Code No: RR312201 **Set No.1**

III B.Tech. I Semester Regular Examinations, November -2005
ANALYTICAL INSTRUMENTATION
(Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define the term Conductivitymetry.
   (b) With neat sketch explain the conductivity method for the measurement of SO_2 in air sample. [4+12]
2. Explain the dissolved oxygen analyzer by Katharometer method. [16]
3. Compare and list out the merits and demerits of non-dispersive infrared analyzer over gas chromatography in carbon monoxide estimation. [16]
4. (a) What is meant by chromatogram? Explain the term "retention time".
   (b) An isopropyl benzene peak has a retention time of 5.36 min at 200 degree centigrade and 3.15 min at 225 degree centigrade on a carbopack c/0.1%sp-1000 column which has an efficiency of 2900 theoretical plates. What is the highest column temperature, which can be used such that the peak width will not be less than 10 sec? [8+8]
5. What is a spectrophotometer and explain a typical UV/ visible spectrometer using double beam. [16]
6. (a) Explain briefly about flame photometry?
   (b) Briefly discuss about the detectors of flame photometry? [8+8]
7. (a) Write down the needs of mass Spectrometer.
   (b) Discuss the merits of various types of mass Spectrometer. [8+8]
8. Write short notes on:
   (a) Factors affecting the counting of pulses.
   (b) Possible radiation methods with different interaction techniques. [8+8]

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Code No: RR312201 **Set No.2**

III B.Tech. I Semester Regular Examinations, November -2005
ANALYTICAL INSTRUMENTATION
(Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. With necessary diagrams briefly discuss the various types of electrodes used in pH measurement. [16]

2. (a) With neat sketch explain the dissolved oxygen electrode system.
   (b) With neat sketch explain the construction of hydrogen gas electrode. [8+8]

3. Explain how conductivitimetry can be used in the estimation of sulphur dioxide. [16]

4. Discuss the various problems arise in using a poorly packed liquid chromatography column? [16]

5. (a) Why is source modulation often employed in atomic absorption spectroscopy?
   (b) Describe one particular technique of such spectroscopic analysis and explain its Operation. [8+8]

6. (a) Explain the importance of atomic spectroscopy.
   (b) Explain grounded singlet, excited singlet and excited triplet states. [8+8]

7. (a) Write down the range of radio frequency. Discuss the working principle of radio frequency mass spectrometer.
   (b) Point out in what sense RF mass spectrometer differs from other types of mass spectrometer. [10+6]

8. Write short notes on:
   (a) Gas amplification gain.
   (b) Geiger range.
   (c) Unit which is used to describe the value of radio activity. [6+4+6]

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Code No: RR312201 **Set No.3**

III B.Tech. I Semester Regular Examinations, November -2005
ANALYTICAL INSTRUMENTATION
(Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Which is the secondary reference electrode for pH measurement?
   (b) Explain constructional details and working principles of secondary reference electrode. [13+3]
2. (a) With neat block diagram explain any one type of sodium analyzer.
   (b) Write short notes on clinical sodium analyzer. [10+6]
3. How co laser can be used for the measurement of nitric oxide. Give a neat block diagram and explain the operation of each block clearly. [16]
4. Express the volume over which the base width of peak elutes in terms of 'N', t_m and K derive this formula? [16]
5. (a) Explain about the advantages and Disadvantages associated with single and double beam spectrometer?
   (b) What is the requirement of chopper in spectrometer. [8+8]
6. (a) Explain the operation of multi channel type instrument to calculate focal length of a monochromator.
   (b) If the order used in an echelle grating is 70 and a dispersion angle 60^0, groove density 80/mm and focal length 0.5 m, Obtain the reciprocal linear dispersion and resolution. [6+10]
7. (a) Write down the needs of mass Spectrometer.
   (b) Discuss the merits of various types of mass Spectrometer. [8+8]
8. Explain with necessary sketches and graphs the characteristics of ionization type of detectors. [16]

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Code No: RR312201 **Set No.4**

III B.Tech. I Semester Regular Examinations, November -2005
ANALYTICAL INSTRUMENTATION
(Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. With schematic diagram explain the following pH meters.
   (a) Chopper Amplifier type pH meter.
   (b) Vibrating Condenser Amplifier pH meter. [8+8]
2. (a) With neat block diagram explain any one type of sodium analyzer.
   (b) Write short notes on clinical sodium analyzer. [10+6]
3. Describe the principle of operation of infrared gas analyzer. [16]
4. (a) With neat sketches, explain with detail photometric detector used in liquid chromatography system.
   (b) With neat sketches, explain with detail fluorometric detector used in liquid chromatography system. [8+8]
5. Briefly explain absorption and interference filters Compare between grating and prism monochromators. [16]
6. (a) Explain the operation of multi channel type instrument to calculate focal length of a monochromator.
   (b) If the order used in an echelle grating is 70 and a dispersion angle 60^0, groove density 80/mm and focal length 0.5 m, Obtain the reciprocal linear dispersion and resolution. [6+10]
7. (a) Explain about the general principle of operation of a mass Spectrometer with neat diagram.
   (b) With needed schematic diagram, explain about magnetic mass Spectrometer. [8+8]
8. Explain the constructional details and principle of operation of
   (a) surface barrier detector.
   (b) lithium drifted germanium detector. [8+8]

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