

[A-92]

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SARDAR PATEL UNIVERSITY

T. Y. B. Sc. Examination
US06CINV04 – Spectroscopy & Biomedical Instrumentation
4th April, 2016, Time: 2:30pm to 5:30pm

Total Marks: 70

Note: The figures to the right indicate maximum marks.

- Q-1. **Multiple Choice Questions-** [10]
- (1) The wavelength of ultraviolet light is
(a) below 400nm (b) from 400nm to 700nm (c) above 700nm (d) none of these
 - (2) High transmittance at desired wavelength and low transmittance at other wavelengths is requirement for
(a) detector (b) source (c) optical filter (d) none
 - (3) Tungsten lamp emits light in the range.
(a) X-ray (b) Visible (c) Microwave (d) Cosmic
 - (4) Earth oxides are used in
(a) Globar Rod (b) Nernst Filament (c) Nichrome Strip (d) none of them
 - (5) The most commonly used window material in IR range is
(a) NaCl (b) CO₂ (c) BaF (d) SiGe
 - (6) Pellet type is sample handling technique for
(a) Liquid (b) Gas (c) Plasma (d) Solid
 - (7) If the thermocouple is made up of Iron-Constantan, it is of type.
(a) J (b) K (c) T (d) S
 - (8) The flow of blood in the heart is example of signals.
(a) bioacoustic (b) biochemical (c) bio-optical (d) bioelectric
 - (9) are immune from cross talk.
(a) copper cable (b) waveguides (c) strip line (d) optical fiber
 - (10) Information regarding relative cell size is obtained by
(a) centrifuge (b) coulter counter (c) inhibitor (d) none

Q-2. **Short answer type (attempt any ten)** [20]

- (1) What type of Instrument related errors occur in Spectrometer?
- (2) State Beer Lambert law.
- (3) Write equation of energy for electromagnetic spectrum. Show the relation between Absorbance and transmittance.
- (4) What is Bolometer?
- (5) Draw the diagram of optical arrangement of IR spectrophotometer.

- (6) What is Littrow mounting infrared monochromator?
- (7) Explain basic principle of Thermocouple.
- (8) List six different Biomedical signals.
- (9) What is the function of stimulators used in EMG machines?
- (10) Write laws to accurately measure temperature by thermoelectric means.
- (11) Define systolic and diastolic pressure.
- (12) What is the use of needle electrodes?
- Q-3. (a) Discuss High vacuum photo-emissive cells and photomultiplier tube. [7]
- (b) Discuss in brief Absorption filters. [3]
- OR**
- Q-3. (a) Discuss Radiation sources for UV-VIS range. [7]
- (b) Draw block diagram of Absorption instruments with neat labeling. [3]
- Q-4. (a) Describe Optical Null type double beam Infrared spectrophotometer. [7]
- (b) Write short note on Globar rod. [3]
- OR**
- Q-4. (a) Explain working principle of Golay's Pneumatic Cell and Pyroelectric detector used in IR spectroscopy. [7]
- (b) Explain in brief different sample handing techniques in IR. [3]
- Q-5. (a) Explain Medical Instrument System with different biomedical sources. [7]
- (b) Write advantages of Thermistors. [3]
- OR**
- Q-5. (a) Explain Coulter counter method. [7]
- (b) List advantages of Optical Fiber Sensors. [3]
- Q-6. (a) Discuss the basic principle of Bio-potential generation with sequential figures and PQRS complex graph. Also define the terms: Resting Potential, Action Potential. [10]
- OR**
- Q-6. (a) Discuss types of Sphygmomanometer in brief. [5]
- (b) Explain with neat block diagram principle of ECG machine. [5]
