MAHATMA GANDHI UNIVERSITY
of
MEDICAL SCIENCES & TECHNOLOGY
JAIPUR

Syllabus

B. Sc. Cath Lab Technology

(Three Years Program)

Edition 2020-21

Notice

1. Amendments made by the University in Rules/ Regulations of the courses shall automatically apply.

2. The University reserves the right to make changes in the syllabus/ books/ guidelines, fee-structure or any other information at any time without prior notice. The decision of the University shall be binding on all.

3. The jurisdiction of all court cases shall be Jaipur Bench of Hon'ble Rajasthan High Court only.

SYLLABUS

B.Sc. Cath Lab Technology

(3 Years Degree Course)

Rules & Regulations

1. **TITLE OF THE COURSE**
   The title of the course shall be **"**Cath Lab Technology".

2. **DURATION OF COURSE/TRAINING**
   The course shall be of three years duration from the date of commencement of academic session

3. **MEDIUM OF INSTRUCTION**
   English shall be the medium of instruction.

4. **ELIGIBILITY FOR ADMISSION**:

   - For admission a candidate should have passed the 10+2 (Senior Secondary) Examination or its equivalent Examination Science stream i.e. Physics, Chemistry and Biology OR Physics, Chemistry and Mathematics Subjects with 45% marks in the aggregate for General Category and 40% for SC/ST/OBC/MBC candidates or as per Govt. Guidelines from a recognized Board.
   - Candidate should have completed the minimum age of 17 years as on 31st December of the year of admission.

5. **CRITERIA FOR ADMISSION**

   Selection shall be done by an Admission Board of the University strictly on merit. It will consist of two-step process –Written Entrance Examination followed by Counseling/Personal Interview (PI).

6. **RESERVATION POLICY**

   Reservation shall be applicable as per policy of the State Government.

7. **ENROLMENT**

   Every candidate who is admitted to the Course in Mahatma Gandhi Medical College shall be required to get himself/herself enrolled with the Mahatma Gandhi University of Medical Sciences & Technology after paying the prescribed eligibility and enrolment fees.

   A candidate shall deposit enrolment fees along with tuition fees at the time of his/her admission to the course. Such a candidate who fails to submit, through the college Principal, duly filled enrolment form along with original documents including migration certificate required for enrolment within two months of his/her admission or up to November 30 of the year of admission whichever is later, he/she will have to pay late fee prescribed by the University.

8. **MIGRATION RULES**

   - No student, once admitted to the course and enrolled by the University, will be permitted to migrate to any other Course/ University.
   - No student will be admitted to the Course on migration from any other Course/ University.

9. ATTENDANCE

Minimum 75% attendancein each year, both for theory and practical classesseparately. Student with deficient attendance will not be permitted to appear in university examination.

10. CONDUCTION OF THE UNIVERSITY EXAMINATION:

University examination shall be conducted twice in a year; that is Main and Supplementary Examination. Supplementary examination shall be conducted after 2-4 months of the main examination.

11. SCHEME OF EXAMINATION

i. Theory

(a) Each Theory paper examination shall be of 3 hours duration and of maximum marks **70**.

(b) Internal assessment shall be of **30** marks for each Theory Paper.

Theory Papers	Theory		Paper Set & Evaluated	
	Total Marks	Pass Marks	No. of Internal Paper Setters	No. of External Paper Setters
Ist Year: Three Theory Papers	300	150	3	-
IInd Year: Three Theory Papers	300	150	3	-
IIIrd Year: Three Theory Papers	300	150	2	1

(c) For the First- and Second-year examinations – these respective above theory papers shall be set by the Internal Examiners covering their respective areas of syllabus. For each question paper there shall be a separate Internal Examiner. The answer books shall be evaluated by the concerned Internal Examiners (Papers Setters).

(d) In Third (Final) Year examination, one of the papers shall be set and evaluated by an External Examiner. In other words, one of the Internal has to be substituted by the External Examiner. The External Examiner (Paper Setter) shall evaluate his/her paper.

(e) The Paper Setter shall set the questions within the prescribed course of study of the concerned paper. There will be a set pattern of question papers duly approved by Academic Council. Model question paper is annexed herewith.

(f) It is to be noted that the Internal and External Examiners of all the three years (First, Second and Third year) shall be appointed by the President of the University. This exercise shall be conducted through the office of the Controller of the Examinations of the University. The External Examiner of Third year shall also be appointed by the President out of the panel of names submitted by the Concerned Coordinator of the course through the Dean to the Controller of Examinations for appointment of Examiners by the President of the University.

(g) Passing Marks: A candidate will have to obtain at least 50% marks in each Theory paper including internal assessment to pass. This shall include the marks obtained in Theory paper of 70 marks and internal assessment for that paper of 30 marks.

ii. Practical and Viva-Voce Examination

(a) Each year there shall be practical and viva-voce examination of 100 marks. It shall consist of one University practical exam of 70 marks and internal assessment of 30 marks. It shall be conducted after the Theory examination is over. A candidate will have to obtain atleast 50% marks in practical and viva-voce examination inclusive of internal assessment to pass.

(b) The pattern of practical examination shall be as follows –

B. Sc. Course	Practical		Practical Examiners
	Total Marks	Pass Marks	
First Year	100	50	Two Internal Examiner(s)
Second Year	100	50	Two Internal
Third Year	100	50	One Internal & One External Examiner

iii. Result

1. A candidate will have to obtain at least 50% marks separately in each Theory paper including internal assessment and a minimum of 50% marks in the practical examination inclusive of internal assessment for him to be declared pass.
2. A Candidate who has failed in theory paper/s will reappear in respective theory papers/s in supplementary examination.
3. Candidate who has failed in Practical examination only will reappear only in practical examination in Supplementary examination.

iv. Supplementary Examination

(a) Eligibility for the failed candidates to appear at the supplementary examination shall be as below –

i. Failed in Theory Paper(s) and failed in Practical – shall reappear in the respective failed Theory paper(s) and Practical examination.

ii. Failed in Theory paper/papers and passed in Practical examination – shall reappear only in the concerned failed Theory paper(s).

iii. Passed Theory papers but failed in Practical – shall reappear only in the Practical Examination.

(b) There shall be a supplementary examination within two months of the declaration of the result of the main examination. Internal assessment marks obtained in main examination in the concerned failed paper/papers/ practical shall be carried forward for working out the result of supplementary Theory paper(s) and or practical examination. Such candidate who has secured less than 50% marks in the internal assessment will be allowed to improve his internal assessment marks in the repeat supplementary internal assessment examination.

(c) Marks secured by the candidate in passed main examination/supplementary examination Theory paper(s) and/or practicals, as the case may be, will be carried forward for working out his result.

(d) **Result**:

i. A candidate obtaining at least 50% marks in the supplementary Theory paper(s) and 50% marks in the supplementary practical examination, as the case may be, shall be declared successful.

ii. A candidate who has failed in supplementary theory paper(s) examination shall have to reappear only in the failed theory paper(s) at the subsequent examination.

iii. A candidate who has failed in supplementary practical examination shall have to reappear both in theory (all papers) and practical at the next main examination.

v. Promotion to Second/Third Year

1. A candidate appeared in the University examination and failed in theory paper(s) /Practical examination shall be promoted to next year
2. A candidate will be allowed to appear for the Final (3rd) year examination only when the backlog of all papers (theory and practical) of first year and second year exams is cleared
3. The student is required to complete the course within 6 years from the joining of the course

vi. Result - Division: Successful candidates will be categorized as under –

1.	Those, securing 50% and above but less than 60% in the aggregate marks of First, Second & Third year taken together	-	Pass
2	Those, securing 60% and above but less than 75% in the aggregate marks of First, Second & Third year taken together	-	Pass with I Division
3	Those, securing 75% and above in the aggregate marks of First, Second & Third year taken together	-	Pass with Honours

12.GRACE MARKS

1. A student who appears in the whole examination in first attempt and obtains the required minimum pass marks in the total aggregate of an examination but fails to obtain the minimum pass marks in one subject (in theory and / or practical as the case may be) will be awarded the grace marks up to a maximum of 05 marks according to the following scale, provided the candidate passes the examination by award of such grace marks:

Marks obtained by the candidate above the required minimum aggregate pass marks		**Grace marks can be given up to**
Up to 6 marks	-	02
Up to 12 marks	-	03
Up to 18 marks	-	04
19 marks and above	-	05

2. No grace marks would be awarded to a candidate who appears in part/ supplementary/remand examination. Non appearance of a candidate in any part of the examination on account of any reason will make him ineligible for grace marks.

3. A candidate who passes the examination after the award of grace marks in a paper/practical or the aggregate will be shown in the marks sheet to have passed the examination by grace. Grace marks will not be added to the marks obtained by a candidate from the examiners.
4. If a candidate passes the examination but misses First or Second Division by one mark as applicable to the Faculty, he will be given one mark in the paper in which he gets the least marks and also in the aggregate of the subject as well as the complete examination to upgrade his division and make him entitled for the first or second division, as the case may be. Indication of this up-gradation will be given in the tabulation register as well as in the marks sheet of the candidate.
5. Non appearance of a candidate in any part of the examination will make him ineligible for grace marks.
6. A candidate who is awarded grace marks in any subject to pass the examination will not be entitled for distinction in any subject.
7. The place of the candidate who is awarded given grace marks to pass the examination or given one mark for up-gradation of his division in the examination merit list will, however, be determined by the aggregate marks he secures from the examiners.

13. **REVALUATION / SCRUTINY**

Revaluation of answer book(s) of the B.Sc. Courses is permissible in not more than 25% of the theory papers within 15 days from the date of declaration of examination result on submission of his/her application on the prescribed form along with the requisite fees. Such answer book(s) shall be re-evaluated as per University rules. Revaluation of answer book(s) shall not be permitted for second attempt in any paper.

Scrutiny (re-totaling) of answer book(s) of the B.Sc. Courses is permissible within 15 days from the date of declaration of examination result on submission of his/her application on the prescribed form along with the requisite fees as per University Rules.

Permission for revaluation / scrutiny

1. In 1st Attempt – Revaluation shall be permitted in 25% of the appeared papers. Scrutiny shall be permitted for all the papers.
2. In 2nd Attempt – Only scrutiny shall be permitted in all the papers. Revaluation shall not be permitted.
3. Revaluation shall also be permitted in 25% of such papers in which a candidate appears for the 1st time irrespective of his attempt in the whole examination.
4. Candidates passing all the subjects of one examination at different times shall be issued their mark-sheets showing actual attempts taken by them in passing the particular examination.
5. For determining the attempt, following criteria shall be followed –

S. No.	Situation	Attempt in next examination	
1.	Candidate is detained in all subjects	His attempt in all the subjects in the next examination will be treated as	1st Attempt
2.	Candidate permitted in all	His attempt in the next	1st Attempt

	subjects But did not appear in all permitted subjects	examination will be treated as	
3.	Candidate is detained in one / few subjects Permitted for the rest of the subjects Appeared in permitted subjects	His attempt in the detained subject(s) in the next examination will be treated as	2nd Attempt
4.	Candidate is detained in one / few subjects Permitted in the rest of the subjects Did not appear in the permitted subjects	His attempt in the next examination In detained subject(s) will be treated as In permitted subject(s) will be treated as	1st Attempt
5.	Candidate permitted in all subjects But did not appear in few subjects	His attempt in the permitted subjects in the next examination will be treated as	2nd Attempt

Selection of Generic Elective and skills Enhancement Courses

Every student has to select any one elective subject out of seven elective subjects mentioned below at the beginning of the academic year during his/her course duration. The Examination of these subjects shall be conducted at the college level.

Sr. No.	Subject	Teaching hours		
		Theory	Practical	Total
1.	Disaster Management	45	15	60
2.	Information and Communication Technology in Health Education	45	15	60
3.	Clinical Nutrition	45	15	60
4.	Yoga	45	15	60
5.	Effective English	45	15	60
6.	Health Care	50	-	50
7.	Constitution of India	50	-	50

Distribution of marks

S. No.	Subject	Theory	Internal Assessment	Total
1	Disaster Management	70	30	100
2	Information and Communication Technology in Health Education	70	30	100
3	Clinical Nutrition	70	30	100
4	Yoga	70	30	100
5	Effective English	70	30	100
6	Health Care	70	30	100
7	Constitution of India	70	30	100

A candidate can appear in the elective subject examinations to be conducted at the college level before the University examinations at the end of I year or II year or III year. Only such candidates shall be eligible to fill University examination form of III year (final year) who have passed their elective subject. It shall be mandatory to obtain 50% marks in the aggregate of prescribed total marks (i.e. 50 out of 100) to pass the elective subjects. Marks of all such candidates who have passed their elective subject shall be sent in the following format by the Principal of the college to the University while sending their examination forms of III year (final year) :

S. No.	University Roll No.	Name of the student	Father's Name	Name of elective subject	Marks obtained	Result

Those candidates who do not pass their elective subjects shall not be eligible to submit their III year (final year) University examination form and accordingly they will not be permitted to appear in the University examination of III year (final year) of the course.

Marks obtained by the candidates in their elective subject shall be mentioned separately in the marks sheets of the University examinations. These marks shall not be counted for preparing the merit list.

Curriculum Outline

Recommended Teaching Hours of Instruction for each subject

1ST Year B.Sc. Cath Lab Technology

S. No.	Course Title	Hours
1	Anatomy	180
2	Physiology	150
3	Preventive Cardiology	160
4	Pharmacology	160
5	Microbiology	150
	Total Theory Hours	**800**
	Practical	400
	Total Hours	**1200**

2nd Year B.Sc. Cath Lab Technology

S. No.	Course Title	Hours
1.	Pathology	150
2.	Medical Ethics	150
3.	Computer Skills	100
4.	Radiology and Defibrillation	150
5.	Echocardiography and ECG	100
6.	Medicine	150
	Total Theory Hours	**800**
	Practical	400
	Total Hours	**1200**

3rd Year B.Sc. Cath Lab Technology

S. No.	Course Title	Hours
1.	Catheters and Instruments	150
2.	Cardiovascular System	150
3.	Circulation	100
4.	Basics of Cardiac Technology	200
5.	Cardiac Catheterization	200
	Total Theory Hours	**800**
	Practical	400
	Total Hours	**1200**

SYLLABUS

B.Sc. Cath Lab Technology

(3 Years Degree Course)

Learning Objectives:

At the end of the B.Sc. in Cath Lab Technology course, the student should be able to:

1) Test patients for heart problems.
2) Understand care of patients suffering from cardiovascular disease.
3) Use and maintain medical equipment and machines used in the field.
4) Apply basic and advanced life support skills.
5) Study emergency invasive procedures that could save an individual's life.
6) Assist in Catheterization procedure.
7) Learn about pacemaker and devices and their programming
8) Study cardiac-related procedures.
9) Observe the correct way to perform cardiac procedures before applying practical skills.

Expectation from the future graduate in the providing patient care

The goal of B.Sc. in Cath Lab Technology course is to produce a competent cath lab technician who:

1) Are trained to assist interventional cardiologists in performing diagnostic and therapeutic invasive cardiac procedures with the help of cardiac and coronary imaging.
2) Are trained to assist doctors during procedures such as coronary imaging including angiography, IVUS, FFR etc., percutaneous coronary interventions (PCI), rotational atherectomy, peripheral angiography, and interventions for structural heart disease.
3) Also be able to interpret basic ECG’s and recognise cardiac arrhythmias.
4) Understand Electrophysiological procedures equipment.
5) Understand programming of pacemakers and other cardiac devices

First B. Sc. Cath Lab Technology

(1 Year Duration)

Paper-I

ANATOMY & PHYSIOLOGY

Anatomy

1) Basic Cells and Tissues
2) Heart
3) Circulation
4) Lungs
5) Diaphragm
6) Brain
7) Liver, spleen, kidney

Physiology

1) Circulatory systems
2) Cardio vascular system
3) Autonomic nervous system
4) Action potential muscles contraction
5) Gas exchange
6) Thrombosis, platelet function
7) Rennin angiotensin system
8) Kidney: physiology

Paper-II

Pharmacology & Microbiology

Pharmacology

1) General pharmacology
2) Sedatives
3) Anaesthetics agents
4) Analgesics
5) Drugs used for heart disease

Microbiology

1) Specimen collection
2) Bacteria and viruses in CVS
3) Serology
4) Immunology
5) Sterilization and Disinfection
6) HIV & AIDS, Hepatitis Virus

Paper-III

Preventive Cardiology

Preventive Cardiology

1) Diet and nutrition
2) Smoking
3) Exercise and heart

Second B. Sc. Cath Lab Technology

(1 Year Duration)

Paper-I

Pathology, Pharmacology & Medicine

Pathology

1) Collection of Blood
2) Anticoagulants
3) Coagulation Profile; method and principles; Advantages and disadvantages
4) Clot Retraction time; Bleeding Time, clotting time

Pharmacology

1) General pharmacology
2) Drugs used for heart disease
3) Effect of drugs and ECG changes
4) Toxicity of drugs and ECG changes

Medicine

1) Epidemiology of CVD in India
2) Hematology
3) Anemia
4) Bleeding disorders
5) Laboratory tests used to diagnose bleeding disorders
6) Respiratory System
7) CNS
8) Automatic nervous system
9) Diabetes Mellitus
10) Obesity

Paper-II

Medical Ethics & Computer skills

Medical Ethics, Legal Aspects and Medical Terminology

1) Role Definition and Interaction, Ethical, Moral, and Legal Responsibilities
2) Medical terminology
3) Medical waste Management

Computer Skills

Computer applications related to Cardiology lab technician

Paper- III

Echocardiography, ECG, Defibrillation & Radiology

Echocardiography

1) M- mode and 2D transthoracic echocardiography
2) Views used in transthoracic echocardiography
3) Doppler echocardiography: pulsed, continuous wave and colour
4) Measurement of cardiac dimensions
5) Evaluation of systolic and diastolic left ventricular function
6) Regional wall motion abnormalities
7) Stroke volume and cardiac output assessment

ECG

1) ECG Machine: parts of ECG
2) Technique of taking an ECG
3) Pitfalls in taking ECGs
4) Recognition of normal ECG waves
5) Abnormal ECG

Defibrillation

1) Technique
2) Indication
3) Complications

Radiology

1) Principles of X-ray
2) Protection form radiation
3) Description and recognition of chest X-rays
4) Different views of chest for identification of cardiopulmonary structures
5) Ultrasonography: principles

Third B. Sc. Cath Lab Technology

(1 Year Duration)

Paper-I

Catheters and Instruments

Catheters and Instruments

1) Arterial Blood Gases (ABG): Techniques and interpretation
2) Haemodynamic monitoring technique, recognition, indication, complications
3) Fluid and electrolytes
4) X-ray imaging in lab
5) Intra-Aortic Balloon Pulsation (IABP): Indication, Technique and complications
6) Artificial ventilation
7) Extra corporeal membrane oxygenator (ECMO)
8) Outline of C-arm, oximetry

Paper-II

Cardiovascular System& Circulation

Cardiovascular System

1) Heart-size, location, chambers, exterior & interior
2) Blood supply of heart
3) Systemic & pulmonary circulation
4) Branches of aorta, common carotid artery, subclavian artery, axillary artery, brachial, artery, superficial palmar arch, femoral artery, internal iliac artery,
5) Peripheral pulse
6) Inferior vena cava, portal vein

Circulation

1) General principles Heart: myocardium – innervation – transmission of cardiac impulse
2) Events during cardiac cycle – cardiac output.
3) Peripheral circulation: peripheral resistances – arterial blood pressure – measurements – factors regulation variations – capillary circulation – venous circulation.
4) Special circulation: coronary cerebral – miscellaneous

Paper-III

Basics of Cardiac Technology & Cardiac Catheterization

Basics of Cardiac Technology

1) Basics of electricity & functioning of electro medical equipments, earthing& care of apparatus, Static electricity.
2) Intensive coronary unit & recovery room concepts
3) Trans-oesophageal Cardiopulmonary resuscitation –Basic cardiac life support - Advanced
4) Cardiac life support
5) Management of Cardiac arrest- definition, causes, external cardiac message, artificial
6) Respiration & other drugs and procedures used in the management of cardiac arrest.
7) Cardiac monitoring –definition, purpose of cardiac monitoring, how to recognize various
8) Arrhythmias

Cardiac Catheterization

1) Preparation for Cath procedure and post procedure care
2) Cardiac Catheterization laboratory
3) Radiation hazards
4) Materials used in the Cath Lab- All catheters , balloons, guidewires, pacemakers, contrast materials & other materials used in the Cardiac Catheterization Laboratory and Sterlisation of all these materials.
5) Catheterization- procedure, cath position, Oxymetry at various levels, angios done & its interpretation
6) Coronary Angiogram
7) Peripheral Angiogram
8) Coronary Angioplasty
9) Peripheral Angioplasty
10) Valvuloplasties
11) Electrophysiological studies and Device implantation

PROPOSED BOOKS

1) William Davis, *Understanding Human Anatomy and Physiology*, McGraw Hill
2) Chatterjee, C C, Human Physiology, Medical Allied Agency
3) Echocardiography – Feigenbaum
4) R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics
5) Tripathi K.D., *Essentials of Medical Pharmacology*, Jay Pee Publishers, New Delhi
6) Computer Fundamentals, Rashmi Sharma

7) Gunasekaran P, Lab Mannual of Microbiology, New Age Publishers
8) AtulLuthra ECG Made Easy JP Medical Ltd
9) Morton L. Kern, Morton J. Kern The Cardiac Catheterization Handbook
10) Introduction to Electrocardiography-Schamroth
11) Cardiac Catheterizatipn – Grossman

MODEL PAPER

B.Sc. Cath Lab Technology

Part-I (Main) Examination Month Year

Paper - I

Anatomy & Physiology

Time: Three Hours

Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	Describe anatomy of Kidney in detail	15
Q.2	Describe conduction system of heart in detail.	15
Q.3	Describe the following:	
	a) Coronary circulation	10
	b) Parts and function of brain	10
Q.4	Write Short Notes (any 4 out of 6)	4x5=20
	a) Renin angiotensin system	
	b) Ventricular Preload and Afterload	
	c) Autonomic Nervous System	
	d) Discuss structure and functioning of cardiac myocytes	
	e) Discuss parts of mediastinum	
	f) Myocardial oxygen demand and supply	

MODEL PAPER

B.Sc. Cath Lab Technology-1 **Short Name**
Code

B.Sc. Cath Lab Technology

Part-I (Main) Examination Month Year

Paper - II

Pharmacology & Microbiology

Time: Three Hours

Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	DescribeAnti-arrhythmic drugs classification. Discuss side effects of Amiodarone	15
Q.2	Discuss Universal Precautions while performing cath lab procedures	15
Q.3	Discuss the following:	
	a) Viral infections of heart	10
	b) Needle prick injuries	10
Q.4	Write short notes (any 4 out of 6)	4x5=20
	a) Atracurium- indication and side effects	
	b) Discuss disinfection of surfaces in hospital	
	c) Discuss Instrument sterilisation techniques	
	d) Viral Markers	
	e) Aspirin	
	f) Warfarin	

MODEL PAPER

B.Sc. Cath Lab Technology-1 **Short Name**
Code

B.Sc. Cath Lab Technology
Part-I (Main) Examination Month Year

Paper - III
Preventive Cardiology

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	Discuss Risk factors for coronary heart disease.	15
Q.2	Discuss Lipids and effect of high fat diet on human body	15
Q.3	Describe	
	a) Smoking cessation	10
	b) Benefits and recommendations for Exercise in prevention of heart disease.	10
Q.4	Short Notes (any 4 out of 6)	4x5=20
	a) Micro nutrients deficiency	
	b) Heart diseases and Stress	
	c) Viral Markers	
	d) DASH	
	e) Obesity and heart diseases	
	f) Discuss Instrument sterilisation techniques	

MODEL PAPER

B.Sc. Cath Lab Technology.-II **Short Name**
Code

B.Sc. Cath Lab Technology

Part-II (Main) Examination Month Year

Paper - I
Pathology &Medicine

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	Discuss extrinsic and intrinsic Coagulation pathways.	15
Q.2	Discuss pathophysiology of Acute Coronary Syndrome	15
Q.3	Describe:	
	a) Diagnosis and treatment pulmonary embolism	10
	b) Discuss Stroke due to cardiac causes	10
Q.4	Short Notes (any 4 out of 6)	4x5=20
	a) Ischemic necrosis	
	b) eGFR	
	c) Cardiac Biomarkers	
	d) Microcytic Anaemia	
	e) Acute limb ischemia	
	f) Various methods of blood collection and transport	

MODEL PAPER

B.Sc. Cath Lab Technology.-**II** **Short Name**
Code

B.Sc. Cath Lab Technology

Part-II (Main) Examination Month Year

Paper - II
Medical Ethics & Computer skills

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	Why are medical laws and ethics important?	15
Q.2	How do medical ethics differ from medical etiquette?	15
Q.3	Describe the following:	
	a) Principles of confidentiality	10
	b) Discuss computer application in clinical studies	10
Q.4	Write Short Notes (any 4 out of 6)	4x5=20
	a) Rights of mentally ill patients	
	b) Discuss how to prepare cath lab reports on computer	
	c) Discuss using Hospital Management Software	
	d) Discuss DICOM software	
	e) Discuss various storage devices (CD, DVD, Pen drive, SSD)	
	f) Discuss Cath Lab operating software	

MODEL PAPER

B.Sc. Cath Lab Technology.-**II** **Short Name**
Code

B.Sc. Cath Lab Technology

Part-II (Main) Examination Month Year

Paper - III

Echocardiography, ECG, Defibrillation & Radiology

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	Discuss normal chest x-ray and abnormality of chest x-ray in Mitral Stenosis	15
Q.2	Describe basic echo views in detail	15
Q.3	Describe the following:	
	a) Radiation- Hazards & Protection	10
	b) Diastolic Dysfunction assessment on Echocardiography	10
Q.4	Write Short Notes (any 4 out of 6)	4x5=20
	a) Cardioversion	
	b) ECG and electrolyte dysfunction	
	c) Describe heart blocks on ECG	
	d) Describe ECG changes in Acute AWMI	
	e) Utility of CT angiography	
	f) Utility of Echocardiography in Cath lab	

MODEL PAPER

B.Sc. Cath Lab Technology.-III **Short Name**
Code

B.Sc. Cath Lab Technology
Part-III (Main) Examination Month Year

Paper - I
Catheters and Instruments

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	Describe parts of Cath Lab machine and maintenance of machine.	15
Q.2	Discuss IABP technique, indications and Comlications	15
Q.3	Describe the following:	
	a) Hemodynamic studies and Oximetry	10
	b) Extra corporeal membrane oxygenation (ECMO)	10
Q.4	Short Notes (any 4 out of 6)	4x5=20
	a) Artificial ventilation	
	b) Pulse oximetry	
	c) Transducer for hemodynamic monitoring	
	d) Coronary angiography	
	e) e)Types of guiding catheters	
	f) f)Catheters for basic EP Study	

MODEL PAPER

B.Sc. Cath Lab Technology.-III **Short Name**
Code

B.Sc. Cath Lab Technology
Part-III (Main) Examination Month Year

Paper - II
Cardiovascular System & Circulation

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	Describe Rheumatic heart diseases	15
Q.2	Discuss Acute Pericarditis and Cardiac Tamponade	15
Q.3	Discuss the following	
	a) Complications of Acute MI	10
	b) Acute Pulmonary Embolism	10
Q.4	Write Short Notes (any 4 out of 6)	4x5=20
	a) Renal Hypertension	
	b) Acute respiratory failure	
	c) Critical limb ischemia	
	d) Restrictive Cardiomyopathy	
	e) Prinzmetal's Angina	
	f) Hypertrophic Obstructive Cardiomyopathy (HOCM)	

MODEL PAPER

B.Sc. Cath Lab Technology.-III **Short Name**
Code

B.Sc. Cath Lab Technology

Part-III (Main) Examination Month Year

Paper - III

Basics of Cardiac Technology&Cardiac Catheterization

Time: Three Hours
Maximum Marks: 70

Students shall be allowed to take only one supplementary copy along with one main answer book. All the parts of one question should be answered at one place. Different parts of one question should not be answered at different places in the answer book Draw diagrams wherever necessary

Attempt all questions

Q.1	Sterilisation before and after cath lab procedure	15
Q.2	Discuss ACLS protocol	15
Q.3	Discuss the following:	
	a) Primary PTCA	10
	b) Balloon Mitral Valvotomy (BMV)	10
Q.4	Write Short Notes (any 4 out of 6)	4x5=20
	a) ASD Device Closure	
	b) Contrast agents for Coronary Angiography	
	c) Catheterizarion and Angiography for TOF	
	d) EP study for Sinus node dysfunction	
	e) Wires for CTO lesion PTCA.	
	f) Renal Angioplasty	

Elective Paper- Non – University Examination
DISASTER MANAGEMENT

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

Introduction to Disasters

a. Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)
b. Disasters
c. Classification Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.)
d. Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters. urban disasters, pandemics, complex emergencies, Climate Change

Approaches to Disaster Risk reduction

a. Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- non structural ensures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake- holders.

Inter-relationship between Disasters and Development

a. Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc. Climate Change Adaptation. Relevance of indigenous knowledge, appropriate technology and local resources

Disaster Risk Management in India

a. Hazard and Vulnerability profile of India Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management institutional
Arrangements (Mitigation, Response and Preparedness, DM Act and Policy, Other related policies, plans, programmes and legislation).

Project Work: (Field Work, Case Studies)

a. The project /fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard profile of the region where the college is located

Suggested Reading list:

- Alexander David, Introduction in 'Confronting Catastrophe', Oxford University Press, 2000
- Andharia J. Vulnerability in Disaster Discourse, JTCDM, Tata Institute of Social Sciences Working Paper no. 8, 2008
- Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disasters, Routledge.
- Coppola P Damon, 2007. Introduction to International Disaster Management,
- Cuny, F. 1983. Development and Disasters, Oxford University Press.

INFORMATION AND COMMUNICATION TECHNOLOGY IN HEALTH EDUCATION

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

Learning objectives
Upon successful completion of this subject, students should

1. To obtain the basic knowledge on computer, devices used in computers.
2. To know the uses of computers like MS office, Power point Presentations, Excel documents.
3. To know about uses of internet, its advantages in regular updating the knowledge in Occupational therapy profession.

SYLLABUS

Introduction

1. Introduction to computers-History of Computer, Generation of Computer, Classification of Computers, Input Devices, Output Devices, Central Processing Unit, Components of CPU, Memory Unit, Peripheral Devices
2. Introduction to M.S. Windows
3. Internet and its applications
4. MGUMST web forum & portal
5. Google Applications
6. Introduction to M.S. Office - Word, Power Point, Excel,
7. Publisher

The Digital Age
Computer and communications, the five operations of a computer-and communication system- input, processing, output, storage and communications as well as the corresponding categories of hardware, five major categories of computers, development I communication Technology.

Applications Software

Applications and systems software, ethics of copying software, four types of applications software, entertainment education and reference, productivity and business and specialized, key functions of word processors, spreadsheets, database managers, graphics programs and suites, group-ware, and internet web browsers.

Storage Devices
Units of storage capacity, primary and secondary storage, data compression, data storage on diskette, hard disks, optical disks, and magnetic tape and describe the purposes of storage media.

Communications
Usage of communications technology, telephone-related services, online information services, the internet

Multimedia

What is multimedia – Multimedia PC– Multimedia Hardware - Central processor – color display, Multimedia accessories – CD ROM – Digital Audio – Audio speakers – Digital video– MIDI – deodisc Read/write storage device- Multimedia software

Radio propagation:

Use of computers in physical therapy – Application Packages used in statistical analysis.

Recommended books

1. Free T. Hotstetter, ―Multimedia Literacy‖ M<egraw Hill,
2. Simon J. Gibbs, Dinoysios C. Tsichritziz, ―Multimedia programming‖, Addison Wesley
3. John F.Koefgel Buford, ―Multimedia Systems‖, Addison Wesley
4. John Vince, ―Virtual Reality Systems‖ Addison Wesley.
5. AndressF.Molisch, ―Wideband Wireless digital communication‖ Pear Education Asia

CLINICAL NUTRITION

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

COURSE OBJECTIVE:

The objective of this course is that after 30 hours of L, D, P the student shall be able to understand the basic knowledge about Diet, balanced diet, metabolism, malnutrition, under nutrition, over nutrition, deficiency disease.

COURSE OUTCOME:

1. Become familiar about the nutritive values of food.
2. Explain about the food sources from which we obtain vitamins.
3. Become familiar with various compositions of food.
4. Well versed with digestion at each stages of digestive system.
5. Become familiar with different cooking methodologies.
6. Know and explain about food preparations by food manufacturer.
7. Explain thoroughly about the advantages and disadvantages of various convenience foods.

UNIT ISOURCES OF FOOD

1. Nutritive value of foods,
2. Food Sources from which key vitamins are derived

UNIT II DIGESTIVE SYSTEM

1. Digestion and absorption –Digestion at each stage of the digestive system
2. Dietary guidelines- Factors affecting food requirements. Planning and serving of family meals. Meals for all ages and occupations.

UNIT III COMPOSITION OF FOOD

Composition and value of the main foods in the diet - Milk, meat, fish, cheese, eggs, margarine and butter cereals (wheat, rice, maize, millets, oats) fruits and vegetables

UNIT IV PROCESSING OF FOOD

1. Cooking of food -Transfer of heat by conduction, convection and radiation.
2. Principles involved in the different methods of cooking – boiling, stewing, grilling, baking, roasting, frying, steaming, pressure cooking, cooking in a microwave oven.

FOOD PREPARATION

1. Convenience foods- Foods partly or totally prepared by a food manufacturer – dehydrated, tinned, frozen, ready to eat. Intelligent use of these foods.

2. Advantages and disadvantages

Text Book:

1. Agarwal, Textbook of human nutrition, JP, 1 Ed, 2014

Reference:

1. Kenneth F. Kiple, KriemhildConeè Ornelas, The Cambridge world history of food, Cambridge University Press,Ist ed,2000

YOGA

Theory Hours: 45
Practical Hours: 15
Total Hours: 60

COURSE OBJECTIVE:

The objective of this course is that after 30 hours of lectures & demonstrations, the student will be able to understand the basic concepts about Asanas and its effects, therapeutics effects of Yoga

COURSE OUTCOME:

1. Demonstrate the introduction and principles of yoga.
2. Knowledge of history of yoga and yoga in modern India.
3. Outline of yoga background and importance of yoga in modern world.
4. Learning the types and forms of Asanas and description of physiological effect of yoga.
5. Understanding the role of yoga in Occupational Therapy

UNIT-I Introduction to Yoga

1. Introduction to Yoga
2. Principles of Yoga

UNIT- II Patanjali

1. History of Yoga
2. Yoga in Ancient and Modern India

UNIT- III Folds of Yoga

1. Types & Forms of Yoga
2. Asanas & its physiological effects

UNIT- IV Yogic Science

1. Scientific background of Yoga
2. Yoga in modern world

UNIT -V Advantages of Yoga

1. Physiological Effects of Yoga
2. Therapeutic Uses of Yoga

Textbook:

1. BKS Iyengar, Light of Yoga, JP, 1st Ed, 2012.

Reference:

1. PayalGidwaniTiwari, Body Gaurders, CBS, 2nd Ed, 2009

EFFECTIVE ENGLISH

Theory Hours: 60
Total Hours: 60

Course Objective:

The objectives of this course is that after 40 hours of lectures, demonstrations and practicals the student will be able to Speak fluently, intelligibly and appropriately to teachers, Colleagues, Doctors, Patients and friends at the college, Hospital and hostel etc. about academic or (occupational) areas of interest. Course Outcome:

1. Students can gain knowledge about the various traditions writer and followed in English
2. Individuals can gain self – confidence in their own voice and speak out their opinions with confidence
3. Students will gain the ability to become a accomplished active readers
4. Helps to build the knowledge and understanding simultaneously through listening and give their point of view
5. Students will be able to write effectively in variety of professional and social setting
6. Acquire the ability to read and understand the literature and have the ability to identify the topics and formulate questions
7. Good communication skills which helps in easy rapport between the patient and therapist
8. Gain the fluency in speaking which helps in easy teaching method and presentation

UNIT – I INTRODUCTION

1. History of the language
2. Regional distribution
3. Variation in dialect and accent

UNIT – II PHONOLOGY

1. Consonants and vowels
2. Phontactics
3. Stress, rhythm and intonation
4. Regional variation

UNIT – III GRAMMER

1. Noun, Pronoun
2. Verb, Tense
3. Adjuncts
4. Adjectives

UNIT – IV SYNTAX

1. Clause syntax
2. Auxillary verbs
3. Vocabulary
4. Word formation
5. Pronounciation

UNIT – V PRESENTATION

1. Oral presentation & Panel discussion
2. Interview preparation
3. Clarity and specificity

Text Book:

1. O' Connor, I.D., Better English Pronunciation - Cambridge, Cambridge University.2009

Reference:

1. Water F.V.A , Proficiency Course in English – Hodder and Stronghton, London.1994
2. Tone Daniel, I.M. , English Pronouncing Dictionary –Dent and sons Ltd. London.2004

HEALTH CARE

Theory Hours: 50
Total Hours: 50

Introduction to Health

1. Definition of Health, Determinants of Health, Health Indicators of India, Health Team Concept.
2. National Health Policy
3. National Health Programmes (Briefly Objectives and scope) Population of India and Family welfare programme in India

Introduction to Nursing

1. What is Nursing? Nursing principles. Inter-Personnel relationships. Bandaging: Basic turns; Bandaging extremities; Triangular Bandages and their application.
2. Nursing Position, Bed making, prone, lateral, dorsal, dorsal re-cumbent, Fowler's positions, comfort measures, Aids and rest and sleep.
3. Lifting and Transporting Patients: Lifting patients up in the bed. Transferring from bed to wheel chair. Transferring from bed to stretcher.
4. Bed Side Management: Giving and taking Bed pan, Urinal: Observation of stools, urine. Observation of sputum, understand use and care of catheters, enema giving.
5. Methods of Giving Nourishment: Feeding, Tube feeding, drips, transfusion Care of Rubber Goods
6. Recording of body temperature, respiration and pulse, Simple aseptic technique, sterilization and disinfection. Surgical Dressing: Observation of dressing procedures

First Aid:

1. Syllabus as for Certificate Course of Red Cross Society of St. John's Ambulance Brigade.

Reference Books:

1. Preventive and Social Medicine by J.Park
2. Text Book of P & SM by Park and Park
3. Counseling& Communicate skills for medical and health, Bayne- Orient Longman Pvt. Ltd.

Constitution of India

Theory Hours: 50
Total Hours: 50

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

Unit-II:
The democratic institutions created by the constitution Bicameral system of Legislature at the Centre and in the States.

Unit-III:
Fundamental Rights and Duties their content and significance.

Unit – IV:
Directive Principles of States Policies the need to balance Fundamental Rights with Directive Principles.

Unit – V:
Special Rights created in the Constitution for: Dalits, Backwards, Women and Children and the Religious and Linguistic Minorities.

Unit-VI:
Doctrine of Separation of Powers legislative, Executive and Judicial and their functioning in India.

Unit – VII:
The Election Commission and State Public Service commissions.

Unit – VIII:
Method of amending the Constitution.

Unit – IX:
Enforcing rights through Writs:

Unit – X:
Constitution and Sustainable Development in India.

Reference Books:

1. J. C. Johari: The Constitution of India- A Politico-Legal Study-Sterling Publication, Pvt. Ltd. New Delhi.
2. J. N. Pandey: Constitution Law of India, Allahbad, Central Law Agency, 1998.
3. Granville Austin: The Indian Constitution – Corner Stone of a Nation-Oxford, New Delhi, 2000.