Nar	ne : .	• • • • • •		•••••				
Roll	No. :	:		• • • • • • • • • • • • • • • • • • • •				
Invi	igilato	or's S	ignature :	• • • • • • • • • • • • • • • • • • • •				
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)13				
		BI	OMEDICAL INS	STRUM	ENTATION			
Tim	e Alle	otted	: 3 Hours		Full Marks : 70			
		Th	ne figures in the man	gin indica	te full marks.			
Ca	andid	lates	-	their ansv as practica	vers in their own words able			
			GRO	UP – A				
			(Multiple Choice	Type Qu	estions)			
1.	Choose the correct alternatives for any ten of the following : $10 \times 1 = 10$							
	i)	Biomedical sen or can sense the energy form of						
		a)	Electrical	b)	Physical			
		c)	Chemical	d)	all of these.			
	ii) Ultrasound waves are above							
		a)	20 Hz	b)	20 kHz			
		c)	both (a) & (b)	d)	none of these.			
	iii)	iii) Which type of fluid is blood?						
		a)	Newtonian	b)	Dilatant			
		c)	Non-Newtonian	d)	Bingham.			

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iv)	iv) Natural pacemaker of the heart is					
	a)	AV node	b)	SA node		
	c)	Bundle of His	d)	Purkinje's fibres.		
v)	The frequency range of ECG waveform is					
	a)	0·05 Hz - 100 Hz	b)	0·05 Hz - 160 Hz		
	c)	1 Hz - 160 Hz	d)	10 Hz - 100 Hz.		
vi)	The tip diameter of a micropipette is					
	a)	$0.01 - 0.1 \mu m$	b)	$0.1 - 10 \mu m$		
	c)	10 - 100 μm	d)	none of these.		
vii)	In b	io-telemetry, the sub-	carrier	frequency lies in		
	a)	AF-range	b)	RF-range		
	c)	VHF-range	d)	none of these.		
viii)	The	The value of let-go cur ent in man is				
	a)	5 mA	b)	9 mA		
	c)	16 mA	d)	21 mA.		
ix)	Bio-potential signal generated from heart muscle along					
	three dimensional axis of the body is known as					
	a)	ECG	b)	VCG		
	c)	EEG	d)	none of these.		
x)	The	no. of electrode	s req	uired to record an		
	a)	6	b)	12		
	c)	5	d)	None of these.		
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- xi) Unit of X-ray is
 - a) curie

b) volt

c) farad

- d) none of these.
- xii) For biomedical application the most suitable electrode is
 - a) Hydrogen electrode
- b) Na-electrode
- c) Cu-electrode
- d) Ag-AgCl electrode.

GROUP - B

(Short Answer Type Questions)

Answer any three of the following

 $3 \times 5 = 15$

- 2. Explain the principle of sphygmomanometer.
- 3. Explain the different artefacts on ECG recordings.
- 4. What is electroencephalography? List the brain waves and their frequency. 3 + 2
- Draw and discuss the basic block diagram of bio-instrumentation system.
- 6. Define fibrillation and defibrillation.

GROUP - C (Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. What are the different types of electrodes used in ECG, EEG and EMG measurement? What are the safety considerations to be taken in the use of electrical systems at the time of *in vivo* measurements? Describe the invasive method of blood pressure measurement. 4 + 4 + 7

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- 8. What is the principle of generation of X-ray ? Mention the important control systems for X-ray generation. What are the applications of computer in medicine ? Describe the data acquisition system of CT. 4 + 5 + 2 + 4
- 9. a) Discuss the indirect method of blood pressure measurement.
 - b) Explain the function of sphygmomanometer.
 - c) What are the values of systolic and diastolic pressure for a normal human being ? 7 + 5 + 3
- 10. a) What do you mean by cardiac pacemaker? How does it work?
 - b) Discuss some types of cardiac pacemaker.
 - c) What do you mean by EMG ? State two electrodes for EMG measurement.
 - d) What is electrocardiography?

5 + 4 + 4 + 2

11. Write short notes on any *three* of the following :

 3×5

- a) MRI
- b) Patient care monitoring unit
- c) CAT
- d) Half-cell potential
- e) Biopotential amplifier.

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