# Model Question Paper -1 with effect from 2020-21(CBCS Scheme)

USN | | | | | | | | | | |

## Fifth Semester B.E. Degree Examination

### Diagnostic & Therapeutic Equipment

**TIME: 03 Hours** **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02.
03.

| | | | |
|---|---|---|---|
| | | **Module – 1** | |
| **Q.1** | **(a)** | With the aid of a block diagram, elaborate on the salient aspects of an oscilloscope display unit incorporating the digital storage, with regard to cardiac monitors. Highlight the importance of roll mode in digital storage as well | 8 |
| | **(b)** | Define cardiac arrhythmia. With an appropriate ECG representation, explain the salient pathological aspects of cardiac arrhythmia | 6 |
| | **(c)** | When is stress test/Exercise electrocardiography used? List the explain the protocols involved with regard to exercise stress testing | 6 |
| | | **OR** | |
| **Q.2** | **(a)** | How are bedside monitors different from conventional cardiac monitors? With an appropriate block diagram, explain the working of a generic bedside monitor | 8 |
| | **(b)** | Expand the acronym AZTEC. Describe the importance of AZTEC and its process, with regard to the data compression and processing of ECG signals. | 6 |
| | **(c)** | With the aid of a functional diagram, explain the construction and working of a data replay and analysis system for ECG signals with regard to ambulatory monitoring | 6 |
| | | **Module – 2** | |
| **Q.3** | **(a)** | What is an oximeter? Why is it required in diagnostic applications? With appropriate pictorial representation, explain the concept behind invitro and invivo oxymetry | 8 |
| | **(b)** | With a neat figure of the anatomy of ear, explain the mechanism of hearing in human beings | 6 |
| | **(c)** | Describe the following with regard to audiometry<br>• Transducers employed in audiometry<br>• Pure tone audiometer vs speech audiometer | 6 |
| | | **OR** | |
| **Q.4** | **(a)** | What is the basis of working of pulse oximetry? With a suitable pictorial representation, describe the salient features of a pulse oximeter | 8 |
| | **(b)** | Define threshold of hearing. Why is it important in auditory diagnostics? Describe the process of measurement of sound with regard to hearing measurement | 6 |
| | **(c)** | With regard to the Bekesy audiometers, with the aid of a block diagram, explain the construction and working of the electrical section of the same | 6 |
| | | **Module – 3** | |
| **Q.5** | **(a)** | Describe in detail, the need for cardiac pacemakers as therapeutic equipment. List the types of pacemakers as well | 8 |

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|---|---|---|---|
| | **(b)** | With a suitable pictorial representation, explain the construction and working of an automatic external defibrillator | 6 |
| | **(c)** | List and explain any five salient aspects with regard to the clinical significance of EEG | 6 |
| **OR** | | | |
| **Q.6** | **(a)** | How are implantable pacemakers different from external pacemakers? List and explain briefly, the types of implantable pacemakers | 8 |
| | **(b)** | Highlight the following aspects with regard to DC defibrillator<br>• Defibrillator electrodes<br>• DC defibrillator with synchronizer | 6 |
| | **(c)** | With the aid of a suitable pictorial representation, describe the construction and working of an EMG acquisition system | 6 |
| **Module – 4** | | | |
| **Q.7** | **(a)** | Describe in detail, the mechanics of respiration from a diagnostic perspective | 10 |
| | **(b)** | With the aid of an appropriate block diagram, explain the construction and working of a microprocessor controlled ventilator | 10 |
| **OR** | | | |
| **Q.8** | **(a)** | What is a ventilator? How is it useful from a therapeutic perspective? With the aid of a figure, explain the working of a positive pressure ventilator | 10 |
| | **(b)** | Describe in detail, the need and salient aspects of the following components in ventilators<br>• Humidifiers<br>• Nebulizers<br>• Aspirators | 10 |
| **Module – 5** | | | |
| **Q.9** | **(a)** | How is physiotherapy different from conventional therapeutic approaches? Describe the importance of high frequency heat therapy | 8 |
| | **(b)** | With an appropriate block diagram, describe the functional aspects of ultrasonic diathermy therapy unit | 6 |
| | **(c)** | Explain in detail, the therapeutic approach used in case of transcutaneous electrical nerve stimulation approach | 6 |
| **OR** | | | |
| **Q.10** | **(a)** | With a circuit-based representation, explain the construction and working of a short-wave diathermy unit. | 8 |
| | **(b)** | What is electrotherapy? Explain the process of the same, with regard to physiotherapy and electrotherapy equipment | 6 |
| | **(c)** | Explain briefly, the following equipment with regard to therapeutic applications<br>• Bladder stimulator<br>• Cerebellar stimulator | 6 |
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**Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome**

| Question | | Bloom's Taxonomy Level attached | Course Outcome | Programme Outcome |
|---|---|---|---|---|
| **Q.1** | (a) | L3 | 1 | |
| | (b) | L2 | 1 | |
| | (c) | L2 | 1 | |
| **Q.2** | (a) | L3 | 1 | |
| | (b) | L2 | 1 | |
| | (c) | L2 | 1 | |
| **Q.3** | (a) | L2 | 2 | |
| | (b) | L3 | 2 | |
| | (c) | L4 | 2 | |
| **Q.4** | (a) | L2 | 2 | |
| | (b) | L3 | 2 | |
| | (c) | L4 | 2 | |
| **Q.5** | (a) | L2 | 3 | |
| | (b) | L2 | 3 | |
| | (c) | L3 | 3 | |
| **Q.6** | (a) | L2 | 3 | |
| | (b) | L2 | 3 | |
| | (c) | L3 | 3 | |
| **Q.7** | (a) | L1 | 4 | |
| | (b) | L3 | 4 | |
| | (c) | | | |
| **Q.8** | (a) | L2 | 4 | |
| | (b) | L3 | 4 | |
| | (c) | | | |
| **Q.9** | (a) | L3 | 5 | |
| | (b) | L2 | 5 | |
| | (c) | L4 | 5 | |
| **Q.10** | (a) | L3 | 5 | |
| | (b) | L2 | 5 | |
| | (c) | L4 | 5 | |

| **Bloom's Taxonomy Levels** | **Lower order thinking skills** | | |
|---|---|---|---|
| | Remembering( knowledge):$L_1$ | Understanding Comprehension): $L_2$ | Applying (Application): $L_3$ |
| | **Higher order thinking skills** | | |
| | Analyzing (Analysis): $L_4$ | Valuating (Evaluation): $L_5$ | Creating (Synthesis): $L_6$ |

# Model Question Paper -2 with effect from 2020-21(CBCS Scheme)

USN | | | | | | | | | | |

## Fifth Semester B.E. Degree Examination

### Diagnostic & Therapeutic Equipment

**TIME: 03 Hours** **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02.
03.

| | | | |
|---|---|---|---|
| **Module – 1** | | | |
| **Q.1** | **(a)** | With the aid of a block diagram, illustrate the functional aspects of a single channel cardioscope with digital memory. | 8 |
| | **(b)** | Why is QRS detection important in diagnostic approach? How could one generate the QRS detection signal in ST/AR system? Explain with the aid of a block diagram as well | 6 |
| | **(c)** | With the aid of a block diagram, describe the salient features of the recording unit of ambulatory monitoring | 6 |
| **OR** | | | |
| **Q.2** | **(a)** | How is a central monitor different from a bedside monitor? Explain the important features of a central monitor | 8 |
| | **(b)** | With the aid of a block diagram, highlight the construction and working of a basic arrhythmia monitoring system | 6 |
| | **(c)** | What is ventricular fibrillation? Why is it important to detect ventricular fibrillation? Explain the process for the same | 6 |
| **Module – 2** | | | |
| **Q.3** | **(a)** | With an appropriate block diagram, explain the construction and working of an ear oximeter | 8 |
| | **(b)** | Define the terms “Air conduction” and “Bone conduction”. Explain the relevance of these terminologies and their concepts with regard to human hearing process | 6 |
| | **(c)** | With regard to the Bekesy audiometers, with the aid of a block diagram, explain the construction and working of mechanical section of the same | 6 |
| **OR** | | | |
| **Q.4** | **(a)** | Describe the construction and working of skin reflectance oximeter as well as intravascular oximeter | 8 |
| | **(b)** | Describe the salient aspects of a basic audiometer with regard to the following<br>• General requirements of audiometer<br>• Masking in audiometry | 6 |
| | **(c)** | How is evoked response audiometer different from a conventional pure tone audiometer? With a suitable block diagram, explain the functional aspects of evoked response audiometry | 6 |
| **Module – 3** | | | |
| **Q.5** | **(a)** | Explain the functional aspects of external pacemakers. List their shortfalls as well | 8 |

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|---|---|---|---|
| | **(b)** | Why is a defibrillator required in case of ventricular fibrillation? With a schematic diagram, explain the salient aspects of a DC defibrillator. | 6 |
| | **(c)** | With the aid of a block diagram, explain the construction and working of a generic EEG acquisition system | 6 |
| **OR** | | | |
| **Q.6** | **(a)** | With an appropriate block diagram, explain the construction and working of a ventricular synchronous demand pacemaker | 8 |
| | **(b)** | How are implantable defibrillators different from external defibrillators? Explain the construction and working of implantable defibrillator with the aid of its system architecture | 6 |
| | **(c)** | How could EMG signals be used for the assessment of nerve conduction? Explain the process of the calculation of nerve conduction velocity using EMG signals | 6 |
| **Module – 4** | | | |
| **Q.7** | **(a)** | What is artificial ventilation? Describe the importance of mask, breathing valves and self-filling bags used for artificial ventilation, with appropriate figures | 10 |
| | **(b)** | How are high frequency ventilators different from conventional ventilators? Explain in detail | 10 |
| **OR** | | | |
| **Q.8** | **(a)** | List the explain, with the appropriate basis, the classification of ventilators in detail | 10 |
| | **(b)** | Differentiate between modern ventilators and high frequency ventilators | 10 |
| **Module – 5** | | | |
| **Q.9** | **(a)** | List and explain the application technique of short-wave diathermy with regard to therapy. Explain the salient aspects of diapulse therapy as well | 8 |
| | **(b)** | With a suitable block diagram, explain the construction and working of a diagnostic/therapeutic stimulator unit | 6 |
| | **(c)** | Expand the acronym TENS, with respect to therapeutic applications. Explain in detail, the important features of interferential current therapy | 6 |
| **OR** | | | |
| **Q.10** | **(a)** | With the aid of a circuit-based representation, explain the construction and working of microwave diathermy equipment | 8 |
| | **(b)** | What is electrodiagnosis? Explain the process of the same, with regard to physiotherapy and electrotherapy equipment | 6 |
| | **(c)** | What is a spinal cord stimulator used for? Explain the therapeutic aspects involved with the same | 6 |
| | | | |

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|---|---|---|---|---|
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| | (b) | L3 | 1 | |
| | (c) | L2 | 1 | |
| **Q.2** | (a) | L2 | 1 | |
| | (b) | L3 | 1 | |
| | (c) | L2 | 1 | |
| **Q.3** | (a) | L2 | 2 | |
| | (b) | L3 | 2 | |
| | (c) | L4 | 2 | |
| **Q.4** | (a) | L2 | 2 | |
| | (b) | L3 | 2 | |
| | (c) | L4 | 2 | |
| **Q.5** | (a) | L3 | 3 | |
| | (b) | L2 | 3 | |
| | (c) | L3 | 3 | |
| **Q.6** | (a) | L3 | 3 | |
| | (b) | L2 | 3 | |
| | (c) | L4 | 3 | |
| **Q.7** | (a) | L2 | 4 | |
| | (b) | L3 | 4 | |
| | (c) | | | |
| **Q.8** | (a) | L2 | 4 | |
| | (b) | L3 | 4 | |
| | (c) | | | |
| **Q.9** | (a) | L3 | 5 | |
| | (b) | L3 | 5 | |
| | (c) | L2 | 5 | |
| **Q.10** | (a) | L3 | 5 | |
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