

OPTICAL & ANALYTICAL INSTRUMENTATION  
3K4-IFO-25E

M.M. : 100

Time : 3 Hrs.

**Note :—**

1. Part 'A' may be attempted in first 6 pages of Answer Sheet.  
भाग 'क' के सभी उत्तर, उत्तर-पुस्तिका के प्रथम छः पृष्ठों में ही करने हैं।
2. Part 'B' in rest of the Sheets of Answer Sheet.  
भाग 'ख' के उत्तर, उत्तर-पुस्तिका के अगले शेष पृष्ठों में लिखिये।
3. Answers may be given in English or Hindi.  
प्रश्नों के उत्तर अंग्रेजी अथवा हिन्दी में दीजिये।

**PART - A**

(10 × 2 = 20)

**1. Attempt any ten questions:**

- (i) Explain the working principle of colorimeter.
- (ii) Define of pH.
- (iii) Define electcial conductivity.
- (iv) Explain electron microscope in detail with neat diagram.
- (v) Explain dark field microscopy and bright field microscopy in short.
- (vi) Write short on flow cytometry.
- (vii) What is histopathology?
- (viii) Explain in detail continuous flow analysers.
- (ix) What is blood gas analyser?
- (x) What is Picoscale?
- (xi) What is optical fiber? Give its applications in endoscopy majorly.
- (xii) What is Laminar flow table?
- (xiii) What is the basic principle of electrophoresis?
- (xiv) State Bragg's law.

**2. Attempt any 5 questions:**

- (i) Discuss interaction of radiation with matter and explain Spectrophotometer type instrument with its various components in details.
- (ii) Explain in details clinical Flame photometer instrument and its essential parts with block diagram. State how it is different from colorimeter.
- (iii) Explain Pulse oximeter type instruments and its signal processing circuit in details.
- (iv) Explain in details principle of Coulter counter.
- (v) Explain in details microscope and its working principle with neat diagram.
- (vi) Explain various parts of endoscopy.
- (vii) Explain any one method of electrical conductivity.

**PART- B****Attempt any 3 questions:**

(3 × 20 = 60)

- 3. (a) Explain briefly measurement of pH and its various types of electrodes.  
(b) Briefly describe various components of Auto analyser and densitometer.
- 4. (a) Write short note on chromatography and its classification. Discuss about HPLC.  
(b) Explain the following equipments in terms of their construction & working:
  - (i) Centrifuge
  - (ii) Hot air oven
- 5. (a) Write short note on the following: (i) PCR Units. (ii) ELISA reader.  
(b) Explain working principle of CCTV and its applications in details.
- 6. (a) Discuss about endoscopic imaging system and explain each subsystem.  
(b) State advantages and disadvantages of automated cell counter. Discuss about automatic recognition and differential counting of cells.