

[Time: 3 Hours]

[Marks:80]

Please check whether you have got the right question paper.

- N.B:**
1. Attempt any four questions
 2. Figures to right indicates full marks
 3. Draw neat labelled diagrams whenever needed
 4. Assume suitable data whenever necessary

- Q.1** Write short notes on any four of the following **20**
- (a) Therapeutic Ultrasound
 - (b) Fast Fourier transform
 - (c) Hanning Window
 - (d) Blood Cell Counter
 - (e) Blood Gas Analysis
 - (f) Cobalt Therapy
- Q.2** (a) Describe hollow fiber hemo-dialyzer **7**
 (b) With the help of a schematic, explain functioning of a dialysis machine. **7**
 (c) Explain construction and working of a Heart Lung Machine. **6**
- Q.3** (a) How do you suppress motion artifacts in Electrocardiography? **7**
 (b) Explain principle and working of Coherent Averaging. **7**
 (c) How mobile network based telemedicine is advantageous over other modalities? **6**
- Q.4** (a) Describe different kinds of arrhythmias and their algorithms. **10**
 (b) Find material constant β for a thermistor whose R-T characteristics are as below: **10**
- | | | | | | | | | |
|------------------------------|------|------|------|------|------|------|------|------|
| Temp. ($^{\circ}\text{C}$) | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 |
| Res. (Ω) | 2492 | 2282 | 2090 | 1915 | 1757 | 1611 | 1481 | 1360 |
- Q.5** (a) For an external defibrillation of 400 Joules, calculate the value of capacitor for voltage supply of 10KV. **7**
 (b) If the energy is delivered to the chest in 10 milliseconds, for the above energy pulse of 400 Joules, what will be the peak current delivered to the patient. **7**
 (c) Describe basic defibrillator circuit. **6**
- Q.6** (a) What is a differential amplifier why its use is important? **7**
 (b) In sensing ECG from the body, how do you take care of the electrode potential? **7**
 (c) The first stage of an instrumentation amplifier (IA) has a differential gain of 10 and common mode gain of unity. The second stage of IA has CMRR of 70 dB. Find the total CMRR in dB of the IA. **6**