



**MAHATMA GANDHI UNIVERSITY**  
*of*  
**MEDICAL SCIENCES & TECHNOLOGY**  
JAIPUR

# **Syllabus**

**B. Sc. ECG 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.

**Rules & Regulations**  
**B.Sc. ECG Technology**  
(3 Years Degree Course)

**1. TITLE OF THE COURSE**

The title of the course shall be “ECG 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% attendance in each year, both for theory and practical classes separately. 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 atleast50% 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 (3<sup>rd</sup>) 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:

<b>Marks obtained by the candidate above the required minimum aggregate pass marks</b>		<b>Grace marks can be given up to</b>
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 alongwith 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 alongwith the requisite fees as per University Rules.

#### **Permission for revaluation / scrutiny**

1. In 1<sup>st</sup> Attempt – Revaluation shall be permitted in 25% of the appeared papers. Scrutiny shall be permitted for all the papers.

2. In 2<sup>nd</sup> 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 1<sup>st</sup> 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	1 <sup>st</sup> Attempt
2.	Candidate permitted in all subjects But did not appear in all permitted subjects	His attempt in the next examination will be treated as	1 <sup>st</sup> Attempt
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	2 <sup>nd</sup> 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	1 <sup>st</sup> 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	2 <sup>nd</sup> 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

#### 1<sup>ST</sup> Year B.Sc. ECG Technology

S. No.	Course Title	Hours
1.	Anatomy	100
2.	Physiology	150
3.	Preventive Cardiology	150
4.	ECG basics	150
5.	Computer Application	100
6.	Microbiology	150
	<b>Total Theory Hours</b>	<b>800</b>
	Practical	400
	<b>Total Hours :</b>	<b>1200</b>

#### 2<sup>nd</sup> Year B.Sc. ECG Technology

S. No.	Course Title	Hours
1.	Pathology	150
2.	Medical Ethics	100
3.	Pharmacology	100
4.	Hospital Practice and Patient Care	100
5.	Basic of Cardiac Technology and ECG	200
	Medicine	150
	<b>Total Theory Hours</b>	<b>800</b>
	Practical	400
	<b>Total Hours :</b>	<b>1200</b>

#### 3<sup>rd</sup> Year B.Sc. ECG Technology

S. No.	Course Title	Hours
1.	Diseases of Heart	150
2.	ECG	200
3.	Treadmill Test	150
4.	Basic Echocardiography	200
5.	Holter ECG	100
	<b>Total Theory Hours</b>	<b>800</b>
	Practical	400
	<b>Total Hours :</b>	<b>1200</b>

## **SYLLABUS**

### **B.Sc. ECG Technology**

(3 Years Degree Course)

#### **Learning Objectives:**

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

1. Describe legal and ethical issues related to ECG practices.
2. Demonstrate effective customer service skills.
3. Maintain a safe environment and infection control.
4. Describe the Anatomy and Physiology of the Cardiovascular System.
5. Incorporate pharmacology within fieldwork.
6. Review Basic Electrophysiology (ie: Four characteristics of cardiac cells, identify nodes, measure heart rate, review ECG waveforms and interpretations)
7. Chart and Read ECGs.
8. Recognize interference, loose leads, and other malfunctions
9. Recognize responding/reporting to emergency situations.
10. Learn about Pacemaker related ECG and programming

#### **Expectation from the future graduate in the providing patient care**

The goal of B.Sc. in ECG Technology course is to produce a competent ECG technician who performs electrocardiograms according to physician's orders and established practices and procedures.

**First B. Sc. ECG 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 - Computer Application & ECG Basic**

### **Computer Application**

- 1) Basics
- 2) Components
- 3) Operating system

### **ECG basics**

- 1) Introduction and history of ECG
- 2) ECG Machine: parts of ECG
- 3) Recording the ECG and lead placement
- 4) Interpretation of ECG
- 5) Assessment of arrhythmias
- 6) Pitfalls in taking ECGs

**Paper-III**  
**Preventive Cardiology & Microbiology**

**Preventive Cardiology**

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

**Microbiology**

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

**Second B. Sc. ECG 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 & Hospital Practice**

**Medical Ethics, Legal Aspects and Medical Terminology**

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

**Hospital Practice and Patient Care**

- 1) Care of patient
- 2) First aid
- 3) Hospital procedure
- 4) Infection
- 5) Sterilization



**Paper- III**  
**Basics of Cardiac Technology & ECG**

**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) Cardiac life support
- 4) Management of Cardiac arrest- definition, causes, external cardiac message, artificial
- 5) Cardiac monitoring –definition, purpose of cardiac monitoring, how to recognize various

**ECG**

- 1) Technique of ECG recording
- 2) Normal ECG

**Third B. Sc. ECG Technology**

**(1 Year Duration)  
Paper-I  
Diseases of Heart**

**Diseases of Heart**

- 1) Congenital
- 2) Rheumatic
- 3) Myocardial and pericardial
- 4) Coronary artery diseases
- 5) Hypertension
- 6) Pulmonary thromboembolism
- 7) Pulmonary hypertension
- 8) Respiratory failure

**Paper-II**  
**ECG Technology and Interpretation**

**ECG**

- 1) The abnormal electrocardiogram, Left atrial abnormality, Right atrial abnormality
- 2) Left ventricular hypertrophy and enlargement, Right ventricular hypertrophy and enlargement,
- 3) Intraventricular conduction delays
- 4) Left anterior fascicular block, Left posterior fascicular block
- 5) Left bundle branch block, Right bundle branch block
- 6) Myocardial ischemia and infarction, Repolarization (ST-Twave) abnormalities, QRS changes
- 7) ECG in patients with Pacemakers and other devices.
- 8) Pacemaker programming
- 7) Traditional and Advance Instruments used for Blood pressure recording, Pressure transducers, Defibrillators, Cathode ray tubes and physiological monitors, plethysmography Pulse oximetry Etc.

## **Paper-III**

### **Basic Echocardiography, Treadmill test and Holter**

#### **Basic 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
- 8) Stress Echocardiography

#### **Treadmill Testing**

- 1) Exercise test indications, contra-indications and precautions
- 2) Functioning of Treadmill

#### **Holter ECG**

- 1) Indications, contra-indications and precautions

#### **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 Manual of Microbiology*, New Age Publishers
- 8) Atul Luthra *ECG Made Easy* JP Medical Ltd
- 9) Morton L. Kern, Morton J. Kern *The Cardiac Catheterization Handbook*
- 10) Cohn, E. & Gilroy-Dooham, M.; *Flip and See ECG*
- 11) Bruce Shade; *Fast and Easy ECGs*
- 12) *Introduction to Electrocardiography-Schamroth*

## MODEL PAPER

B.Sc. ECG Technology -1  
Code

Short Name

### **B.Sc. ECG 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 anatomy 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) Peripheral Circulation                                |        |
|     | 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. ECG Technology -1  
Code

Short Name

### **B.Sc. ECG Technology** Part-I (Main) Examination Month Year

#### **Paper - II** Computer Application & ECG basics

**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 use of Computers in ECG Interpretation.              | 15     |
| Q.2 | Discuss computer application in clinical studies             | 15     |
| Q.3 | Describe the following:                                      |        |
|     | a) Types of Computer Operating System.                       | 10     |
|     | b) Various segments and intervals in normal ECG              | 10     |
| Q.4 | Write short Notes (any 4 out of 6)                           | 4x5=20 |
|     | a) Calculating electrical axis of heart                      |        |
|     | b) Discuss how to prepare reports on computer                |        |
|     | c) Discuss using Hospital Management Software                |        |
|     | d) Causes of Bradycardia                                     |        |
|     | e) Discuss various storage devices (CD, DVD, Pen drive, SSD) |        |
|     | f) Discuss ECG operating software                            |        |

## MODEL PAPER

B.Sc. ECG Technology -1  
Code

Short Name

**B.Sc. ECG Technology**  
Part-I (Main) Examination Month Year

**Paper - III**  
Preventive Cardiology & 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 | 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) Needle prick injuries                                 | 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. ECG Technology.-II  
Code

Short Name

**B.Sc. ECG Technology**  
Part-II (Main) Examination Month Year

**Paper - I**  
**Pathology, Pharmacology & 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 | Describe Anti-arrhythmic drugs classification, indications and side effects | 15     |
| Q.2 | Discuss pathophysiology of Acute Myocardial Infarction                      | 15     |
| Q.3 | Describe:   |        |
|     | a) Diagnosis and treatment pulmonary embolism                               | 10     |
|     | b) Clinical features and complications of Infective Endocarditis            | 10     |
| Q.4 | Write short notes (any 4 out of 6)  | 4x5=20 |
|     | a) Ischemic necrosis  |        |
|     | b) Aortic Stenosis  |        |
|     | c) Aortic dissection  |        |
|     | d) Microcytic Anaemia   |        |
|     | e) Circle of Willis   |        |
|     | f) Various methods of blood collection and transport                        |        |



## MODEL PAPER

B.Sc. ECG Technology.-II  
Code

Short Name

**B.Sc. ECG Technology**  
Part-II (Main) Examination Month Year

**Paper - II**  
**Medical Ethics & Hospital Practice**

**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) Informed Consent  | 10     |
| Q.4 | 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. ECG Technology.-II  
Code

Short Name

**B.Sc. ECG Technology**  
Part-II (Main) Examination Month Year

**Paper - III**  
**Basics of Cardiac Technology & ECG**

**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 Component of ECG Machine.              | 15     |
| Q.2 | Discuss remote ECG monitoring through internet | 15     |
| Q.3 | Describe the following                         |        |
|     | a) Holter monitoring technology                | 10     |
|     | b) AV blocks on ECG                            | 10     |
| Q.4 | Short Notes (any 4 out of 6)                   | 4x5=20 |
|     | a) Basic ECHO views                            |        |
|     | b) Ambulatory BP Monitoring                    |        |
|     | c) Discuss ECG lead placements and errors      |        |
|     | d) WPW Syndrome                                |        |
|     | e) Brady arrhythmias                           |        |
|     | f) Trans Esophageal Echo (TEE)                 |        |

## MODEL PAPER

B.Sc. ECG Technology.-III  
Code

Short Name

### **B.Sc. ECG Technology** Part-III (Main) Examination Month Year

#### **Paper - I** **Diseases of Heart**

**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                        | 15     |
| Q.3 | Describe the following:                           |        |
|     | a) Atrial Septal Defect                           | 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) Unstable Angina                                |        |
|     | d) Constrictive Pericarditis                      |        |
|     | e) Prinzmetal's Angina                            |        |
|     | f) Hypertrophic Obstructive Cardiomyopathy (HOCM) |        |

## MODEL PAPER

B.Sc. ECG Technology.-III  
Code

Short Name

**B.Sc. ECG Technology**  
Part-III (Main) Examination Month Year

**Paper - II**  
**ECG Technology and Interpretation**

**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 | VT- monomorphic, polymorphic and VT storm      | 15     |
| Q.2 | Discuss Irregular SVT causes and diagnosis     | 15     |
| Q.3 | Describe the following                         |        |
|     | a) ECG Changes in Hyperkalemia and Hypokalemia | 10     |
|     | b) Pacemaker over sensing and under sensing    | 10     |
| Q.4 | Write short notes (any 4 out of 6)             | 4x5=20 |
|     | a) Sinus arrhythmia                            |        |
|     | b) Atrial Flutter                              |        |
|     | c) Localization of STEMI                       |        |
|     | d) ECG in Acute Pericarditis                   |        |
|     | e) Discuss T wave inversion and its causes     |        |
|     | f) ECG in left atrial enlargement              |        |

## MODEL PAPER

B.Sc. ECG Technology.-III  
Code

Short Name

**B.Sc. ECG Technology**  
Part-III (Main) Examination Month Year

**Paper - III**  
**Treadmill Testing, Holter and Basic Echocardiography**

**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 various Treadmill Protocols              | 15     |
| Q.2 | Discuss Holter ECG interpretation.               | 15     |
| Q.3 | Describe:  |        |
|     | a) Duke scoring                                  | 10     |
|     | b) Diastolic Dysfunction assessment on Echo      | 10     |
| Q.4 | Write short notes (any 4 out of 6)               | 4x5=20 |
|     | a) Contraindications of Treadmill testing.       |        |
|     | b) M-mode Echo                                   |        |
|     | c) Principles of Doppler imaging                 |        |
|     | d) Discuss Mitral stenosis assessment on echo    |        |
|     | e) Ejection Fraction calculation methods on echo |        |
|     | f) PLAX view ECHO                                |        |

**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‖ McGraw Hill,
2. Simon J. Gibbs, Dinoysios C. Tschritziz, —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, Kriemhild Coneè Ornelas, The Cambridge world history of food, Cambridge University Press, 1st 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. Pronunciation

## **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.