A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 55904

B.E./B.Tech. DEGREE EXAMINATION, MAY 2018

Fifth Semester

Chemical Engineering

15UCH504 - INSTRUMENTAL METHODS OF ANALYSIS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer All Questions

PART A - (10x 1 = 10 Marks)

1. Identify the UV wavelength range CO1- R

   (a) 180-400 nm (b) 435-480 nm (c) 570-600 nm (d) 610-750 nm

2. The thermocouple wire can be insulated by CO1- U

   (a) Teflon (b) Asbestos (c) Fiber glass (d) None of these

3. Radiation thermometer has CO2- R

   (a) rapid response (b) high differential stability

   (c) relatively high initial cost (d) all the above

4. Optical pyrometers are sensitive in a CO2- U

   (a) very narrow wavelength range only (b) wide wavelength range only

   (c) Both (a) and (b) (d) None of the above

5. Which of the following is suitable for measuring the temperature of red hot moving object CO3- R

(a) Thermocouple (b) Thermistor

(c) Radiation Pyrometer (d) None of these

6. Thermistors are included in the class of solids called CO3- R

(a) conductor (b) semiconductor (c) insulator (d) None of these

7. Gas chromatography is used for measurement of CO4- U

(a) temperature (b) pressure (c) concentration (d) flow rate

8. Active transducer is CO4- R

(a) photo emissive cell (b) photo voltaic cell

(c) selsyn (d) all of these

9. Instrumentation in a process plant offers CO5- A

(a) great safety of operation (b) better quality of product

(c) greater operation economy (d) all a,b and c

10. Which one of the following is the principal disadvantage of a piezoelectric transducer CO5- R

(a) it can measure force only (b) it cannot measure static conditions

(c) it is too small to handle (d) it produces only dc voltage

PART – B (5 x 2= 10Marks)

11. How are fast Fourier transformation used to reduce noise? CO1- U

12. Explain Beers Law**.** CO2- U

13. Name some solvents used in NMR spectroscopy. CO3- U

14. What is chromatography? CO4- U

15. Define potentiometry technique. CO5- U

PART – C (5 x 16= 80Marks)

16. (a) Explain the types of optical instruments. CO1-U (16)

Or

(b) Explain the software techniques used for signal to noise enhancement. CO1 -U (16)

17. (a) Explain the theory, instrumentation and applications of Raman spectroscopy. CO2 -U (16)

Or

(b) Draw and explain the block diagram of an infrared spectrophotometer. CO2 -U (16)

18. (a) When does nuclear magnetic resonance occur? Explain the working of NMR spectrometer with a schematic diagram. CO3- App (16)

Or

(b) State the basic principles of mass spectroscopy. Write about different types of ions produces in a mass spectrometer CO3- App (16)

19. (a) Explain the various chromatographic techniques in detail. CO4-U (16)

Or

(b) Discuss in detail the characteristics and types of pumps used in HPLC. CO4 -Ana (16)

20. (a) With a neat sketch explain in detail about electrochemical cells and its working procedure. What are the three AFM modes? Explain. CO5- U (16)

Or

(b) Discuss in brief about (i) Voltammetry and (ii) Potentiometry. CO5- U (16)