Reg. No.																

Question Paper Code	14663

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2026

Fifth Semester

Electronics and Instrumentation Engineering

20EIPC501 - ANALYTICAL INSTRUMENTATION

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART – A (i) (MCQ)
(16 × 1 = 16 Marks)
Answer ALL Questions

		Marks	K – Level	CO
1.	Which of the following statements is false about single beam absorption instruments? a) Tungsten bulb is used as a source b) Beam splitter is used to get parallel beam c) Test tube is used as sample holder d) Photovoltaic cell as detector	1	K1	CO1
2.	In Flame emission photometers, the measurement of _____ is used for qualitative analysis. a) Colour b) Intensity c) Velocity d) Frequency	1	K2	CO1
3.	Which of the following is not an advantage of Laminar flow burner used in Flame photometry? a) Noiseless b) Stable flame for analysis c) Efficient atomization of sample d) Sample containing two or more solvents can be burned efficiently	1	K1	CO1
4.	What happens during the 'elution from the column' phase in chromatography? a) Components with greatest affinity elute first b) Components with least affinity elute first c) Components elute in a random manner d) Components elute according to their concentration in the mixture	1	K1	CO2
5.	Show which of the following is not a type of detector used in gas chromatography? a) Argon ionisation detector b) Thermal conductivity detector c) UV visible spectrometric detector d) Electron capture detector	1	K2	CO2
6.	Which of the following columns are not used in liquid or high performance liquid chromatography? a) Analytical column b) Separation column c) Guard column d) Capillary column	1	K1	CO2
7.	Which among the following elements has the highest thermal conductivity? a) Nitrogen b) Oxygen c) Hydrogen d) Chlorine	1	K1	CO3
8.	How is NO converted to NO_2 for analysis in UV and Visible analyzers? a) Treating sample gas with pressurized oxygen b) Treating sample gas with ozone c) Treating sample gas with oxygen at low pressure d) Treating sample gas with water at high pressure	1	K1	CO3
9.	Which of the following methods results in the formation of yellow coloured compound? a) Griess-Saltzman method b) Phenoldisulphonoic acid method c) Chemiluminescence method d) West-Gaeke method	1	K1	CO3

10.	During which of the following conditions is the blank correction not necessary?	*1*	*K1*	*CO4*
	a) If sample concentration rises in linear response region	b) If sample concentration falls in linear response region		
	c) If sample concentration rises in non-linear response region	d) If sample concentration falls in non-linear response region		
11.	In combination electrode, which of the following electrodes are built together?	*1*	*K1*	*CO4*
	a) Primary electrode, secondary reference electrode	b) Primary reference electrode, glass electrode		
	c) Glass electrode, secondary reference electrode	d) Glass electrode with another glass electrode		
12.	An example of biosensor, urea electrode makes use of which ofthe following electrodes?	*1*	*K2*	*CO4*
	a) Carbon dioxide electrode	b) Ammonia electrode		
	c) Fluoride electrode	d) Ammonium electrode		
13.	Show Which of the following must be done to improve sensitivity?	*1*	*K2*	*CO5*
	a) Frequency sweep mode must be preferred	b) Field sweep mode must be preferred		
	c) Single channel excitation must be preferred	d) Multichannel excitation must be preferred		
14.	Which of the following is used as a coolant for magnets in continuous-wave NMR spectrometer?	*1*	*K1*	*CO5*
	a) Water	b) Liquid He		
	c) Liquid Na	d) Heavy water		
15.	Relate Which of the following produces the electron beam in magnetic deflection mass spectrometer?	*1*	*K2*	*CO5*
	a) Tungsten filament	b) Quartz rod		
	c) Silica	d) Rhodium filament		
16.	Contrast Which of the following should be in a position to split the effluent?	*1*	*K2*	*CO5*
	a) Interface	b) Ion source		
	c) Makeup gas	d)Microbore		

PART – A (ii) (Short Answer Questions)
(8 × 3 = 24 Marks)
Answer ALL Questions

17.	Outline spectroscopy.	*3*	*K2*	*CO1*
18.	Identify the range covered by UV-Visible Spectrophotometer.	*3*	*K3*	*CO1*
19.	Compare gas and liquid chromatography .	*3*	*K2*	*CO2*
20.	Identify any four detectors used in liquid chromatography.	*3*	*K3*	*CO2*
21.	Illustrate Why thermistors are used in thermal conductivity analyzer as heat sensing element?	*3*	*K2*	*CO3*
22.	Construct conductivity of electrolyte.	*3*	*K3*	*CO4*
23.	Identify the different types of electrodes used for PH measurement.	*3*	*K3*	*CO4*
24.	What are the applications of mass NMR spectrometer?	*3*	*K3*	*CO5*

PART - B (Descriptive Answer Questions)
(5 × 12 = 60 Marks)
Answer ALL Questions

25.	a)	Construct the operation of Single beam and Double beam spectrophotometer with neat diagram.	*12*	*K3*	*CO1*
		OR			
	b)	Select the spectrometer which is used to measure atomic absorption.	*12*	*K3*	*CO1*
26.	a)	Develop the classification of chromatography, state the factors to be consider in carrier gas supply system.	*12*	*K3*	*CO2*
		OR			
	b)	Build the high pressure liquid chromatography in detail with neat sketch.	*12*	*K3*	*CO2*
27.	a)	Make use of the schematic diagram and explain about typical H2S analyzer.	*12*	*K3*	*CO3*
		OR			
	b)	Identify and Explain the analyzer which is based on the principle of magnetic susceptibility.	*12*	*K3*	*CO3*
28.	a)	Make use of the construction and working principle of dissolved oxygen analyzer for Industrial application.	*12*	*K3*	*CO4*
		OR			
	b)	Develop the construction and working principle of silicon analyzer.	*12*	*K3*	*CO4*
29.	a)	Develop the construction and working principle of mass spectrometer with neat diagram.	*12*	*K3*	*CO5*
		OR			
	b)	Draw the block diagram of NMR spectrometer also construct the function of each part.	*12*	*K3*	*CO5*