Reg. No. : | | | | | | | | | | | | |

Question Paper Code : X10341

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2020
Fifth/Seventh Semester
Electronics and Communication Engineering
EC 8073 – MEDICAL ELECTRONICS
(Common to Electronics and Telecommunication Engineering)
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. List the different types of electrodes used in the measurement of ECG, EEG and EMG.

2. Mention the specifications of biopotential amplifiers.

3. What is the heart rate in beats per minute of a patient with an R to R interval to 856 ms ?

4. Define Lung compliance.

5. Mention the role of EMR signal in MRI.

6. State the principle of Doppler Effect. Give its applications in medical ultrasound imaging.

7. What is one of the major limitations of the diathermy machines ? Identify a method to avoid it.

8. List the types of electrodes used in surgical diathermy machine.

9. Draw the block diagram of Telemedicine system.

10. How does an insulin pump work ?

PART – B **(5×13=65 Marks)**

11. a) How bioelectric signals are generated ? Illustrate it with a cell potential waveform.

(OR)

b) Draw the action potential waveform and discuss about depolarization, repolarization, absolute and relative refractory periods.

12. a) i) State the Beer-Lambert's law in spectrometry. **(3)**

ii) With neat diagram explain the method of blood cell counting based on change in electrical conductivity. **(10)**

(OR)

b) Describe the various indirect methods of blood pressure measurement with necessary diagrams.

13. a) i) Explain the working of an asynchronous cardiac pacemaker using appropriate block diagram. **(6)**

ii) With neat sketch, explain the working of demand-type synchronous cardiac pacemaker. **(7)**

(OR)

b) Explain in detail the construction and operation of MRI.

14. a) With the block diagram of solid state surgical diathermic machine, explain its working.

(OR)

b) Explain and the various modulation techniques used to transfer biosignals in the Multichannel Biotelemetry system.

15. a) i) Describe in detail on the principal benefits claimed for telemedicine. **(8)**

ii) Summarize the limitations of telemedicine. **(5)**

(OR)

b) Explain the principle, construction and working of an Endomicroscopy.

PART – C **(1×15=15 Marks)**

16. a) i) What is the need of a cardiac defibrillator ? Draw the schematic diagram of a d.c. defibrillator and explain the function of each component. **(7)**

ii) The 30-μF capacitor of the defibrillator is charged to energy of 300 J. When the electrodes are attached to the patient, a 40-Ω resistive load is seen. What value of inductance L is required for critical damping ? Also find out the peak current passing through the patient during the discharge under these conditions. **(8)**

(OR)

b) i) Identify the type of telemedicine from the given statement and give the definition of it. **(4)**

ii) With real-time systems, the consultant actively operates a microscope located at a distant site – changing focus, illumination, magnification and field of view at will. **(4)**

iii) To reduce the healthcare costs of chronically ill patients while providing them access to healthcare providers and maintaining their quality of life. **(7)**

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