protocols; Spill management and decontamination procedures; Environmental and public health concerns related to biohazards.

Unit V: Emergency Preparedness and Legal Aspects – Biological accidents and emergency response planning

Needle stick injuries and post-exposure prophylaxis; Incident reporting and documentation; National and international biosafety guidelines and regulations; Ethical and legal considerations in biosafety management.

UNIT I – Principles of Infection Control – Hospital acquired infections

Sources of infection; Modes of transmission; Standard precautions; Hand hygiene protocols; Personal protective equipment; Infection surveillance; Safety measures.

UNIT II – Sterilization and Disinfection – Principles of sterilization

Autoclaving procedures; Chemical sterilization; High level disinfection; Sterility assurance; Instrument cleaning; Packaging techniques; Storage methods.

UNIT III – Biomedical Waste Management – Biomedical waste categories

Segregation methods; Color coding systems; Waste transportation; Disposal techniques; Sharp waste management; Infection prevention; Biomedical regulations.

UNIT IV – Infection Control in Surgical Robotics – Robotic instrument sterilization

Endoscope reprocessing; Operation Theatre sterilization; Prevention of cross contamination; Sterile field maintenance; Quality assurance; Documentation systems; Future innovations.

Practicals

- Demonstration of hand hygiene and infection control techniques.

- Identification and proper use of personal protective equipment (PPE).
- Demonstration of biomedical waste segregation using color coding.
- Practice of sterilization and disinfection procedures.
- Handling and safe transport of biological samples.
- Demonstration of spill management and decontamination techniques.
- Risk assessment of laboratory and hospital biohazards.
- Observation of biosafety levels and containment facilities.
- Management of accidental exposure and needle stick injury protocol.
- Preparation of biosafety incident reporting and documentation.
- Hand washing techniques
- Personal protective equipment demonstration
- Instrument sterilization
- Biomedical waste segregation
- Autoclave operation
- Endoscope cleaning
- Operation Theatre cleaning protocols
- Clinical observation

Reference Books

- Biosafety in Microbiological and Biomedical Laboratories
- Hospital Infection Control: Principles and Practice
- Medical Laboratory Technology
- Clinical Laboratory Safety
- INFECTION CONTROL AND STERILIZATION

Course Outcomes (COs)

CO1: Describe introduction to Biosafety and Biohazards - Definition, scope, and importance of biosafety and biohazard management.

CO2: Explain the structure, function or principles underlying biosafety Levels and Containment Measures - Biosafety levels (BSL-1, BSL-2, BSL-3, BSL-4) and their applications.

CO3: Apply knowledge of infection Prevention and Control - Principles of infection prevention and control to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to biomedical Waste and Biohazard Management - Biomedical waste: definition, classification, and segregation.

CO5: Evaluate the clinical, safety or quality implications of emergency Preparedness and Legal Aspects - Biological accidents and emergency response planning.

CO6: Demonstrate safe, competent procedural skills related to principles of Infection Control - Hospital acquired infections.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

24. Clinical Postings - I [BSRT307]

L-T-P-C: - - - - 6 - 3 | Category: SI | Semester: 3

Practicals

- AABB Technical Manual.
- Clinical Laboratory Safety.

Reference Books

- Modern Blood Banking and Transfusion Practices – Denise M. Harmening.
- Blood Bank Technology Manual – DGHS.

Course Outcomes (COs)

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during clinical postings - i.

CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.

CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.

CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.

CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

25. Soft Skills Development [BSRT308]

L-T-P-C: 2 - - - - - 2 | Category: VAC | Semester: 3

Unit-wise Syllabus

Unit 1 – Introduction to Soft Skills

Definition of soft skills vs. hard skills; The importance of soft skills in the workplace; Key soft skills: communication, teamwork, adaptability, problem-solving, leadership, etc. Activities: Icebreakers, group discussions on soft skills in the workplace; Assignment: Self-assessment on current soft skills.

Unit 2 – Communication Skills

The communication process: sender, message, receiver, feedback Active listening techniques; Body language and non-verbal cues Effective speaking: tone, clarity, and pacing Email and phone communication etiquette; Activities: Role-playing scenarios (e.g., client interaction, conflict resolution); Assignment: Practice active listening and send an email incorporating effective communication principles..

Unit 3 – Emotional Intelligence (EQ)

What is emotional intelligence? (Self-awareness, self-regulation, motivation, empathy, and social skills) Recognizing and managing your emotions; Understanding others' emotions and building empathy Developing emotional resilience; Activities: Emotional intelligence quizzes, group discussion on handling emotions in stressful situations; Assignment: Journaling emotional responses and reflection on EQ practices..

Unit 4 – Teamwork and Collaboration Roles and dynamics within teams Effective communication in teams Conflict resolution in teams

Building trust and fostering a collaborative environment; Activities: Team exercises, problem-solving tasks, and brainstorming sessions Assignment: Work on a team project or task, and present it in class..

Unit 5 – Conflict Resolution

Sources of conflict (miscommunication, differing priorities, etc.); Conflict resolution strategies (e.g., negotiation, mediation, compromise) The role of active listening in resolving conflicts; Managing personal emotions during conflict; Activities: Case studies, role-playing conflict resolution scenarios; Assignment: Reflect on a personal or professional conflict and propose a resolution strategy..

Unit 6 – Time Management and Personal Organization

The importance of time management in personal and professional success Prioritization techniques (e.g., Eisenhower Matrix, ABCDE method); Tools for time management (digital calendars, to-do lists, Pomodoro technique) Setting SMART goals; Managing procrastination and avoiding distractions Activities: Time-blocking

exercises, goal-setting workshop; Assignment: Create a personal time management plan and track daily productivity for a week..

Unit 7 – Leadership and Influence

Types of leadership (e.g., transformational, transactional, servant leadership) Leading by example: qualities of effective leaders; Building and maintaining team morale The art of persuasion and influence Activities: Leadership style assessment, group discussions on leadership challenges Assignment: Write a reflection on a leader you admire and why..

Unit 8 – Public Speaking and Presentation Skills Overcoming fear of public speaking

Structuring a presentation (opening, body, conclusion) Effective use of visual aids (PowerPoint, etc.); Engaging the audience through storytelling, eye contact, and body language; Activities: Group presentations, peer feedback sessions, impromptu speaking exercises Assignment: Prepare and deliver a short presentation (5-7 minutes) on a topic of choice..

Reference Books

- The 7 Habits of Highly Effective People" by Stephen R. Covey
- IIyear IV semester

Course Outcomes (COs)

CO1: Describe introduction to Soft Skills.

CO2: Explain the structure, function or principles underlying communication Skills.

CO3: Apply knowledge of emotional Intelligence (EQ) to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to teamwork and Collaboration Roles and dynamics within teams Effective communication in teams Conflict resolution in teams.

CO5: Evaluate the clinical, safety or quality implications of conflict Resolution.

CO6: Demonstrate safe, competent procedural skills related to time Management and Personal Organization.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

AI in Healthcare: Foundation

Category: Skill Enhancement Course (SEC) | **L-T-P:** 1-0-0 | **Credits:** 1

Course Objectives

- · Explain fundamental artificial intelligence concepts, machine learning principles, and health data types without complex mathematics.
- · Identify and examine major clinical, diagnostic, public health, and operational AI use cases across the healthcare ecosystem.
- · Evaluate AI performance metrics, clinical validation strategies, algorithmic bias, and limitations of medical AI tools.
- · Apply ethical, legal, regulatory, and human-in-the-loop principles to ensure patient safety and privacy in AI deployment.
- · Demonstrate practical competency with no-code AI platforms to formulate a realistic solution

for a discipline-specific healthcare challenge.

Course Outcomes: On completion, students will be able to:

- · CO1: Explain core AI concepts (machine learning, deep learning, NLP, generative AI) and their applications across healthcare systems in plain language.
- · CO2: Identify and describe major healthcare use cases of AI, including diagnostics, clinical decision support, drug discovery, public health surveillance, and hospital operations.
- · CO3: Critically evaluate AI tools by interpreting performance measures (accuracy, sensitivity, specificity) and recognizing bias and data-quality limitations.
- · CO4: Apply ethical, legal, and regulatory principles (privacy, consent, fairness, accountability, transparency) to healthcare AI implementation.
- · CO5: Use no-code AI tools responsibly to design and propose realistic AI solutions for discipline-specific healthcare challenges.

Graduate Attributes Addressed: GA1 (Disciplinary & Interdisciplinary Knowledge), GA2 (Critical Thinking & Problem Solving), GA3 (Digital & Technological Literacy), GA5 (Effective Communication), GA7 (Ethical Reasoning & Professional Integrity), GA9 (Entrepreneurship & Innovation Mindset), GA10 (Lifelong Learning & Self-Directed Growth)

Unit I: Introduction to AI and Health Data

- · Fundamental definitions and scope: What AI is and isn't; distinguishing AI, Machine Learning (ML), and Deep Learning (DL)
- · Basic principles of how machines learn patterns from data without advanced mathematics
- · Structure and taxonomy of health data: Electronic Health Records (EHR), medical imaging, genomics, and wearable sensor streams
- · Health data quality, data curation, and the principle of "garbage in, garbage out" in healthcare algorithms
- · Practical/Hands-on Session: Building and training a simple medical/healthcare image classifier using no-code platforms (e.g., Teachable Machine)

Unit II: AI Applications Across Healthcare Domains

- · Medical imaging applications in radiology, digital pathology, and ophthalmology
- · Clinical Decision Support Systems (CDSS), symptom checkers, and patient risk prediction models
- · Natural Language Processing (NLP) for unstructured clinical notes, voice recognition, and EHR

documentation

- · Generative AI, LLMs, drug discovery workflows, public health surveillance, hospital operations, and AI-enabled telemedicine
- · Practical/Case Demo Session: Case demonstrations and critical group discussion on real-world AI deployment in clinical settings

Unit III: Evaluating AI Performance, Bias, and Validation

- · Interpreting performance metrics in plain clinical terms: accuracy, sensitivity, specificity, and false positives/negatives
- · Understanding overfitting, model generalizability across diverse patient populations, and performance degradation
- · Clinical validation frameworks, clinical trials for AI algorithms, and black-box explainability/interpretability
- · Identifying algorithmic bias, data representation gaps, and evaluating fitness-for-purpose
- · Practical/Tutorial Session: Critical appraisal exercise evaluating and critiquing a published AI tool's clinical claims

Unit IV: Ethics, Law, and Healthcare AI Governance

- · Patient data privacy, consent frameworks, and regulatory awareness (HIPAA, GDPR, and India's DPDP Act)
- · Algorithmic fairness, health equity, and preventing bias against vulnerable patient demographics
- · Clinical liability, accountability when AI systems err, and Software as a Medical Device (SaMD) regulatory oversight
- · Human-in-the-loop principles and maintaining practitioner oversight in automated healthcare decision-making
- · Practical/Interactive Session: Ethical dilemma role-play and decision-making scenario analysis

Unit V: Responsible Practice and Capstone Project

- · Prompt engineering techniques for generative AI tools (e.g., ChatGPT, Claude) in clinical and academic contexts
- · Managing AI hallucinations, fact-verification protocols, and ethical academic/professional use
- · Tracking fast-moving AI developments and future trajectories in medical technology
- · Practical/Capstone Presentation: Group formulation, design pitch, and presentation proposing

a realistic AI solution to a domain-specific healthcare problem

Recommended Readings

Key Textbooks & Reference Books

1. Topol, E. (2019). Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again. Basic Books.
2. Bohr, A., & Memarzadeh, K. (Eds.). (2020). Artificial Intelligence in Healthcare. Academic Press.
3. Agrawal, A., Gans, J., & Goldfarb, A. (2018). Prediction Machines: The Simple Economics of Artificial Intelligence. Harvard Business Review Press.

Regulatory Reports & Ethical Guidelines

1. World Health Organization. (2021). Ethics and governance of artificial intelligence for health: WHO guidance. Geneva: World Health Organization.
2. Ministry of Law and Justice, Government of India. (2023). The Digital Personal Data Protection Act, 2023 (DPDP Act). Gazette of India.
3. U.S. Food and Drug Administration (FDA). (2021). Artificial Intelligence/Machine Learning (AI/ML)-Based Software as a Medical Device (SaMD) Action Plan.

Online Interactive & No-Code Resources

1. Google Teachable Machine:
   https://teachablemachine.withgoogle.com/
2. Orange Data Mining (Visual Programming & Interactive Workflows):
   https://orangedatamining.com/

3. WHO / ITU Focus Group on Artificial Intelligence for Health (FG-AI4H) Resources:

https://www.who.int/initiatives/cih

26. Minimally Invasive Surgery [BSRT401]

L-T-P-C: 3 - - - 2 - 4 | Category: MC | Semester: 4

Unit-wise Syllabus

UNIT I – Introduction to Minimally Invasive Surgery – History and evolution of minimally invasive surgery

Principles of minimally invasive surgery; Types of minimally invasive procedures; Advantages and limitations; Surgical applications; Patient selection criteria; Safety protocols; Future scope of minimally invasive surgery.

UNIT II – Laparoscopic Systems and Equipment – Laparoscopic camera systems

Light source systems; Insufflators; Trocars and cannulas; Suction irrigation systems; Energy devices; Visualization systems; Equipment maintenance.

UNIT III – Principles of Pneumoperitoneum – Creation of pneumoperitoneum

Carbon dioxide insufflation; Veress needle technique; Open access technique; Pressure monitoring systems; Physiological effects of pneumoperitoneum; Complications; Safety measures.

UNIT IV – Minimally Invasive Surgical Instrumentation – Graspers and dissectors

Scissors and needle holders; Stapling devices; Clip applicators; Endoscopic accessories; Instrument handling techniques; Instrument sterilization; Instrument maintenance.

UNIT V – Minimally Invasive Surgical Procedures – Laparoscopic appendectomy

Cholecystectomy; Hernia repair procedures; Thoracoscopic procedures; Gastrointestinal minimally invasive procedures; Gynecological minimally invasive procedures; Urological minimally invasive procedures; Bariatric surgery basics.

UNIT VI – Operation Theatre Management and Safety – Operation Theatre setup

Patient positioning; Surgical ergonomics; Sterile field maintenance; Infection prevention protocols; Biomedical waste management; Surgical documentation; Team coordination.

UNIT VII – Complications and Troubleshooting – Entry complications

Bleeding complications; Organ injuries; Gas embolism; Equipment malfunction; Electrosurgical complications; Emergency management; Postoperative complications.

UNIT VIII – Recent Advances in Minimally Invasive Surgery – Robotic assisted minimally invasive surgery

Artificial Intelligence integration; Navigation systems; Three dimensional laparoscopy; Fluorescence imaging; Single incision surgery; Natural Orifice Transluminal Endoscopic Surgery; Future innovations.

Practicals

- Camera handling techniques
- Instrument identification
- Pneumoperitoneum setup
- Laparoscopic suturing practice
- Operation Theatre setup
- Sterilization procedures
- Simulation based training
- Clinical observation

Reference Books

- SAGES Manual of Surgery
- Atlas of Endoscopic Surgery
- Principles of Surgical Technology

Course Outcomes (COs)

CO1: Describe introduction to Minimally Invasive Surgery - History and evolution of minimally invasive surgery.

CO2: Explain the structure, function or principles underlying laparoscopic Systems and Equipment - Laparoscopic camera systems.

CO3: Apply knowledge of principles of Pneumoperitoneum - Creation of pneumoperitoneum to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to minimally Invasive Surgical Instrumentation - Graspers and dissectors.

CO5: Evaluate the clinical, safety or quality implications of minimally Invasive Surgical Procedures - Laparoscopic appendectomy.

CO6: Demonstrate safe, competent procedural skills related to operation Theatre Management and Safety - Operation Theatre setup.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

27. Robotic Assisted Surgical Procedures [BSRT402]

L-T-P-C: 3 - - - 2 - 4 | Category: MC | Semester: 4

Unit-wise Syllabus

UNIT I – Introduction to Robotic Surgical Procedures – Principles of robotic surgery

Evolution of robotic assisted procedures; Components of robotic surgical systems; Advantages of robotic surgery; Limitations of robotic systems; Surgical workflow; Patient selection criteria; Future scope of robotic surgery.

UNIT II – Robotic System Components – Surgeon console

Patient cart; Vision cart; Robotic arms; End effectors; Camera systems; Motion scaling systems; Navigation systems.

UNIT III – Robotic Instrumentation – Robotic graspers

Needle holders; Energy devices; Robotic staplers; Suturing systems; Instrument docking; Instrument maintenance; Sterilization protocols.

UNIT IV – Robotic Surgical Applications – Gastrointestinal robotic surgery

Cardiac robotic surgery; Thoracic robotic surgery; Urological robotic surgery; Gynecological robotic surgery; Orthopedic robotic systems; Neurosurgical robotics; Bariatric robotic surgery.

UNIT V – Principles of Robotic Minimally Invasive Surgery – Port placement techniques

Pneumoperitoneum principles; Camera navigation; Tissue handling techniques; Robotic suturing; Surgical ergonomics; Team coordination; Safety measures.

UNIT VI – Artificial Intelligence and Navigation Systems – Artificial Intelligence integration

Navigation systems; Image guided surgery; Motion tracking systems; Three dimensional visualization; Smart robotic systems; Data integration systems; Future developments.

UNIT VII – Complications and Troubleshooting – Instrument malfunction

Docking errors; Console troubleshooting; Electrical hazards; Bleeding complications; Organ injury management; Emergency conversion procedures; Quality assurance.

UNIT VIII – Recent Advances in Robotic Surgery – Autonomous robotic systems

Remote robotic surgery; Augmented reality integration; Virtual simulation systems; Smart robotic systems; Artificial Intelligence powered robotics; Digital surgery concepts; Future trends in robotics.

Practicals

- Robotic console demonstration
- Docking and positioning
- Camera navigation
- Instrument handling
- Simulation based robotic training
- Operation Theatre setup
- Instrument sterilization
- Clinical observation

Reference Books

- Fundamentals of Robotic Surgery
- Surgical Robotics Textbook
- Atlas of Robotic Surgery
- Principles of Minimally Invasive Surgery

Course Outcomes (COs)

CO1: Describe introduction to Robotic Surgical Procedures - Principles of robotic surgery.

CO2: Explain the structure, function or principles underlying robotic System Components - Surgeon console.

CO3: Apply knowledge of robotic Instrumentation - Robotic graspers to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to robotic Surgical Applications - Gastrointestinal robotic surgery.

CO5: Evaluate the clinical, safety or quality implications of principles of Robotic Minimally Invasive Surgery - Port placement techniques.

CO6: Demonstrate safe, competent procedural skills related to artificial Intelligence and Navigation Systems - Artificial Intelligence integration.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

28. Biomedical Equipment Technology [BSRT403]

L-T-P-C: 4 - - - 2 - 5 | Category: MC | Semester: 4

Unit-wise Syllabus

UNIT I – Introduction to Biomedical Equipment – Biomedical equipment basics

Classification of biomedical devices; Principles of biomedical engineering; Electrical systems in healthcare; Biomedical sensors; Safety standards; Equipment regulations; Documentation systems.

UNIT II – Surgical and Operation Theatre Equipment – Operation Theatre tables

Surgical lights; Electrosurgical units; Suction apparatus; Defibrillators; Ventilators; Patient monitoring systems; Infusion pumps.

UNIT III – Laparoscopic and Robotic Equipment – Laparoscopic camera systems

Insufflators; Robotic console systems; Navigation systems; Endoscopic systems; Three dimensional visualization systems; Energy devices; Equipment maintenance.

UNIT IV – Biomedical Equipment Maintenance – Preventive maintenance

Equipment inspection; Calibration techniques; Functional testing; Maintenance schedules; Documentation procedures; Safety checks; Quality assurance.

UNIT V – Electrical and Equipment Safety – Electrical hazards

Grounding systems; Leakage current testing; Fire safety measures; Emergency backup systems; Biomedical waste management; Safety audits; Healthcare regulations.

UNIT VI – Troubleshooting Techniques – Equipment failure analysis

Camera system troubleshooting; Monitor issues; Console troubleshooting; Instrument malfunction; Electrical fault management; Emergency repairs; Service documentation.

UNIT VII – Artificial Intelligence and Smart Biomedical Systems – Artificial Intelligence based maintenance

Smart monitoring systems; Internet of Things integration; Remote monitoring systems; Digital healthcare systems; Smart Operation Theatre systems; Biomedical innovations; Future developments.

UNIT VIII – Recent Advances in Biomedical Technology – Robotic biomedical systems

Automated calibration systems; Advanced imaging technologies; Telemedicine equipment; Smart diagnostics; Digital documentation systems; Research innovations; Future trends in biomedical engineering.

Practicals

- Biomedical equipment inspection
- Calibration exercises

- Electrical safety testing
- Camera system troubleshooting
- Preventive maintenance demonstrations
- Equipment setup procedures
- Documentation practice
- Clinical observation

Reference Books

- Biomedical Equipment Technology
- Biomedical Instrumentation by Arumugam
- Principles of Biomedical Engineering
- Hospital Equipment Maintenance Manual

Course Outcomes (COs)

CO1: Describe introduction to Biomedical Equipment - Biomedical equipment basics.
CO2: Explain the structure, function or principles underlying surgical and Operation Theatre Equipment - Operation Theatre tables.
CO3: Apply knowledge of laparoscopic and Robotic Equipment - Laparoscopic camera systems to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to biomedical Equipment Maintenance - Preventive maintenance.
CO5: Evaluate the clinical, safety or quality implications of electrical and Equipment Safety - Electrical hazards.
CO6: Demonstrate safe, competent procedural skills related to troubleshooting Techniques - Equipment failure analysis.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

29. Clinical Postings - II [BSRT404]

L-T-P-C: - - - - 8 - 4 | Category: SI | Semester: 4

Course Outcomes (COs)

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during clinical postings - ii.
CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.
CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.
CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.
CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

30. Health and Well-being [BSRT405]

L-T-P-C: 1 - - - - - 1 | Category: VAC | Semester: 4

Unit-wise Syllabus

Unit 1 – Introduction to Health and Well-being Overview of health and well-being concepts

Dimensions of health: Physical, mental, social, and emotional The impact of lifestyle choices on health.

Unit 2 – Physical Health and Fitness

Importance of physical activity for overall health; Types of exercise: Aerobic, strength, flexibility, and balance Creating a personal fitness plan Unit 3; Nutrition and Healthy Eating; Basics of nutrition: Macronutrients and micronutrients Healthy eating habits and food groups Impact of nutrition on physical and mental health.

Unit 4 – Mental Health and Emotional Well-being

Understanding mental health: Definitions, stigma, and myths Key aspects of emotional well-being; Building emotional resilience Unit 5; Stress Management Techniques Understanding stress and its effects on health Mindfulness and relaxation techniques; Time management for stress reduction.

Unit 6 – Sleep and Recovery

Importance of sleep for physical and mental health Sleep hygiene and healthy sleep habits Impact of sleep deprivation on overall well-being.

Unit 7 – Social Health and Relationships

The role of social connections in well-being; Healthy relationships: Communication, boundaries, and support Community involvement and social well-being.

Unit 8 – Substance Use and Addiction

The impact of alcohol, tobacco, and drugs on health Understanding addiction and treatment options Preventive measures and harm reduction strategies.

Unit 9 – Chronic Diseases and Prevention

Common chronic diseases (e.g., diabetes, heart disease) Risk factors and lifestyle modifications for prevention Screening, early detection, and health monitoring.

Unit 10 – Building Healthy Habits

The psychology of habit formation; Strategies for adopting and maintaining healthy habits Overcoming barriers to healthy behaviour changes.

Reference Books

- Health and Wellness" by S. L. Kaskutas & K. A. A. N

Course Outcomes (COs)

CO1: Describe introduction to Health and Well-being Overview of health and well-being concepts.

CO2: Explain the structure, function or principles underlying physical Health and Fitness.

CO3: Apply knowledge of mental Health and Emotional Well-being to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to sleep and Recovery.

CO5: Evaluate the clinical, safety or quality implications of social Health and Relationships.

CO6: Demonstrate safe, competent procedural skills related to substance Use and Addiction.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

31. Medical Coding [BSRT406]

L-T-P-C: 1 - - 4 - 3 | Category: MS | Semester: 4

Unit-wise Syllabus

Unit I: Introduction to Medical Coding – Definition, scope, and importance of medical coding

History and evolution of medical coding systems; Role of medical coders in healthcare organizations; Healthcare documentation and medical records; Ethics, confidentiality, and legal aspects of coding.

Unit II: Medical Terminology and Basic Sciences for Coding – Basics of medical terminology, prefixes, suffixes, and abbreviations

Fundamentals of anatomy and physiology for coding; Disease processes and clinical terminology; Diagnostic procedures and laboratory terminology; Pharmacological terminology relevant to coding.

Unit III: Coding Systems and Classification – Introduction to diagnostic and procedural coding systems

Disease classification and coding standards; Diagnostic coding principles and guidelines; Procedure coding and documentation requirements; Coding conventions, symbols, and modifiers.

Unit IV: Healthcare Reimbursement and Compliance – Basics of healthcare insurance and reimbursement systems

Claims processing and billing cycle; Documentation improvement and coding accuracy; Compliance, auditing, and quality assurance in coding; Fraud, abuse prevention, and legal regulations.

Unit V: Applications of Medical Coding – Coding of diseases and medical procedures in different specialties

Inpatient and outpatient coding principles; Case-based coding applications and exercises; Electronic health records and coding software; Career opportunities and professional standards in medical coding.

Practicals

- Identification and interpretation of medical terminologies and abbreviations.
- Practice in anatomy and disease-based coding exercises.
- Demonstration of diagnostic coding using standard classification systems.
- Practice of procedural coding from clinical case records.
- Coding of inpatient and outpatient medical records.
- Preparation and verification of insurance claim documentation.
- Use of coding manuals and electronic coding software.
- Case study analysis for coding accuracy and compliance.
- Practice in coding audits and error identification.
- Preparation of coding reports and medical documentation review.

Reference Books

- ICD-10-CM Expert for Physicians
- Medical Terminology for Health Professions
- Understanding Health Insurance: A Guide to Billing and Reimbursement
- Step-by-Step Medical Coding
- Medical Coding Training: CPC Practice Exam
- IIIyear – V semester

Course Outcomes (COs)

CO1: Describe introduction to Medical Coding - Definition, scope, and importance of medical coding.

CO2: Explain the structure, function or principles underlying medical Terminology and Basic Sciences for Coding - Basics of medical terminology, prefixes, suffixes, and abbreviations.

CO3: Apply knowledge of coding Systems and Classification - Introduction to diagnostic and procedural coding systems to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to healthcare Reimbursement and Compliance - Basics of healthcare insurance and reimbursement systems.

CO5: Evaluate the clinical, safety or quality implications of applications of Medical Coding - Coding of diseases and medical procedures in different specialties.

CO6: Perform, under supervision, the practical/simulation exercises prescribed for this course (e.g., identification and interpretation of medical terminologies and abbreviations., practice in anatomy and disease-based coding exercises., demonstration of diagnostic coding using standard classification systems.) with correct technique and documentation.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

32. Emerging Healthcare Technologies [BSRT501]

L-T-P-C: 1 - - - 2 - 2 | Category: MC | Semester: 5

Unit-wise Syllabus

Unit I: Introduction to Emerging Healthcare Technologies – Evolution of healthcare technology

Digital transformation in healthcare; Current trends and future directions; Technology adoption in healthcare settings.

Unit II: Digital Health and Telemedicine – Electronic Health Records (EHR)

Telemedicine and telehealth services; Mobile health (mHealth) applications; Remote patient monitoring systems; Wearable healthcare devices.

Unit III: Artificial Intelligence and Data Analytics – Introduction to Artificial Intelligence (AI)

Machine learning applications in healthcare; Clinical decision support systems; Big data analytics in healthcare; Predictive healthcare technologies.

Unit IV: Robotics and Automation in Healthcare – Medical and surgical robotics

Robotic-assisted procedures; Automation in hospitals and laboratories; Rehabilitation and assistive robots; Future scope of robotics in healthcare.

Unit V: Advanced Diagnostic and Therapeutic Technologies – Point-of-care diagnostic technologies

Advanced imaging systems; 3D printing in healthcare; Virtual Reality (VR) and Augmented Reality (AR); Precision and personalized medicine.

Unit VI: Smart Healthcare Systems and Future Innovations – Internet of Medical Things (IoMT)

Smart hospitals and connected healthcare; Cloud computing in healthcare; Cybersecurity and data protection; Emerging innovations and future healthcare technologies.

Practicals

- Demonstration of Electronic Health Record systems
- Use of telemedicine platforms
- Observation of wearable and remote monitoring devices
- Introduction to healthcare data management systems
- Demonstration of AI-enabled healthcare applications
- Observation of robotic healthcare systems
- Familiarization with VR/AR healthcare applications
- Demonstration of smart medical devices and IoMT technologies
- Case studies on emerging healthcare technologies
- Presentation and discussion on recent technological innovations in healthcare

Course Outcomes (COs)

CO1: Describe introduction to Emerging Healthcare Technologies - Evolution of healthcare technology.

CO2: Explain the structure, function or principles underlying digital Health and Telemedicine - Electronic Health Records (EHR).

CO3: Apply knowledge of artificial Intelligence and Data Analytics - Introduction to Artificial Intelligence (AI) to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to robotics and Automation in Healthcare - Medical and surgical robotics.

CO5: Evaluate the clinical, safety or quality implications of advanced Diagnostic and Therapeutic Technologies - Point-of-care diagnostic technologies.
CO6: Demonstrate safe, competent procedural skills related to smart Healthcare Systems and Future Innovations - Internet of Medical Things (IoMT).
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

33. Advanced Robotic Surgical Systems [BSRT502]

L-T-P-C: 2 - - - 2 - 3 | Category: MC | Semester: 5

Unit-wise Syllabus

UNIT I – Advanced Robotic Platforms and Technologies – Evolution of advanced robotic surgical platforms
Multi arm robotic systems; Modular robotic systems; Hybrid robotic systems; Flexible robotic systems; Compact robotic surgical systems; Telesurgical robotic platforms; Future robotic technologies.

UNIT II – Advanced Imaging and Visualization Systems – High definition imaging systems
Four kilo and eight kilo visualization; Three dimensional visualization technologies; Fluorescence guided imaging; Intraoperative imaging systems; Augmented reality integration; Virtual reality integration; Image enhancement technologies.

UNIT III – Advanced Robotic Instrumentation – Wristed robotic instruments
Smart robotic instruments; Advanced end effectors; Robotic stapling systems; Vessel sealing technologies; Robotic microsurgical instruments; Flexible robotic instruments; Instrument tracking systems.

UNIT IV – Robotic System Integration and Operating Theatre Automation – Integrated robotic Operation Theatre systems
Smart Operation Theatre technologies; Robotic workflow automation; Voice controlled systems; Data integration systems; Digital surgical platforms; Robotic communication systems; Operation Theatre networking systems.

UNIT V – Artificial Intelligence and Smart Surgical Systems – Artificial Intelligence powered robotic systems
Machine learning applications in robotic surgery; Predictive analytics in surgery; Automated surgical assistance; Motion tracking technologies; Real time surgical analytics; Smart decision support systems; Autonomous robotic concepts.

UNIT VI – Advanced Safety, Calibration and Troubleshooting – Advanced robotic calibration systems
System diagnostics and troubleshooting; Console synchronization errors; Instrument calibration errors; Robotic arm failure management; Electrical and software safety systems; Emergency robotic shutdown protocols; Cybersecurity in robotic systems.

UNIT VII – Specialized Robotic Surgical Applications – Robotic cardiac surgery systems
Robotic thoracic surgery systems; Robotic neurosurgical systems; Robotic orthopedic systems; Robotic microsurgery platforms; Robotic transplant surgery; Single port robotic surgery; Pediatric robotic surgical systems.

UNIT VIII – Recent Advances and Future Innovations – Remote robotic surgery
Telesurgery systems; Nanorobotics in surgery; Digital twin technology; Cloud connected robotic systems; Artificial Intelligence guided autonomous surgery; Smart healthcare robotics; Future trends in robotic surgical systems.

Practicals

- Advanced robotic console training
- Robotic system integration demonstration
- Advanced docking techniques
- Three dimensional visualization practice
- Instrument calibration exercises

- Smart robotic system demonstrations
- Troubleshooting and diagnostics practice
- Clinical observation of advanced robotic procedures

Reference Books

- Surgical Robotics: Systems Applications and Visions
- Fundamentals of Robotic Surgery
- Atlas of Robotic Surgery
- Robotic Surgery Technology and Applications

Course Outcomes (COs)

CO1: Describe advanced Robotic Platforms and Technologies - Evolution of advanced robotic surgical platforms.
CO2: Explain the structure, function or principles underlying advanced Imaging and Visualization Systems - High definition imaging systems.
CO3: Apply knowledge of advanced Robotic Instrumentation - Wristed robotic instruments to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to robotic System Integration and Operating Theatre Automation - Integrated robotic Operation Theatre systems.
CO5: Evaluate the clinical, safety or quality implications of artificial Intelligence and Smart Surgical Systems - Artificial Intelligence powered robotic systems.
CO6: Demonstrate safe, competent procedural skills related to advanced Safety, Calibration and Troubleshooting - Advanced robotic calibration systems.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

34. Robotic Urology and Gynecology Procedures [BSRT503]

L-T-P-C: 3 - - - 2 - 4 | Category: MC | Semester: 5

Unit-wise Syllabus

UNIT I – Introduction to Robotic Urology and Gynecology – Principles of robotic surgery

Applications in urology and gynecology; Advantages of robotic procedures; Patient selection criteria; Surgical workflow; Safety protocols; Team coordination; Future developments.

UNIT II – Robotic Urological Procedures – Robotic prostatectomy

Robotic nephrectomy; Pyeloplasty procedures; Cystectomy basics; Ureteric procedures; Robotic instrumentation in urology; Patient positioning; Procedure complications.

UNIT III – Robotic Gynecological Procedures – Robotic hysterectomy

Ovarian cystectomy; Endometriosis surgery; Pelvic floor procedures; Myomectomy; Fertility related robotic procedures; Gynecological robotic instrumentation; Surgical complications.

UNIT IV – Imaging and Navigation in Urology and Gynecology – Three dimensional visualization

Image guided surgery; Navigation systems; Motion tracking systems; Fluorescence imaging; Smart imaging systems; Artificial Intelligence integration; Future innovations.

UNIT V – Instrumentation and Docking Techniques – Robotic docking procedures

End effectors; Camera systems; Energy devices; Suturing systems; Stapling devices; Instrument maintenance; Sterilization protocols.

UNIT VI – Patient Safety and Infection Control – Surgical safety checklist

Infection prevention protocols; Biomedical waste management; Operation Theatre sterilization; Patient monitoring systems; Emergency management; Documentation systems; Quality assurance.

UNIT VII – Complications and Troubleshooting – Instrument malfunction

Docking errors; Bleeding complications; Organ injuries; Electrical hazards; Equipment troubleshooting; Emergency conversion procedures; Postoperative complications.

UNIT VIII – Recent Advances in Robotic Urology and Gynecology – Artificial Intelligence assisted robotic surgery

Remote robotic surgery; Smart robotic systems; Augmented reality integration; Virtual simulation systems; Robotic research innovations; Hybrid robotic procedures; Future trends in robotic surgery.

Practicals

- Robotic console demonstration
- Docking techniques
- Instrument handling
- Camera navigation
- Simulation based robotic training
- Urology robotic procedure observation
- Gynecology robotic procedure observation
- Clinical case discussions

Reference Books

- Robotic Urological Surgery
- Atlas of Gynecological Robotic Surgery
- Surgical Robotics Textbook
- Principles of Robotic Surgery

Course Outcomes (COs)

CO1: Describe introduction to Robotic Urology and Gynecology - Principles of robotic surgery.

CO2: Explain the structure, function or principles underlying robotic Urological Procedures - Robotic prostatectomy.

CO3: Apply knowledge of robotic Gynecological Procedures - Robotic hysterectomy to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to imaging and Navigation in Urology and Gynecology - Three dimensional visualization.

CO5: Evaluate the clinical, safety or quality implications of instrumentation and Docking Techniques - Robotic docking procedures.

CO6: Demonstrate safe, competent procedural skills related to patient Safety and Infection Control - Surgical safety checklist.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

35. Artificial Intelligence in Healthcare [BSRT504]

L-T-P-C: 3 - - - 2 - 4 | Category: MS | Semester: 5

Unit-wise Syllabus

UNIT I – Introduction to Artificial Intelligence – Basics of Artificial Intelligence

Machine learning concepts; Deep learning applications; Artificial Intelligence in healthcare; Data analytics; Decision support systems; Benefits and limitations; Future scope of Artificial Intelligence.

UNIT II – Artificial Intelligence in Diagnostics – Artificial Intelligence in medical imaging

Computer aided diagnosis; Predictive analytics; Pattern recognition systems; Clinical decision making; Artificial Intelligence in pathology; Smart diagnostic systems; Future innovations.

UNIT III – Artificial Intelligence in Robotic Surgery – Artificial Intelligence assisted robotic systems

Navigation systems; Motion tracking systems; Automated robotic movements; Image guided surgery; Workflow automation; Smart Operation Theatre systems; Future developments.

UNIT IV – Healthcare Data Management – Electronic medical records

Big data in healthcare; Data integration systems; Cloud based healthcare systems; Cybersecurity in healthcare; Data privacy and ethics; Artificial Intelligence ethics; Regulatory standards.

UNIT V – Artificial Intelligence in Patient Care – Remote patient monitoring

Telemedicine systems; Virtual healthcare assistants; Smart wearable devices; Artificial Intelligence based patient management; Clinical workflow optimization; Healthcare automation; Personalized medicine.

UNIT VI – Artificial Intelligence in Biomedical Equipment – Smart biomedical devices

Automated calibration systems; Predictive maintenance; Remote monitoring systems; Internet of Things in healthcare; Digital healthcare systems; Biomedical innovations; Future technologies.

UNIT VII – Simulation and Virtual Technologies – Virtual reality systems

Augmented reality systems; Simulation based medical education; Artificial Intelligence training simulators; Surgical simulation systems; Smart learning platforms; Remote learning technologies; Future educational systems.

UNIT VIII – Future Trends in Artificial Intelligence in Healthcare – Autonomous healthcare systems

Digital twin technology; Nanotechnology in medicine; Artificial Intelligence research applications; Smart hospitals; Robotic healthcare systems; Future innovations in healthcare; Future scope of Artificial Intelligence.

Practicals

- Artificial Intelligence software demonstration
- Simulation based robotic training
- Navigation system demonstration
- Data management exercises
- Smart healthcare system observation
- Imaging system analysis
- Clinical case studies
- Research discussions

Reference Books

- Artificial Intelligence in Healthcare
- Artificial Intelligence in Surgery
- Healthcare Data Analytics
- Principles of Medical Artificial Intelligence

Course Outcomes (COs)

CO1: Describe introduction to Artificial Intelligence - Basics of Artificial Intelligence.

CO2: Explain the structure, function or principles underlying artificial Intelligence in Diagnostics - Artificial Intelligence in medical imaging.

CO3: Apply knowledge of artificial Intelligence in Robotic Surgery - Artificial Intelligence assisted robotic systems to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to healthcare Data Management - Electronic medical records.

CO5: Evaluate the clinical, safety or quality implications of artificial Intelligence in Patient Care - Remote patient monitoring.

CO6: Demonstrate safe, competent procedural skills related to artificial Intelligence in Biomedical Equipment - Smart biomedical devices.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

36. Quality Assurance in Robotic Technology [BSRT505]

L-T-P-C: 3 - - - - - 3 | Category: SEC | Semester: 5

Unit-wise Syllabus

UNIT I – Principles of Quality Assurance – Concepts of quality assurance

Quality indicators in healthcare; Quality control systems; Risk management; Continuous quality improvement; Patient safety systems; Documentation standards; Audit procedures.

UNIT II – Quality Standards in Robotic Surgery – National Accreditation Board for Hospitals standards

Joint Commission International standards; Biomedical equipment standards; Surgical safety protocols; Infection prevention standards; Equipment validation systems; Compliance monitoring; Healthcare regulations.

UNIT III – Biomedical Equipment Quality Assurance – Preventive maintenance

Calibration techniques; Equipment inspection; Functional testing; Electrical safety checks; Instrument tracking systems; Sterilization validation; Documentation systems.

UNIT IV – Robotic Operation Theatre Quality Management – Operation Theatre quality indicators

Workflow optimization; Sterile field maintenance; Biomedical waste management; Surgical documentation; Team coordination; Incident reporting systems; Emergency preparedness.

UNIT V – Infection Control and Safety – Infection surveillance systems

Sterilization protocols; Endoscope reprocessing; Robotic instrument sterilization; Occupational safety; Fire safety measures; Electrical safety systems; Patient safety protocols.

UNIT VI – Audit and Accreditation – Clinical audit procedures

Equipment audit systems; Documentation audit; Accreditation processes; Quality improvement plans; Compliance assessment; Healthcare governance; Regulatory compliance.

UNIT VII – Artificial Intelligence in Quality Assurance – Artificial Intelligence based monitoring

Smart quality systems; Predictive maintenance systems; Data analytics in quality management; Automated audit systems; Digital healthcare monitoring; Smart Operation Theatre systems; Future innovations.

UNIT VIII – Recent Advances in Quality Assurance – Smart robotic quality systems

Remote monitoring technologies; Simulation based quality training; Digital documentation systems; Hybrid healthcare technologies; Robotic research innovations; Emerging healthcare quality systems; Future trends in robotic quality assurance.

Reference Books

- Quality Assurance in Healthcare
- Biomedical Equipment Maintenance Manual
- National Accreditation Board for Hospitals Accreditation Standards
- Principles of Healthcare Quality Management

Course Outcomes (COs)

CO1: Describe principles of Quality Assurance - Concepts of quality assurance.

CO2: Explain the structure, function or principles underlying quality Standards in Robotic Surgery - National Accreditation Board for Hospitals standards.

CO3: Apply knowledge of biomedical Equipment Quality Assurance - Preventive maintenance to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to robotic Operation Theatre Quality Management - Operation Theatre quality indicators.

CO5: Evaluate the clinical, safety or quality implications of infection Control and Safety - Infection surveillance systems.
CO6: Demonstrate safe, competent procedural skills related to audit and Accreditation - Clinical audit procedures.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

37. Clinical Postings - III [BSRT506]

L-T-P-C: - - - - 10 - 5 | Category: SI | Semester: 5

Course Outcomes (COs)

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during clinical postings - iii.
CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.
CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.
CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.
CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

38. Interpersonal Communication [BSRT507]

L-T-P-C: 1 - - - - - 1 | Category: VAC | Semester: 5

Unit-wise Syllabus

Unit 1 – Introduction to Interpersonal Communication

Overview of interpersonal communication theory.; Key principles: sender, message, receiver, feedback, noise. Importance of communication in daily life..

Unit 2 – Verbal Communication

The role of language in communication.; Choosing words carefully: Clarity, precision, and ambiguity. Influence of culture and context on verbal communication..

Unit 3 – Non-Verbal Communication

Body language, facial expressions, and gestures. Space, posture, and touch in communication.; The role of non-verbal cues in conveying emotions.

Unit 4 – Listening Skills

Types of listening: Active, passive, reflective. Barriers to effective listening.; Developing empathy through listening. Unit 5; Self-Disclosure and Relationship Development The importance of self-disclosure in relationships. The Johari Window model.; How self-disclosure affects trust and intimacy. Unit 6; Conflict in Interpersonal Communication Types of conflict: Productive vs. destructive. Conflict management styles.; Strategies for resolving conflict in healthy ways..

Unit 7 – Cultural and Gender Differences in Communication

Cultural influences on communication styles. Gender communication differences.; Strategies for effective cross-cultural communication. Unit 8; Communication in Close Relationships; Communication patterns in romantic relationships, family, and friendships.; Managing expectations and maintaining healthy communication in intimate relationships..

Unit 9 – Communication in the Workplace

Interpersonal communication in professional settings.; Navigating professional relationships and maintaining boundaries. Communication and leadership..

Unit 10 – Digital Communication

The role of technology in interpersonal communication. The impact of social media on relationships.; Pros and cons of digital communication tools.; The Ethics of Communication; Ethical dilemmas in communication.; Honesty, transparency, and privacy in conversations. Balancing openness with respect for others' boundaries..

Reference Books

- "Interpersonal Communication: Everyday Encounters" (Author: Julia T. Wood, 9th Edition)

Course Outcomes (COs)

CO1: Describe introduction to Interpersonal Communication.
CO2: Explain the structure, function or principles underlying verbal Communication.
CO3: Apply knowledge of non-Verbal Communication to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to listening Skills.
CO5: Evaluate the clinical, safety or quality implications of cultural and Gender Differences in Communication.
CO6: Demonstrate safe, competent procedural skills related to communication in the Workplace.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

39. Robotic Cardiac and Thoracic Surgery [BSRT601]

L-T-P-C: 2 - - - 2 - 3 | Category: MC | Semester: 6

Unit-wise Syllabus

UNIT I – Introduction to Robotic Cardiac and Thoracic Surgery – History and evolution of robotic cardiac surgery

Principles of robotic thoracic surgery; Advantages of robotic cardiac procedures; Applications of robotic surgery in cardiothoracic procedures; Patient selection criteria; Surgical workflow; Team coordination; Future scope of robotic cardiothoracic surgery.

UNIT II – Robotic Cardiac Surgical Procedures – Robotic coronary artery bypass surgery

Mitral valve repair procedures; Internal mammary artery harvesting; Robotic cardiac ablation procedures; Pericardial procedures; Cardiac robotic instrumentation; Cardiac surgical positioning; Cardiac surgery complications.

UNIT III – Robotic Thoracic Procedures – Robotic thoracoscopy

Robotic lobectomy; Mediastinal procedures; Pleural procedures; Lung biopsy techniques; Thoracic robotic instrumentation; Chest drain management; Thoracic surgery complications.

UNIT IV – Imaging and Navigation in Cardiothoracic Robotics – Three dimensional imaging systems

Image guided robotic surgery; Navigation systems; Motion tracking technologies; Fluorescence imaging; Smart visualization systems; Artificial Intelligence integration; Future imaging technologies.

UNIT V – Instrumentation and Safety – Robotic console systems

Robotic arms and end effectors; Energy devices; Instrument docking techniques; Patient monitoring systems; Infection prevention protocols; Emergency management; Quality assurance systems.

UNIT VI – Recent Advances in Robotic Cardiac and Thoracic Surgery – Remote robotic surgery

Artificial Intelligence assisted robotic surgery; Smart robotic systems; Hybrid cardiothoracic procedures; Virtual simulation systems; Robotic research innovations; Advanced surgical planning systems; Future trends in robotic cardiothoracic surgery.

Practicals

- Robotic console observation
- Docking and positioning techniques
- Camera navigation practice

- Instrument handling
- Thoracic robotic procedure observation
- Cardiac robotic surgery observation
- Simulation based robotic training
- Clinical case discussions

Reference Books

- Atlas of Thoracic Robotic Surgery
- Surgical Robotics Textbook
- Principles of Cardiothoracic Surgery

Course Outcomes (COs)

CO1: Describe introduction to Robotic Cardiac and Thoracic Surgery - History and evolution of robotic cardiac surgery.

CO2: Explain the structure, function or principles underlying robotic Cardiac Surgical Procedures - Robotic coronary artery bypass surgery.

CO3: Apply knowledge of robotic Thoracic Procedures - Robotic thoracoscopy to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to imaging and Navigation in Cardiothoracic Robotics - Three dimensional imaging systems.

CO5: Evaluate the clinical, safety or quality implications of instrumentation and Safety - Robotic console systems.

CO6: Demonstrate safe, competent procedural skills related to recent Advances in Robotic Cardiac and Thoracic Surgery - Remote robotic surgery.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

40. Research Methodology and Biostatistics [BSRT602]

L-T-P-C: 3 - - - - - 3 | Category: MC | Semester: 6

Reference Books

- Methods in biostatistics by Mahajan
- Research methodology by C R Kothari
- Creswell, J.W., & Creswell, J.D. (2023). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches
- Shamoo, A.E., & Resnik, D.B. (2015). Responsible Conduct of Research.
- Creswell, J.W. (2023). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches

Course Outcomes (COs)

CO1: Demonstrate the core competencies expected on completion of this course.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

41. Image Guided and Navigation Surgery [BSRT603]

L-T-P-C: 3 - - - 2 - 4 | Category: MS | Semester: 6

Unit-wise Syllabus

UNIT I – Introduction to Image Guided Surgery – Principles of image guided surgery

Evolution of navigation surgery; Applications in healthcare; Types of navigation systems; Advantages and limitations; Surgical workflow; Safety protocols; Future scope of navigation surgery.

UNIT II – Imaging Technologies in Surgery – Computed Tomography imaging

Magnetic Resonance Imaging; Fluoroscopy systems; Ultrasound guided surgery; Positron Emission Tomography imaging; Three dimensional imaging; Hybrid imaging systems; Imaging safety protocols.

UNIT III – Navigation Systems – Optical navigation systems

Electromagnetic navigation systems; Tracking technologies; Registration techniques; Motion tracking systems; Image fusion technologies; Surgical mapping systems; Navigation software systems.

UNIT IV – Image Guided Robotic Surgery – Image guided robotic systems

Artificial Intelligence integration; Motion scaling systems; Smart robotic technologies; Surgical planning systems; Navigation assisted robotics; Hybrid robotic systems; Future innovations.

UNIT V – Applications of Navigation Surgery – Neurosurgical navigation

Orthopedic navigation systems; Cardiac navigation procedures; Thoracic navigation surgery; Gastrointestinal navigation surgery; Ear Nose and Throat navigation systems; Urological navigation procedures; Gynecological navigation systems.

UNIT VI – Safety and Troubleshooting – Navigation system calibration

Imaging system troubleshooting; Registration errors; Motion tracking errors; Radiation safety; Emergency management; Quality assurance; Biomedical regulations.

UNIT VII – Augmented Reality and Virtual Reality in Surgery – Principles of augmented reality

Virtual reality simulation systems; Three dimensional visualization; Surgical simulation training; Virtual surgical planning; Smart visualization systems; Clinical applications; Future technologies.

UNIT VIII – Recent Advances in Image Guided Surgery – Artificial Intelligence based navigation

Smart surgical systems; Remote navigation surgery; Cloud based imaging systems; Digital twin technologies; Robotic image guided surgery; Simulation based surgical systems; Future trends in navigation surgery.

Practicals

- Navigation system demonstration
- Imaging system observation
- Registration techniques
- Motion tracking exercises
- Three dimensional visualization practice
- Surgical planning demonstrations
- Simulation based training
- Clinical observation

Reference Books

- Image Guided Surgery
- Principles of Navigation Surgery
- Surgical Robotics and Navigation
- Atlas of Image Guided Procedures

Course Outcomes (COs)

CO1: Describe introduction to Image Guided Surgery - Principles of image guided surgery.

CO2: Explain the structure, function or principles underlying imaging Technologies in Surgery - Computed Tomography imaging.

CO3: Apply knowledge of navigation Systems - Optical navigation systems to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to image Guided Robotic Surgery - Image guided robotic systems.

CO5: Evaluate the clinical, safety or quality implications of applications of Navigation Surgery - Neurosurgical navigation.

CO6: Demonstrate safe, competent procedural skills related to safety and Troubleshooting - Navigation system calibration.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

42. Robotics Maintenance and Troubleshooting [BSRT604]

L-T-P-C: 3 - - - 2 - 4 | Category: MC | Semester: 6

Unit-wise Syllabus

UNIT I – Introduction to Robotics Maintenance – Principles of biomedical maintenance

Preventive maintenance protocols; Robotic system inspection; Equipment documentation; Safety standards; Maintenance schedules; Biomedical regulations; Quality assurance systems.

UNIT II – Robotic Console and System Maintenance – Console maintenance procedures

Camera system maintenance; Vision cart troubleshooting; Robotic arm inspection; Motion scaling system checks; Software updates; System calibration; Preventive maintenance exercises.

UNIT III – Instrumentation and Calibration – Robotic instrument inspection

Instrument calibration techniques; End effector maintenance; Energy device maintenance; Instrument tracking systems; Sterilization effects on instruments; Instrument repair basics; Documentation systems.

UNIT IV – Electrical and Software Troubleshooting – Electrical hazards

Grounding systems; Power supply troubleshooting; Software troubleshooting; System synchronization errors; Cybersecurity basics; Emergency shutdown systems; Backup systems.

UNIT V – Imaging and Navigation Troubleshooting – Camera system errors

Imaging calibration techniques; Navigation system troubleshooting; Motion tracking errors; Registration errors; Data integration issues; Visualization problems; Emergency troubleshooting.

UNIT VI – Recent Advances in Robotic Maintenance – Artificial Intelligence based maintenance

Smart diagnostics; Internet of Things monitoring systems; Predictive maintenance systems; Remote troubleshooting systems; Automated calibration systems; Digital healthcare systems; Future trends in robotic maintenance.

Practicals

- Console troubleshooting demonstrations
- Instrument calibration exercises
- Camera system maintenance
- Navigation system checks
- Electrical safety testing
- Preventive maintenance demonstrations
- Emergency troubleshooting practice
- Clinical equipment observation

Reference Books

- Biomedical Equipment Technology
- Surgical Robotics Textbook
- Principles of Biomedical Engineering
- Robotics Maintenance Manual

Course Outcomes (COs)

CO1: Describe introduction to Robotics Maintenance - Principles of biomedical maintenance.
CO2: Explain the structure, function or principles underlying robotic Console and System Maintenance - Console maintenance procedures.
CO3: Apply knowledge of instrumentation and Calibration - Robotic instrument inspection to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to electrical and Software Troubleshooting - Electrical hazards.
CO5: Evaluate the clinical, safety or quality implications of imaging and Navigation Troubleshooting - Camera system errors.
CO6: Demonstrate safe, competent procedural skills related to recent Advances in Robotic Maintenance - Artificial Intelligence based maintenance.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

43. Clinical Postings - IV [BSRT605]

L-T-P-C: - - - - 10 - 5 | Category: SI | Semester: 6

Course Outcomes (COs)

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during clinical postings - iv.
CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.
CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.
CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.
CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

44. Art of Being a Better Person [BSRT606]

L-T-P-C: 1 - - - - - 1 | Category: VAC | Semester: 6

Unit-wise Syllabus

Unit 1 – Introduction to Being a Good Human Defining "goodness" and ethical living

Overview of moral philosophies: Utilitarianism, Deontology, Virtue Ethics The role of self-awareness in; personal growth; Activity: Reflective journaling on what "being good" means to you. Unit 2; The Power of Empathy Understanding empathy vs. sympathy; The science behind empathy and its benefits for social connections Techniques for cultivating empathy in everyday life; Activity: Empathy-building exercises and discussions..

Unit 3 – Emotional Intelligence (EQ)

What is Emotional Intelligence? (Self-awareness, self-regulation, motivation, empathy, and social skills) The role of EQ in personal and professional relationships; Strategies to improve emotional intelligence; Activity: Self-assessment of emotional intelligence and EQ development exercises. Unit 4; Compassion and Kindness; The science of kindness: How kindness benefits us and others Practicing kindness in small, everyday actions; Overcoming barriers to kindness (e.g., stress, biases, indifference) Activity: "Random Acts of Kindness" challenge..

Unit 5 – Personal Integrity and Honesty

The importance of integrity in personal and professional life Consequences of dishonesty and lack of integrity; How to align actions with values; Activity: Case study discussion on ethical dilemmas and decision-making. Unit 6; Building Positive Relationships; Communication skills for healthy relationships Setting boundaries and respecting

others' boundaries Conflict resolution and forgiveness; Activity: Role-playing scenarios to practice healthy communication..

Unit 7 – Responsibility and Accountability

The concept of personal responsibility in life Accountability in both personal and community contexts How to take ownership of mistakes and learn from them Activity: Reflect on past mistakes and plan for growth..

Unit 8 – Contributing to the Community and Society

The role of individuals in building strong communities Volunteering, activism, and social responsibility The impact of small, positive actions on a larger scale; Activity: Brainstorming session on potential ways to contribute to the local community..

Unit 9 – Practicing Gratitude and Contentment

The psychological and emotional benefits of gratitude Practicing contentment in a consumer-driven world Techniques for cultivating a mindset of abundance Activity: Gratitude journal and daily reflection..

Unit 10 – Living with Purpose and Meaning Discovering personal values and purpose

The intersection of passion, skills, and service Creating a life plan that aligns with core values Activity: Create a personal mission statement.; Week 11; Overcoming Negative Traits: Greed, Anger, and Envy The psychology behind negative emotions and traits How greed, anger, and envy affect our well-being; Strategies for managing and transforming negative emotions Activity: Mindfulness meditation and reflection exercises.; Bringing It All Together: A Life of Goodness Review of key learnings from the course Creating a vision for continuous personal growth; How to maintain a positive and ethical life in a challenging world; Activity: Final reflection paper or presentation on how students will apply the course's principles to their life..

Reference Books

- How to Win Friends and Influence People" by Dale Carnegie
- The Seven Habits of Highly Effective People" by Stephen R. Covey

Course Outcomes (COs)

CO1: Describe introduction to Being a Good Human Defining "goodness" and ethical living.
CO2: Explain the structure, function or principles underlying emotional Intelligence (EQ).
CO3: Apply knowledge of personal Integrity and Honesty to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to responsibility and Accountability.
CO5: Evaluate the clinical, safety or quality implications of contributing to the Community and Society.
CO6: Demonstrate safe, competent procedural skills related to practicing Gratitude and Contentment.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

45. Management of Medical Emergencies [BSRT607]

L-T-P-C: 1 - - - 2 - 2 | Category: MS | Semester: 6

Unit-wise Syllabus

Unit I: Fundamentals of Medical Emergencies – Introduction to medical emergencies

Emergency response systems; Primary and secondary assessment; Triage and patient prioritization.

Unit II: Basic Life Support and Airway Management – Adult and pediatric BLS

CPR techniques; Airway maintenance; Oxygen therapy; AED operation.

Unit III: Cardiovascular and Respiratory Emergencies – Cardiac arrest

Shock; Acute coronary syndrome; Respiratory distress; Asthma and airway obstruction.

Unit IV: Neurological, Metabolic and Trauma Emergencies – Seizures

Stroke; Hypoglycemia and hyperglycemia; Poisoning and anaphylaxis; Trauma and hemorrhage control.

Practicals

- Vital signs assessment and monitoring
- Basic Life Support (BLS) practice
- CPR on manikins
- AED demonstration and practice
- Airway management techniques
- Oxygen delivery methods
- Emergency drug tray familiarization
- Patient transfer and positioning
- Mock code blue drills
- Emergency documentation and reporting

Course Outcomes (COs)

CO1: Describe fundamentals of Medical Emergencies - Introduction to medical emergencies.

CO2: Explain the structure, function or principles underlying basic Life Support and Airway Management - Adult and pediatric BLS.

CO3: Apply knowledge of cardiovascular and Respiratory Emergencies - Cardiac arrest to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to neurological, Metabolic and Trauma Emergencies - Seizures.

CO5: Perform, under supervision, the practical/simulation exercises prescribed for this course (e.g., vital signs assessment and monitoring, basic life support (bls) practice, cpr on manikins) with correct technique and documentation.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

46. Internship - I [BSRT701]

L-T-P-C: - - - - 30 - 15 | Category: SI | Semester: 7

Course Outcomes (COs)

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during internship - i.

CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.

CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.

CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.

CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.

(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

47. Project - I [BSRT702]

L-T-P-C: - - - - 4 - 2 | Category: RP | Semester: 7

Course Outcomes (COs)

CO1: Formulate a research problem or project topic relevant to surgical/robotic technology, with defined objectives.

CO2: Apply an appropriate methodology, including literature review and data/information collection, to the project.

CO3: Analyze and interpret project findings using appropriate analytical or evaluative methods.
CO4: Prepare a structured, plagiarism-compliant written project report following academic conventions.
CO5: Present and defend the project outcomes through a viva-voce/oral presentation.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

48. Internship - II [BSRT801]

L-T-P-C: - - - - 30 - 15 | Category: SI | Semester: 8

Course Outcomes (COs)

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during internship - ii.
CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.
CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.
CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.
CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

49. Project - II [BSRT802]

L-T-P-C: - - - - 4 - 2 | Category: RP | Semester: 8

Reference Books

- Journal article preparation
- Seminar presentation
- Viva voce preparation
- Research ethics compliance
- Plagiarism checking
- Evidence based practice
- Research publication basics
- Documentation and logbook completion
- Communication and presentation skills
- Research innovations in robotic surgery
- Final project submission

Course Outcomes (COs)

CO1: Formulate a research problem or project topic relevant to surgical/robotic technology, with defined objectives.
CO2: Apply an appropriate methodology, including literature review and data/information collection, to the project.
CO3: Analyze and interpret project findings using appropriate analytical or evaluative methods.
CO4: Prepare a structured, plagiarism-compliant written project report following academic conventions.
CO5: Present and defend the project outcomes through a viva-voce/oral presentation.
(CO–PO–PSO and CO–GA mapping for this course appears in Annexure V.)

Annexure V – CO–PO–PSO–GA Mapping for All Courses

This annexure is the single consolidated reference for outcome-based education (OBE) compliance: for every course in the curriculum, it lists the approved Course Outcomes (COs) and maps each CO to the Programme Outcomes (POs), Programme Specific Outcomes (PSOs), and Graduate Attributes (GAs) defined in Sections 7 and 8. Mapping scale: 3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation. CO–GA correlations are derived from each CO's PO mapping combined with the GA–PO matrix (Section 7.2).

Mapping Scale

Score	Meaning
3	High correlation — the CO substantially develops this PO/PSO/GA
2	Medium correlation — the CO partially develops this PO/PSO/GA
1	Low correlation — the CO touches on this PO/PSO/GA indirectly
-	No meaningful correlation

Template

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Consolidated Programme-Level CO Density

Number of courses whose COs record a High (3) correlation with each PO, aggregated across all 49 courses of the curriculum:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
17	18	18	56	16	0	0	0	10	0

Course-wise CO–PO–PSO–GA Mapping

1. Human Anatomy - I [BSRT101]

CO1: Describe introduction to Anatomy & Osteology.

CO2: Explain the structure, function or principles underlying thorax, Lungs & Heart.

CO3: Apply knowledge of musculoskeletal & Excretory System to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to digestive System.

CO5: Evaluate the clinical, safety or quality implications of nervous System.

CO6: Perform, under supervision, the practical/simulation exercises prescribed for this course (e.g., bone identification, surface anatomy demonstration, organ anatomy) with correct technique and documentation.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	3	-	-	-	-	-	-	2	-	-	3	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	3	3	3	2	-	2	2	-	3	2

2. Human Physiology - I [BSRT102]

CO1: Describe cell and Blood Physiology.

CO2: Explain the structure, function or principles underlying cardiovascular System.

CO3: Apply knowledge of respiratory and Excretory System to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to reproductive, Nervous and Endocrine System.

CO5: Evaluate the clinical, safety or quality implications of digestive System and Special Senses.

CO6: Perform, under supervision, the practical/simulation exercises prescribed for this course (e.g., determination of blood groups (blood grouping, rh factor determination), vital signs measurement (blood pressure, heart rate, respiratory rate, body

temperature measurement using sphygmomanometer, stethoscope and thermometer), electrocardiography – ecg (electrode placement, ecg waveform recording, interpretation of ecg, identification of abnormalities)) with correct technique and documentation.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	3	-	-	-	-	-	-	-	-	-	3	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	2	-	-	-	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	2	2	2	-	2	2	-	3	2

3. Medical Biochemistry [BSRT103]

CO1: Describe carbohydrate & Lipid Chemistry.

CO2: Explain the structure, function or principles underlying amino Acid & Nucleic Acid Chemistry.

CO3: Apply knowledge of enzymes & Vitamins to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to intermediary Metabolism.

CO5: Evaluate the clinical, safety or quality implications of mineral Metabolism & Clinical Biochemistry.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 3	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	3	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	3	-	-	-	-	-	-	2	-	-	3	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	2	-	2	2	-	3	2

4. Sociology [BSRT104]

CO1: Describe introduction:.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-

5. English and Communication Skills [BSRT105]

CO1: Demonstrate the core competencies expected on completion of this course.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-

6. Basics of Computers [BSRT106]

CO1: Describe to understand all components of computer, different working environments and operations of computer.
CO2: Explain to learn creating different types of word documents, MS Excel manipulations, Power point documents.
CO3: Apply to understand basic requirements of computer network hardware, software and its network architecture.
CO4: Analyze uNIT – I(6 HOURS).
CO5: Evaluate introduction to computers--Definition of Computer-Characteristics of computer- Components of Computer Hardware – Input & Output devices- Memories– RAM and ROM– MB, GB their conversions – Software: Application Software and Systems software- Data and Information.
CO6: Demonstrate different computer languages- Number systems- Binary and decimal conversions. UNIT – II(6 HOURS).

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	3	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	3	-	3	-	3
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-

7. Human Anatomy - I Practical [BSRT107]

CO1: Demonstrate the core competencies expected on completion of this course.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-

8. Human Physiology - I Practical [BSRT108]

CO1: Demonstrate the core competencies expected on completion of this course.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-

9. Environmental Awareness [BSRT109]

CO1: Describe introduction to Environmental Awareness What is environmental awareness?.

CO2: Explain the structure, function or principles underlying earth's Ecosystems and Biodiversity.

CO3: Apply knowledge of pollution and Its Impact to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to climate Change and Global Warming The science of climate change..

CO5: Evaluate the clinical, safety or quality implications of resource Conservation.

CO6: Demonstrate safe, competent procedural skills related to sustainable Agriculture and Food Systems Environmental impact of conventional farming practices.Sustainable agriculture: organic farming, permaculture, and agroecology. The role of diet in environmental sustainability..

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	-	-	-	-	-	-	-	-	-

10. Human Anatomy - II [BSRT201]

CO1: Describe lOWER EXTREMITY:.

CO2: Explain the structure, function or principles underlying lOWER EXTREMITY:.

CO3: Apply knowledge of vERTEBRAL COLUMN AND PELVIC GIRDLE: to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to hEAD AND NECK:.

CO5: Evaluate the clinical, safety or quality implications of nEURO ANATOMY:.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	3	-	-	-	-	-	-	2	-	-	3	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	2	2	-	3	2

11. Human Physiology - II [BSRT202]

CO1: Describe nERVOUS SYSTEM-I.

CO2: Explain the structure, function or principles underlying nERVOUS SYSTEM-II.

CO3: Apply knowledge of sPECIAL SENSES: to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to rEPRODUCTIVE SYSTEM:.

CO5: Evaluate the clinical, safety or quality implications of gASTROINTESTINAL SYSTEM: - Physiological stages of digestion.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	3	-	-	-	-	-	-	2	-	-	3	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	2	2	-	3	2

12. Pathology [BSRT203]

CO1: Describe cellular adaptation, Cell injury & cell death..

CO2: Explain the structure, function or principles underlying inflammation. - - General features of inflammation Historical highlights.

CO3: Apply knowledge of immunity disorders. to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to infectious diseases. - - General principles of microbial pathogenesis viral infections..

CO5: Evaluate the clinical, safety or quality implications of neoplasia. - - Definitions Nomenclature..

CO6: Demonstrate safe, competent procedural skills related to environmental and nutritional disorders..

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	3	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	3	3	3	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	-	-	-	-	-	-	-	-	-

13. Microbiology [BSRT204]

CO1: Describe morphology - - Classification of microorganisms, size, shape and structure of bacteria. Use of microscope in the study of bacteria..

CO2: Explain the structure, function or principles underlying growth and nutrition. - - Nutrition, growth and multiplications of bacteria, use of culture media in diagnostic bacteriology..

CO3: Apply knowledge of culture media. - - Use of culture media in diagnostic bacteriology, antimicrobial sensitivity test. to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to sterilization and Disinfection..

CO5: Evaluate the clinical, safety or quality implications of immunology. - - Immunity, vaccines, types of vaccine and immunization schedule, principles, and interpretation of common serological tests namely Widal, VDRL, ASLO, CRP, RF & ELISA..

CO6: Demonstrate safe, competent procedural skills related to morphology, cultivation, diseases caused, laboratory diagnosis including specimen.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	3	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	3	3	3	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	-	-	-	-	-	-	-	-	-

14. Human Anatomy - II Practical [BSRT205]

CO1: Demonstrate the core competencies expected on completion of this course.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-

15. Human Physiology - II Practical [BSRT206]

CO1: Demonstrate the core competencies expected on completion of this course.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-

16. Introduction to Surgical Robotics [BSRT207]

CO1: Describe introduction to Robotics - Definition and history of robotics.

CO2: Explain the structure, function or principles underlying basic Components of Robotic Systems - Manipulators and robotic arms.

CO3: Apply knowledge of robot Kinematics and Motion - Degrees of Freedom to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to control Fundamentals in Robotics - Principles of robotic control systems.

CO5: Evaluate the clinical, safety or quality implications of introduction to Surgical Robotics - Principles of robotic surgery.

CO6: Demonstrate safe, competent procedural skills related to robotic Systems in Healthcare - Robotic laparoscopic assistance.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 2	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	3	-	-	-	2	-	-	-	3	3	3
CO 6	-	-	-	3	-	-	2	-	-	-	-	3	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	3	-	3	-	3
CO2	3	3	3	-	-	3	-	3	-	3
CO3	-	-	-	-	-	-	-	-	-	-

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO4	3	3	3	-	-	3	-	3	-	3
CO5	3	3	3	2	-	3	2	3	3	3
CO6	3	3	3	-	3	3	-	3	-	3

17. Stress Management [BSRT208]

CO1: Describe introduction to Stress and Its Effects Definition of stress: Eustress vs. Distress Types of stress: Acute vs. Chronic.
CO2: Explain the structure, function or principles underlying identifying Stressors and Personal Stress Responses.
CO3: Apply knowledge of coping Strategies and Stress Relief Techniques Problem-focused vs. emotion-focused coping to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to lifestyle Changes for Managing Stress The role of physical activity and exercise Sleep hygiene and its connection to stress Nutrition and its impact on mental health Social support and healthy relationships Mindfulness and meditation practices.
CO5: Evaluate the clinical, safety or quality implications of stress Management at Work and School.
CO6: Demonstrate safe, competent procedural skills related to building Long-Term Stress Resilience.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	2	-	-	-	3
CO 6	-	-	-	-	-	-	-	-	-	2	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	2	-	2	2	-	-	3	2	2	3
CO2	2	-	2	2	-	-	3	2	2	3
CO3	2	-	2	2	-	-	3	2	2	3
CO4	2	-	2	2	-	-	3	2	2	3
CO5	2	2	2	2	-	2	3	2	3	3
CO6	2	-	2	2	-	-	3	2	2	3

18. General Surgery and OT Techniques [BSRT301]

CO1: Describe introduction to General Surgery - History and evolution of surgery.

CO2: Explain the structure, function or principles underlying operation Theatre Techniques - Operation Theatre design and layout.

CO3: Apply knowledge of surgical Instrumentation - Surgical instruments classification to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to principles of Asepsis and Sterilization - Surgical asepsis.

CO5: Evaluate the clinical, safety or quality implications of wound Care and Suturing Techniques - Types of wounds.

CO6: Demonstrate safe, competent procedural skills related to anesthesia and Patient Monitoring - Basics of anesthesia.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	3	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	3	-	-	-	-	-	-	-	-	3	-	-
CO 4	-	-	-	-	3	-	-	-	-	-	-	3	3	-
CO 5	-	-	3	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	2	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	3	3	-	3	-	-
CO3	3	3	3	-	-	-	-	-	3	3
CO4	3	3	3	-	-	-	3	3	3	-
CO5	3	3	3	2	-	2	2	-	3	3
CO6	2	-	-	-	-	-	2	2	-	-

19. Pharmacology [BSRT302]

CO1: Describe general Pharmacology.

CO2: Explain the structure, function or principles underlying autonomic nervous system & Peripheral nervous system.

CO3: Apply knowledge of hormones to supervised clinical/laboratory/simulation practice.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	3	-	-	-	-	2	-	-	-	-	3	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	-	2	2	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-

20. Medical Law and Ethics [BSRT303]

CO1: Describe medical ethics - Definition - Goal Scope Introduction to Code of conduct.

CO2: Explain the structure, function or principles underlying basic principles of medical ethics Confidentiality Malpractice and negligence - Rational and irrational drug therapy.

CO3: Apply knowledge of autonomy and informed consent - Right of patients Care of the terminally ill- Euthanasia to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to organ transplantation.

CO5: Evaluate the clinical, safety or quality implications of commonly Used Prefixes, Suffixes and root words in Medical Terminology, Common Latin Terms used in Prescription Writing, Study of Standard Abbreviations..

CO6: Demonstrate safe, competent procedural skills related to medical Records Management. Meaning, functions, principles of record keeping, Importance of medical records to patients, doctors, and hospitals, classification of records like coding system, indexing system, types of forms basic and special, legal aspects of medical records..

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 2	3	-	-	-	-	2	-	-	-	2	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	2	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	2	-	2	2	-	-	3	2	2	3
CO2	3	3	3	2	-	-	3	2	2	3
CO3	2	-	2	2	-	-	3	2	2	3
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	2	2	2	-	2	2	-	3	2

21. Principles of Surgical Robotics [BSRT304]

CO1: Describe introduction to Surgical Robotics - History and evolution of surgical robotics.
CO2: Explain the structure, function or principles underlying robotic System Components - Surgeon console.
CO3: Apply knowledge of robotic Instrumentation - Robotic graspers to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to principles of Minimally Invasive Robotic Surgery - Port placement.
CO5: Evaluate the clinical, safety or quality implications of artificial Intelligence and Navigation - Artificial Intelligence basics.
CO6: Demonstrate safe, competent procedural skills related to applications of Surgical Robotics - Gastrointestinal robotic surgery.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 2	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 3	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO 4	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	3	-	-	-	-	-	-	-	3	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	3	-	3	-	3
CO2	3	3	3	-	-	3	-	3	-	3
CO3	3	3	3	-	-	3	-	3	3	3

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO4	3	3	3	-	-	3	-	3	-	3
CO5	-	2	2	2	-	2	2	-	3	2
CO6	3	3	3	-	-	3	-	3	-	3

22. Health Care Administration [BSRT305]

CO1: Describe the organization, structure and functions of healthcare and hospital administration.

CO2: Explain healthcare systems, policy and regulatory frameworks relevant to India.

CO3: Apply basic principles of human-resource and materials management to a healthcare/OT setting.

CO4: Analyze healthcare quality and accreditation requirements relevant to surgical/robotic-technology services.

CO5: Evaluate basic healthcare finance and information-systems concepts in supporting administrative decision-making.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	3	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	3	-	-	-	2	-	-	-	3	3	3
CO 5	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	3	3	-	3	-	-
CO4	3	3	3	2	-	3	2	3	3	3
CO5	-	-	-	-	-	-	-	-	-	-

23. Infection Control and Sterilization [BSRT306]

CO1: Describe introduction to Biosafety and Biohazards - Definition, scope, and importance of biosafety and biohazard management.

CO2: Explain the structure, function or principles underlying biosafety Levels and Containment Measures - Biosafety levels (BSL-1, BSL-2, BSL-3, BSL-4) and their applications.

CO3: Apply knowledge of infection Prevention and Control - Principles of infection prevention and control to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to biomedical Waste and Biohazard Management - Biomedical waste: definition, classification, and segregation.
CO5: Evaluate the clinical, safety or quality implications of emergency Preparedness and Legal Aspects - Biological accidents and emergency response planning.
CO6: Demonstrate safe, competent procedural skills related to principles of Infection Control - Hospital acquired infections.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	3	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	3	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	3	-	-	-	-	-	-	-	3	-
CO 4	3	-	-	-	3	-	-	-	-	-	3	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	3	-	-	-	-	-	-	-	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	-	3	3	3	-
CO2	3	3	3	-	-	-	3	3	3	-
CO3	3	3	3	-	-	-	3	3	3	-
CO4	3	3	3	-	-	-	3	3	3	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	3	3	3	-	-	-	3	3	3	-

24. Clinical Postings - I [BSRT307]

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during clinical postings - i.
CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.
CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.
CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.
CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	3	-	-	-	-	2	-	-	3	3
CO 2	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	3	-	3
CO 4	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 5	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	2	-	-	3	3	3	3
CO2	3	3	3	-	3	3	-	3	-	3
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	3	3	-	3	-	3
CO5	-	-	-	-	-	-	-	-	-	-

25. Soft Skills Development [BSRT308]

CO1: Describe introduction to Soft Skills.

CO2: Explain the structure, function or principles underlying communication Skills.

CO3: Apply knowledge of emotional Intelligence (EQ) to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to teamwork and Collaboration Roles and dynamics within teams Effective communication in teams Conflict resolution in teams.

CO5: Evaluate the clinical, safety or quality implications of conflict Resolution.

CO6: Demonstrate safe, competent procedural skills related to time Management and Personal Organization.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 2	-	-	-	-	-	-	2	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	2	-	-	-	1	-	-	-

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	2	-	2	2	-	-	3	2	2	3
CO2	-	2	-	-	3	3	-	2	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	2	-	-	3	3	-	2	-	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	-	-	-	-	-	-	-	-	-

26. Minimally Invasive Surgery [BSRT401]

CO1: Describe introduction to Minimally Invasive Surgery - History and evolution of minimally invasive surgery.

CO2: Explain the structure, function or principles underlying laparoscopic Systems and Equipment - Laparoscopic camera systems.

CO3: Apply knowledge of principles of Pneumoperitoneum - Creation of pneumoperitoneum to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to minimally Invasive Surgical Instrumentation - Graspers and dissectors.

CO5: Evaluate the clinical, safety or quality implications of minimally Invasive Surgical Procedures - Laparoscopic appendectomy.

CO6: Demonstrate safe, competent procedural skills related to operation Theatre Management and Safety - Operation Theatre setup.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO 2	-	-	3	-	-	-	-	-	-	-	-	-	3	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	3	-	-	-	-	-	-	-	-	3	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	3	-	3

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 6	-	3	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	3	3
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	-	-	-	3	3
CO5	-	2	2	2	-	2	2	-	3	2
CO6	3	3	3	-	3	3	-	3	-	-

27. Robotic Assisted Surgical Procedures [BSRT402]

CO1: Describe introduction to Robotic Surgical Procedures - Principles of robotic surgery.

CO2: Explain the structure, function or principles underlying robotic System Components - Surgeon console.

CO3: Apply knowledge of robotic Instrumentation - Robotic graspers to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to robotic Surgical Applications - Gastrointestinal robotic surgery.

CO5: Evaluate the clinical, safety or quality implications of principles of Robotic Minimally Invasive Surgery - Port placement techniques.

CO6: Demonstrate safe, competent procedural skills related to artificial Intelligence and Navigation Systems - Artificial Intelligence integration.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 2	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 3	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO 4	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 5	-	-	-	3	-	-	-	2	-	-	-	3	3	3
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	3	-	3	-	3
CO2	3	3	3	-	-	3	-	3	-	3
CO3	3	3	3	-	-	3	-	3	3	3
CO4	3	3	3	-	-	3	-	3	-	3
CO5	3	3	3	2	-	3	2	3	3	3
CO6	-	-	-	-	-	-	-	-	-	-

28. Biomedical Equipment Technology [BSRT403]

CO1: Describe introduction to Biomedical Equipment - Biomedical equipment basics.

CO2: Explain the structure, function or principles underlying surgical and Operation Theatre Equipment - Operation Theatre tables.

CO3: Apply knowledge of laparoscopic and Robotic Equipment - Laparoscopic camera systems to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to biomedical Equipment Maintenance - Preventive maintenance.

CO5: Evaluate the clinical, safety or quality implications of electrical and Equipment Safety - Electrical hazards.

CO6: Demonstrate safe, competent procedural skills related to troubleshooting Techniques - Equipment failure analysis.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	3	-	3	-	-	-	-	-	-	-	3	-	3	-
CO 2	-	3	3	-	-	-	-	-	-	-	-	3	3	-
CO 3	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO 4	3	-	3	-	-	-	-	2	-	-	3	-	3	-
CO 5	-	-	3	-	-	-	-	2	-	-	-	-	3	3
CO 6	-	-	3	-	-	-	-	2	-	-	-	-	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	-	-	-	3	3
CO2	3	3	3	-	3	3	-	3	3	3
CO3	3	3	3	-	-	3	-	3	3	3
CO4	3	3	3	2	-	2	2	-	3	3

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO5	3	3	3	2	-	2	2	-	3	3
CO6	3	3	3	2	-	2	2	-	3	3

29. Clinical Postings - II [BSRT404]

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during clinical postings - ii.
CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.
CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.
CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.
CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	3	-	-	-	-	2	-	-	3	3
CO 2	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	3	-	3
CO 4	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 5	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	2	-	-	3	3	3	3
CO2	3	3	3	-	3	3	-	3	-	3
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	3	3	-	3	-	3
CO5	-	-	-	-	-	-	-	-	-	-

30. Health and Well-being [BSRT405]

CO1: Describe introduction to Health and Well-being Overview of health and well-being concepts.
CO2: Explain the structure, function or principles underlying physical Health and Fitness.
CO3: Apply knowledge of mental Health and Emotional Well-being to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to sleep and Recovery.
CO5: Evaluate the clinical, safety or quality implications of social Health and Relationships.

CO6: Demonstrate safe, competent procedural skills related to substance Use and Addiction.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	2	-	2	2	-	-	3	2	2	3
CO2	-	-	-	-	-	-	-	-	-	-
CO3	2	-	2	2	-	-	3	2	2	3
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	-	-	-	-	-	-	-	-	-

31. Medical Coding [BSRT406]

CO1: Describe introduction to Medical Coding - Definition, scope, and importance of medical coding.

CO2: Explain the structure, function or principles underlying medical Terminology and Basic Sciences for Coding - Basics of medical terminology, prefixes, suffixes, and abbreviations.

CO3: Apply knowledge of coding Systems and Classification - Introduction to diagnostic and procedural coding systems to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to healthcare Reimbursement and Compliance - Basics of healthcare insurance and reimbursement systems.

CO5: Evaluate the clinical, safety or quality implications of applications of Medical Coding - Coding of diseases and medical procedures in different specialties.

CO6: Perform, under supervision, the practical/simulation exercises prescribed for this course (e.g., identification and interpretation of medical terminologies and abbreviations., practice in anatomy and disease-based coding exercises., demonstration of diagnostic coding using standard classification systems.) with correct technique and documentation.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	2	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	2	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	2	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	3	-	3
CO 6	3	-	-	-	-	-	-	2	-	-	3	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	2	2	2	-	2	2	-	3	2
CO2	-	2	2	2	-	2	2	-	3	2
CO3	-	2	2	2	-	2	2	-	3	2
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	3	3	3	2	-	2	2	-	3	2

32. Emerging Healthcare Technologies [BSRT501]

CO1: Describe introduction to Emerging Healthcare Technologies - Evolution of healthcare technology.

CO2: Explain the structure, function or principles underlying digital Health and Telemedicine - Electronic Health Records (EHR).

CO3: Apply knowledge of artificial Intelligence and Data Analytics - Introduction to Artificial Intelligence (AI) to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to robotics and Automation in Healthcare - Medical and surgical robotics.

CO5: Evaluate the clinical, safety or quality implications of advanced Diagnostic and Therapeutic Technologies - Point-of-care diagnostic technologies.

CO6: Demonstrate safe, competent procedural skills related to smart Healthcare Systems and Future Innovations - Internet of Medical Things (IoMT).

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 2	-	-	-	-	-	-	-	2	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	2	2	2	-	2	2	-	3	2
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	3	-	3	-	3
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	-	-	-	-	-	-	-	-	-

33. Advanced Robotic Surgical Systems [BSRT502]

CO1: Describe advanced Robotic Platforms and Technologies - Evolution of advanced robotic surgical platforms.

CO2: Explain the structure, function or principles underlying advanced Imaging and Visualization Systems - High definition imaging systems.

CO3: Apply knowledge of advanced Robotic Instrumentation - Wristed robotic instruments to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to robotic System Integration and Operating Theatre Automation - Integrated robotic Operation Theatre systems.

CO5: Evaluate the clinical, safety or quality implications of artificial Intelligence and Smart Surgical Systems - Artificial Intelligence powered robotic systems.

CO6: Demonstrate safe, competent procedural skills related to advanced Safety, Calibration and Troubleshooting - Advanced robotic calibration systems.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 3	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO 4	-	3	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	3	-	-	-	2	-	-	-	3	3	3
CO 6	-	-	-	3	-	-	-	2	-	-	-	-	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	3	-	3	-	3
CO2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	3	-	3	3	3
CO4	3	3	3	-	3	3	-	3	-	3
CO5	3	3	3	2	-	3	2	3	3	3
CO6	3	3	3	2	-	3	2	3	3	3

34. Robotic Urology and Gynecology Procedures [BSRT503]

CO1: Describe introduction to Robotic Urology and Gynecology - Principles of robotic surgery.

CO2: Explain the structure, function or principles underlying robotic Urological Procedures - Robotic prostatectomy.

CO3: Apply knowledge of robotic Gynecological Procedures - Robotic hysterectomy to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to imaging and Navigation in Urology and Gynecology - Three dimensional visualization.

CO5: Evaluate the clinical, safety or quality implications of instrumentation and Docking Techniques - Robotic docking procedures.

CO6: Demonstrate safe, competent procedural skills related to patient Safety and Infection Control - Surgical safety checklist.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 2	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 5	-	-	3	3	-	-	-	2	-	-	-	3	3	3
CO 6	-	-	-	-	3	-	-	-	-	-	-	3	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	3	-	3	-	3
CO2	3	3	3	-	-	3	-	3	-	3
CO3	3	3	3	-	-	3	-	3	-	3
CO4	-	-	-	-	-	-	-	-	-	-
CO5	3	3	3	2	-	3	2	3	3	3
CO6	3	3	3	-	-	-	3	3	3	-

35. Artificial Intelligence in Healthcare [BSRT504]

CO1: Describe introduction to Artificial Intelligence - Basics of Artificial Intelligence.

CO2: Explain the structure, function or principles underlying artificial Intelligence in Diagnostics - Artificial Intelligence in medical imaging.

CO3: Apply knowledge of artificial Intelligence in Robotic Surgery - Artificial Intelligence assisted robotic systems to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to healthcare Data Management - Electronic medical records.

CO5: Evaluate the clinical, safety or quality implications of artificial Intelligence in Patient Care - Remote patient monitoring.

CO6: Demonstrate safe, competent procedural skills related to artificial Intelligence in Biomedical Equipment - Smart biomedical devices.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	3	-	-	2	-	-	-	-	3	3	-
CO 4	-	-	-	-	-	-	-	2	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	3	-	3	-	-	-	-	-	-	-	3	-	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	3	3	-	3	-	3
CO4	-	2	2	2	-	2	2	-	3	2
CO5	-	2	2	2	-	2	2	-	3	2
CO6	3	3	3	-	-	-	-	-	3	3

36. Quality Assurance in Robotic Technology [BSRT505]

CO1: Describe principles of Quality Assurance - Concepts of quality assurance.

CO2: Explain the structure, function or principles underlying quality Standards in Robotic Surgery - National Accreditation Board for Hospitals standards.

CO3: Apply knowledge of biomedical Equipment Quality Assurance - Preventive maintenance to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to robotic Operation Theatre Quality Management - Operation Theatre quality indicators.

CO5: Evaluate the clinical, safety or quality implications of infection Control and Safety - Infection surveillance systems.

CO6: Demonstrate safe, competent procedural skills related to audit and Accreditation - Clinical audit procedures.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 2	-	-	-	3	-	-	-	2	-	-	-	-	3	3
CO 3	3	-	3	-	-	-	-	2	-	-	3	-	3	3
CO 4	-	3	-	3	-	-	-	2	-	-	-	-	3	3
CO 5	-	-	-	-	3	-	-	2	-	-	-	-	3	3
CO 6	-	-	-	-	-	-	-	-	-	-	-	3	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	2	2	2	-	2	2	-	3	2
CO2	3	3	3	2	-	3	2	3	3	3

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO3	3	3	3	2	-	2	2	-	3	3
CO4	3	3	3	2	3	3	2	3	3	3
CO5	3	3	3	2	-	2	3	3	3	2
CO6	-	-	-	-	-	-	-	-	-	-

37. Clinical Postings - III [BSRT506]

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during clinical postings - iii.

CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.

CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.

CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.

CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	3	-	-	-	-	2	-	-	3	3
CO 2	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	3	-	3
CO 4	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 5	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	2	-	-	3	3	3	3
CO2	3	3	3	-	3	3	-	3	-	3
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	3	3	-	3	-	3
CO5	-	-	-	-	-	-	-	-	-	-

38. Interpersonal Communication [BSRT507]

CO1: Describe introduction to Interpersonal Communication.

CO2: Explain the structure, function or principles underlying verbal Communication.

CO3: Apply knowledge of non-Verbal Communication to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to listening Skills.
CO5: Evaluate the clinical, safety or quality implications of cultural and Gender Differences in Communication.
CO6: Demonstrate safe, competent procedural skills related to communication in the Workplace.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	2	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	2	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	2	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	2	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	2	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	2	-	-	3	3	-	2	-	-
CO2	-	2	-	-	3	3	-	2	-	-
CO3	-	2	-	-	3	3	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	3	3	2	2	3	2
CO6	-	2	-	-	3	3	-	2	-	-

39. Robotic Cardiac and Thoracic Surgery [BSRT601]

CO1: Describe introduction to Robotic Cardiac and Thoracic Surgery - History and evolution of robotic cardiac surgery.
CO2: Explain the structure, function or principles underlying robotic Cardiac Surgical Procedures - Robotic coronary artery bypass surgery.
CO3: Apply knowledge of robotic Thoracic Procedures - Robotic thoracoscopy to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to imaging and Navigation in Cardiothoracic Robotics - Three dimensional imaging systems.
CO5: Evaluate the clinical, safety or quality implications of instrumentation and Safety - Robotic console systems.
CO6: Demonstrate safe, competent procedural skills related to recent Advances in Robotic Cardiac and Thoracic Surgery - Remote robotic surgery.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 2	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 3	-	-	-	3	-	-	-	-	-	-	-	3	3	-
CO 4	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	3	3	-	-	-	2	-	-	-	-	3	3
CO 6	-	-	-	3	-	-	-	-	-	-	-	-	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	-	-	3	-	3	-	3
CO2	3	3	3	-	-	3	-	3	-	3
CO3	3	3	3	-	-	3	-	3	-	3
CO4	3	3	3	-	-	3	-	3	-	3
CO5	3	3	3	2	-	3	2	3	3	3
CO6	3	3	3	-	-	3	-	3	-	3

40. Research Methodology and Biostatistics [BSRT602]

CO1: Demonstrate the core competencies expected on completion of this course.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-

41. Image Guided and Navigation Surgery [BSRT603]

CO1: Describe introduction to Image Guided Surgery - Principles of image guided surgery.

CO2: Explain the structure, function or principles underlying imaging Technologies in Surgery - Computed Tomography imaging.

CO3: Apply knowledge of navigation Systems - Optical navigation systems to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to image Guided Robotic Surgery - Image guided robotic systems.
CO5: Evaluate the clinical, safety or quality implications of applications of Navigation Surgery - Neurosurgical navigation.
CO6: Demonstrate safe, competent procedural skills related to safety and Troubleshooting - Navigation system calibration.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	3	-	3
CO 6	-	-	-	-	-	-	-	2	-	-	-	-	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	-	3	-	3	-	3
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	2	2	2	-	2	2	-	3	2

42. Robotics Maintenance and Troubleshooting [BSRT604]

CO1: Describe introduction to Robotics Maintenance - Principles of biomedical maintenance.
CO2: Explain the structure, function or principles underlying robotic Console and System Maintenance - Console maintenance procedures.
CO3: Apply knowledge of instrumentation and Calibration - Robotic instrument inspection to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to electrical and Software Troubleshooting - Electrical hazards.
CO5: Evaluate the clinical, safety or quality implications of imaging and Navigation Troubleshooting - Camera system errors.
CO6: Demonstrate safe, competent procedural skills related to recent Advances in Robotic Maintenance - Artificial Intelligence based maintenance.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	3	-	-	3	-	-	-	2	-	-	3	-	3	-
CO 2	-	-	-	3	-	-	-	2	-	-	-	3	3	-
CO 3	-	-	3	3	-	-	-	-	-	-	-	-	3	-
CO 4	-	-	-	-	-	-	-	2	-	-	-	-	3	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	3	3
CO 6	-	-	-	3	-	-	-	2	-	-	-	-	3	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	2	-	3	2	3	3	3
CO2	3	3	3	2	-	3	2	3	3	3
CO3	3	3	3	-	-	3	-	3	3	3
CO4	-	2	2	2	-	2	2	-	3	2
CO5	-	2	2	2	-	2	2	-	3	2
CO6	3	3	3	2	-	3	2	3	3	3

43. Clinical Postings - IV [BSRT605]

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during clinical postings - iv.

CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.

CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.

CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.

CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	3	-	-	-	-	2	-	-	3	3
CO 2	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	3	-	3

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 4	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 5	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	2	-	-	3	3	3	3
CO2	3	3	3	-	3	3	-	3	-	3
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	3	3	-	3	-	3
CO5	-	-	-	-	-	-	-	-	-	-

44. Art of Being a Better Person [BSRT606]

CO1: Describe introduction to Being a Good Human Defining "goodness" and ethical living.
CO2: Explain the structure, function or principles underlying emotional Intelligence (EQ).
CO3: Apply knowledge of personal Integrity and Honesty to supervised clinical/laboratory/simulation practice.
CO4: Analyze findings, variations or problems related to responsibility and Accountability.
CO5: Evaluate the clinical, safety or quality implications of contributing to the Community and Society.
CO6: Demonstrate safe, competent procedural skills related to practicing Gratitude and Contentment.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	2	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3
CO 6	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	2	-	2	2	-	-	3	2	2	3
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	-	2	2	-	3	2
CO6	-	-	-	-	-	-	-	-	-	-

45. Management of Medical Emergencies [BSRT607]

CO1: Describe fundamentals of Medical Emergencies - Introduction to medical emergencies.

CO2: Explain the structure, function or principles underlying basic Life Support and Airway Management - Adult and pediatric BLS.

CO3: Apply knowledge of cardiovascular and Respiratory Emergencies - Cardiac arrest to supervised clinical/laboratory/simulation practice.

CO4: Analyze findings, variations or problems related to neurological, Metabolic and Trauma Emergencies - Seizures.

CO5: Perform, under supervision, the practical/simulation exercises prescribed for this course (e.g., vital signs assessment and monitoring, basic life support (bls) practice, cpr on manikins) with correct technique and documentation.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 4	-	-	-	-	-	-	-	-	-	-	1	-	-	-
CO 5	-	-	-	-	-	-	-	2	-	-	-	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	2	2	2	-	2	2	-	3	2

46. Internship - I [BSRT701]

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during internship - i.
CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.
CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.
CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.
CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	3	-	-	-	-	2	-	-	3	3
CO 2	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	3	-	3
CO 4	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 5	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	2	-	-	3	3	3	3
CO2	3	3	3	-	3	3	-	3	-	3
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	3	3	-	3	-	3
CO5	-	-	-	-	-	-	-	-	-	-

47. Project - I [BSRT702]

CO1: Formulate a research problem or project topic relevant to surgical/robotic technology, with defined objectives.
CO2: Apply an appropriate methodology, including literature review and data/information collection, to the project.
CO3: Analyze and interpret project findings using appropriate analytical or evaluative methods.
CO4: Prepare a structured, plagiarism-compliant written project report following academic conventions.
CO5: Present and defend the project outcomes through a viva-voce/oral presentation.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	3	-	-	-	-	3	-	-	3	3	3

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 2	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO 3	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO 4	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO 5	-	-	-	-	-	-	-	-	3	-	-	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	3	-	3	-	3	3	3
CO2	3	3	-	3	-	-	-	-	3	3
CO3	3	3	-	3	-	-	-	-	3	3
CO4	3	3	-	3	-	-	-	-	3	3
CO5	3	3	-	3	-	-	-	-	3	3

48. Internship - II [BSRT801]

CO1: Demonstrate professional conduct, punctuality and adherence to infection-control and patient-safety protocols during internship - ii.

CO2: Perform, under supervision, the OT/robotic-OT preparation, positioning and surgical-assistance tasks appropriate to this stage of clinical training.

CO3: Maintain an accurate structured logbook of cases, procedures and competencies observed or performed.

CO4: Communicate effectively and collaborate with the surgical/robotic-OT team, supervisors and patients.

CO5: Reflect on clinical experience to identify learning gaps and plan continued skill development.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	-	3	-	-	-	-	2	-	-	3	3
CO 2	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 3	-	-	-	-	-	-	-	-	-	-	-	3	-	3
CO 4	-	3	-	3	-	-	2	-	-	-	-	3	3	-
CO 5	-	-	-	-	-	-	-	-	-	-	1	-	-	-

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	2	-	-	3	3	3	3
CO2	3	3	3	-	3	3	-	3	-	3
CO3	-	-	-	-	-	-	-	-	-	-
CO4	3	3	3	-	3	3	-	3	-	3
CO5	-	-	-	-	-	-	-	-	-	-

49. Project - II [BSRT802]

CO1: Formulate a research problem or project topic relevant to surgical/robotic technology, with defined objectives.
CO2: Apply an appropriate methodology, including literature review and data/information collection, to the project.
CO3: Analyze and interpret project findings using appropriate analytical or evaluative methods.
CO4: Prepare a structured, plagiarism-compliant written project report following academic conventions.
CO5: Present and defend the project outcomes through a viva-voce/oral presentation.

CO–PO–PSO Mapping (3 = High, 2 = Medium, 1 = Low, '-' = Nil correlation)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO 1	-	-	-	3	-	-	-	-	3	-	-	3	3	3
CO 2	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO 3	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO 4	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO 5	-	-	-	-	-	-	-	-	3	-	-	-	-	3

CO–Graduate Attribute (GA) Mapping (derived from CO–PO correlation and the GA–PO matrix, Section 7.2)

CO	GA1	GA2	GA3	GA4	GA5	GA6	GA7	GA8	GA9	GA10
CO1	3	3	3	3	-	3	-	3	3	3
CO2	3	3	-	3	-	-	-	-	3	3
CO3	3	3	-	3	-	-	-	-	3	3
CO4	3	3	-	3	-	-	-	-	3	3
CO5	3	3	-	3	-	-	-	-	3	3

Annexure VI – Model Question Paper Pattern

A. Theory — University (External) Examination (100 Marks, 3 Hours)

Section	Instruction	No. of Questions	Total Marks
1	Very Short Answer Questions	15 × 2 marks	30
2	Short Answer Questions	5 × 8 marks	40
3	Essay Questions (answer 2 of 3)	2 × 15 marks	30

B. Theory — Internal Assessment (50 Marks: two 20-mark exams + 10-mark continuous assessment)

Section	Instruction	No. of Questions	Total Marks
1	Very Short Answer Questions	10 × 1 mark	10
2	Long Answer Questions	2 × 5 marks	10
3	Continuous Assessment (attendance, class performance, extracurricular participation)	-	10

C. Practical Examination

Section	Marks
Spotters	As prescribed
Major Practical	As prescribed
Minor Practical	As prescribed
Viva Voce	As prescribed
Practical Record	As prescribed

D. Value Added Courses (VAC)

Internal only: five assignments/presentations/case presentations × 10 marks (50 marks) + final 1.5-hour written examination of 5 × 10-mark questions (50 marks). Minimum pass: 40%.

Annexure VII – Faculty Requirement Norms and Staffing Pattern

Position	Minimum Qualification	Indicative Strength
Professor / Head of School	MD/MS/Ph.D. in a relevant surgical/perioperative or allied-health discipline, with 10+ years' experience	1
Associate Professors	MD/MS/Ph.D./M.Sc. (Surgical Robotic Technology / OT Technology) with relevant specialization	2
Assistant Professors	M.Sc./B.Sc. (Surgical Robotic Technology / OT Technology) with relevant qualification	4
Clinical Faculty / Adjunct Faculty & Clinical Preceptors	Practising surgeons, anaesthetists, senior OT technologists and robotic-programme coordinators for guest lectures and clinical-posting/internship mentoring	As required
Laboratory Instructors / Technical Assistants	B.Sc./Diploma with relevant technical background to support practicals and simulation-lab equipment	3
Administrative & Support Staff	Office superintendent, laboratory attendants, librarian support staff, student counsellor	As per University norms

Annexure VIII – List of Laboratories and Equipment

Laboratory	Key Equipment / Facilities
Human Anatomy & Physiology Laboratory	Anatomical models, specimens/spotters, charts, physiology recording equipment (ECG, spirometry, BP apparatus).
Biochemistry & Pathology / Microbiology Laboratory	Basic clinical-chemistry and haematology equipment, microscopes, culture and staining facilities.
OT Skills & Surgical Assistance Laboratory	OT tables, positioning aids, draping stations, sterile-technique kits, instrument sets, surgical-count training material.
Robotic Surgery Simulation Laboratory	Robotic surgical simulator(s) with virtual-reality/haptic modules, surgeon-console and patient-side-cart trainers, docking/undocking simulation setup.
Sterilization & CSSD Simulation Laboratory	Steam/ETO/low-temperature sterilization demonstration units, robotic-instrument reprocessing/decontamination training kits.
Biomedical Equipment & Robotics Maintenance Laboratory	Biomedical-equipment demonstration kits, robotic-instrument inspection/tracking stations, troubleshooting-scenario simulators.
Computer & Digital Skills Laboratory	Networked computers, basic office/health-informatics software, internet access for digital-literacy and medical-coding training.

Laboratories are shared/co-located with the University's central biomedical-science facilities and the affiliated teaching-hospital robotic-surgery programme, subject to institutional biosafety and radiation/biohazard protocols.