

**GANPAT UNIVERSITY**  
**B. TECH. SEMESTER: V (BM&I) ENGINEERING**  
**REGULAR EXAMINATION NOV – DEC 2015**  
**2BM506: ANALYTICAL INSTRUMENTATION**

Time: 3 Hours

Total Marks: 70

**Instruction:**

1. Answer to the each section must be written in separate answer books.
2. Figure to the right indicate marks.
3. Conventional terms / notations are used.
4. All the questions are compulsory.

**Section - I**

- Que. – 1** 12
- (a) Compare classical methods and instrumentation methods of chemical analysis. Describe the following term: spectral method, analytical technique. 6
  - (b) Derive the equation of centrifugal effect. Write the applications of centrifuge. 6

**OR**

- Que. – 1** 12
- (a) Define: Analytical instruments. Enlist and explain the elements of analytical instruments with block diagram. 6
  - (b) Describe the following term: Analytical balance, electronic balance. Explain the mechanism of load cell type of electronic balance with neat diagram. 6

- Que. – 2** 11
- (a) Describe the Beer Lambert Law and derive the equation of it. 6
  - (b) What is the function of photomultiplier tube? Write the advantages and limitations of it. 3
  - (c) Describe the function of the monochromator. 2

**OR**

- Que. – 2** 11
- (a) Draw the block diagram of infrared spectrophotometer. Explain sources, wavelength selection and detectors of infrared spectrophotometer briefly. 6
  - (b) The molar absorptivity of a compound in aqueous solution at 765 nm is  $1.54 \times 10^3$ . The percent transmittance of a solution of the compound in a cell with a 1.00-cm path length is 43.2. What is the concentration of solution? 3
  - (c) What is photo emissive detector? Enlist the types of photo emissive cell. 2

- Que. – 3** 12
- (a) Explain with neat diagram essential parts of the flame photometers. 4
  - (b) Explain with neat diagram principle of operation of mass spectrometer. 4
  - (c) Describe the thermal ionization method with neat diagram. 4



## Section - II

Que. - 4

- (a) With neat circuit diagram explain temperature control circuit for thermo stated chamber. 6
- (b) Why acid-base equilibrium is necessary for human body? Describe the operation of A to D converter used in complete Blood Gas Analyser. 6

OR

Que. - 4

- (a) Explain the following briefly: Blood PH, Effect of Blood on electrode. 6
- (b) Describe the operation of complete Blood Gas Analyser. Explain the  $\text{HCO}_3^-$  Measurement with necessary diagram. 6

Que. - 5

- (a) What is the principle of liquid chromatography? Explain the construction detail and operation of liquid chromatograph with block diagram. 6
- (b) Explain thermal conductivity detector with diagram. 5

OR

Que. - 5

- (a) With neat diagram explain high performance liquid chromatography. 6
- (b) Define: adsorption, electrophoretic mobility, electro osmotic flow, immune diffusion, dark field illumination. 5

Que. - 6

- (a) Draw the diagram of instrumentation for X-ray spectrometry and explain X-ray generating equipment briefly. 4
- (b) Enlist the types of blood cell counting method. Explain flow cytometry with neat diagram. 4
- (c) Explain the instrumental setup of capillary electrophoresis. 4

END OF PAPER