

[163]

SEAT No. _____



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SARDAR PATEL UNIVERSITY
B.Sc. (VI SEMESTER)- INSTRUMENTATION (V) EXAMINATION
US06CINV24:
SPECTROSCOPY & BIOMEDICAL INSTRUMENTATION

Date: 7-04-2022

TIME:- 3:00 pm to 5:00 pm

MARKS-70

Q-1 Choose correct answer

[10]

1. High transmittance at desired wavelength and low transmittance at other wavelength is requirement for
(a) detector (b) sample (c) optical filter (d) none
2. $E = hv$, v represents.....
(a) wavelength (b) velocity (c) energy (d) frequency
3. The most commonly used window material in IR range is ...
(a) NaCl (b) CO₂ (c) BaF (d) SiGe
4. Nernst filament is the source of energy in which range?
(a) UV (b) VIS (c) IR (d) Microwave
5. Bolometer is used to detect.....radiation.
(a) UV (b) Visible (c) Microwave (d) Thermal
6. Coulter counter method gives information regarding relative
(a) muscles (b) cells (c) nerves (d) enzymes
7. Bioacoustic signal is generated through.....
(a) brain (b) legs (c) neck (d) lungs
8. EMG is common example of signals.
(a) bioacoustics (b) biochemical (c) bio-optical (d) bioelectric
9. Normal range of blood pressure ismmHg.
(a) 180 – 20 (b) 120 – 80 (c) 72 – 150 (d) 60 – 200
10. If the thermocouple is made up of Copper-Constantan, it is of type.
(a) J (b) K (c) T (d) S



Q-2 Fill in the blanks

[8]

1. Globar rod is used as source in range.
 2. Tungsten lamp emits light in the range.
 3. Photometric sensor is the type of sensor.
 4. Thermister istransducer.
- State True or False**
5. Deviation of Beer's law is at low concentration.
 6. Bolometer is used as detector in IR range.
 7. Pellet type is sample handling technique used for liquid samples.
 8. Optical fibre medium is immune to cross talk.

Q-3 Short answer type question. (attempt any 10)

[20]

1. State Beer-Lambert law
2. What type of Instrument related errors occur in Spectrometer?
3. Write the principle of Pyroelectric detector.
4. List the materials used for prism construction.
5. What is Littrow mounting IR mono-chromator?
6. What are the limitations of Photomultiplier tube?
7. State empirical laws to accurately measure temperature by thermoelectric means.
8. List advantages of Thermistors.
9. What is the use of skin and needle electrodes?
10. What is the importance of Bioimpedance signal?
11. Draw neat labelled diagram of man machine interface.
12. Define systolic and diastolic pressure.



Q-4 Descriptive type (attempt any 4)

[32]

1. Describe components of Absorption instruments.
2. Explain High vacuum photo-emissive cell and photomultiplier tube.
3. With block diagram explain Optical Null type double beam IR spectrophotometer.
4. Explain Golay's pneumatic cell with neat figure.
5. Describe Bio-potential generation with sequential figures explaining PQRS graph. Also define the terms: Resting Potential and Action Potential.
6. Write a short note on Thermocouples. What are empirical laws?
7. Explain Blood Pressure measurement technique with neat diagram.
8. Explain Electrocardiograph (ECG) machine and PQRS complex in detail with necessary figures.

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