

Code No: 07A61003

**R07****Set No. 2**

III B.Tech II Semester Examinations, APRIL 2011

ANALYTICAL INSTRUMENTATION

Instrumentation And Control Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. Explain the Beckman Paramagnetic Oxygen analyzer with neat diagram. [16]
2. Write short notes on:
  - (a) Prism monochromators
  - (b) Grating monochromators. [8+8]
3. Discuss briefly about the radio frequency transmitter used in NMR with suitable diagram. [16]
4. (a) Briefly explain Argon Ionization detector in Gas chromatography.  
(b) What are the different methods of Peak area measurement? Explain. [8+8]
5. What is a semiconductor detector? Explain the advantages in the sense of working principle compared to other radio active detectors. [16]
6. Write the procedure for analysis of the chemical sample by using flame photometry. [16]
7. (a) Define Ionization. Describe the Gas analyzer for Nitrogen with a neat figure.  
(b) How do you analyze  $\text{NO}_x$ ? Explain. [8+8]
8. (a) How does Vibrating Condensing Amplifier type pH meter differ from other types of pH meter? Explain.  
(b) Write short notes on
  - i. Temperature Compensation in Conductivity measurement
  - ii. High frequency method for conductivity measurement. [6+5+5]

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**R07****Set No. 4**

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**Instrumentation And Control Engineering**

Time: 3 hours

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1. (a) Define pH. Explain the principle of operation of pH meter with a neat sketch.  
(b) With neat sketch explain the construction and working principle of Silica analyzer. [8+8]
2. Give the schematic diagram of different types of ion sources used in mass spectrometer and explain. [16]
3. Draw and explain the block diagram of improved version of IR Gas analyzer. [16]
4. (a) What are the methods used to develop a chromatograph?  
(b) What do you understand by Carrier Gas? List few considerations in selecting a Carrier gas. [8+8]
5. (a) Explain in detail the radiation sources, globar rod and nichrome wire used in infrared spectrophotometer.  
(b) Explain in detail the Littrow mounting infrared monochromator with suitable diagram. [8+8]
6. What is a semiconductor detector? Explain the advantages in the sense of working principle compared to other radio active detectors. [16]
7. (a) Name an Oxygen analyzer used for medical applications and explain it.  
(b) What are the different electrochemical methods for Oxygen analysis? Explain any one of them. [8+8]
8. Explain in detail about the sampling system used in atomic absorption spectroscopy. [16]

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**R07****Set No. 1**

**III B.Tech II Semester Examinations, APRIL 2011**  
**ANALYTICAL INSTRUMENTATION**  
**Instrumentation And Control Engineering**

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
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1. (a) Define sensitivity of an instrument and discuss the various operation techniques for sensitivity enhancement.  
(b) Compare the conventional NMR and the Fourier transform NMR spectroscopy.  
(c) Explain about the relaxation process in NMR spectroscopy. [8+4+4]
2. With a neat block diagram explain the basic parts of gas Chromatograph. [16]
3. (a) Describe the constructional details and applications of a proportional counter with a neat sketch.  
(b) Discuss about the dead time of the GM counter.  
(c) Write short notes on the Geiger range. [8+4+4]
4. Explain in detail the sample handling technique in infrared spectrophotometers. [16]
5. (a) What are the applications of CO monitor.  
(b) What are the similarities and differences between Bolometer and Thermistor? [4+12]
6. (a) State the relation between concentration and absorbance .  
(b) What are the advantages of flame photometry?  
(c) Explain briefly the principle of flame photometry. [4+4+8]
7. (a) What are the problems encountered in Magnetic Wind instruments?  
(b) Explain Thermo-magnetic analyzers in detail. [8+8]
8. (a) Write short notes on
  - i. Direct reading pH meter
  - ii. Standardization of pH Electrode.  
(b) Explain how Thermal Conductivity of Hydrogen differs from other gases. [8+8]

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R07

Set No. 3

III B.Tech II Semester Examinations, APRIL 2011  
ANALYTICAL INSTRUMENTATION  
Instrumentation And Control Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. Write short notes on:
  - (a) Prism monochromators
  - (b) Grating monochromators. [8+8]
2. Give the schematic diagram of the time -of-flight mass spectrometer and explain the construction and working principle. [16]
3. Explain Katharometer dissolved Oxygen meter with neat diagram. [16]
4. Discuss the principle of operation of the different modes in atomic absorption spectrophotometers. [16]
5. (a) Write short notes on
  - i. Gas-Liquid Chromatography
  - ii. Gas-Solid Chromatography.(b) Why do you think Thermal Compartment is needed in the Chromatograph? Explain. [8+8]
6. (a) With a neat sketch explain IR Gas Analyzer.  
(b) Define Thermal Conductivity of a gas Explain the principle of operation of Thermal Conductivity Gas Analyzer. [8+8]
7. Explain in detail the construction and working principle of any two types of radiation detectors with a neat diagram. [16]
8. (a) Why do you think MOSFETs are used at the input stage of pH meter? Explain the circuit arrangement of a pH meter using MOSFET at the input stage of pH meter.  
(b) How does the potential of pH Electrode changes with temperature? Explain. [8+8]

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