Reg. No.																

Question Paper Code	14619

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

Second Semester

M.E. - CAD/CAM

24PCDEL210 - METROLOGY AND NON DESTRUCTIVE TESTING

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

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

		Marks	K – Level	CO
1.	A Co-ordinate Measuring Machine (CMM) measures objects using: a) Heat sensors b) Sound waves c) A probe system along X, Y, Z axes d) Hydraulic pressure	1	K1	CO1
2.	In metrology, computers are used for: a) Energy production b) Data acquisition and analysis c) Material melting d) Increasing friction	1	K1	CO1
3.	Image Shearing Microscopes help in measuring a) Height only b) Surface roughness only c) Small angular deviations d) Sound frequency	1	K1	CO1
4.	The main objective of Statistical Quality Control (SQC) is a) Reduce labour cost b) Maintain and improve product and process quality c) Increase machine speed d) Reduce production time	1	K1	CO2
5.	Confidence limits indicate a) Measurement of machine life b) Expected range of population values c) Part tolerance values d) Sampling standards	1	K1	CO2
6.	The measure of variation within a dataset is called a) Accuracy b) Dispersion c) Capability d) Sampling	1	K2	CO2
7.	Developers in liquid penetrant testing are used to: a) Increase surface roughness b) Draw penetrant out of defects c) Create magnetic flux d) Remove excess penetrant	1	K2	CO3
8.	Liquid penetrant testing is mainly suitable for a) Porous materials b) Ferromagnetic metals only c) Non-porous materials d) All insulating materials	1	K2	CO3
9.	Liquid penetrant testing is primarily used to detect a) Internal defects b)Surface-breaking defects c)Chemical composition d)Hardness variation	1	K2	CO3
10.	X-rays that have high frequency, high energy, and high penetrating power are termed a) Soft X-rays b) Grenz rays c) Hard X-rays d) Characteristic rays	1	K2	CO4

11.	To obtain a proper X-ray image, which material in the emulsion layer of a conventional X-ray film is responsible for responding to X-ray photons and light? a) Silver bromide b) Gelatin c) Lead oxide d) Calcium tungstate	*1*	*K3*	*CO4*
12.	While analyzing the generation of Characteristic X-rays in an X-ray tube, which physical process should be identified as responsible for their production? a) The deceleration of electrons near the target nucleus b) An incident electron knocks out an inner-shell electron, and an outer-shell electron drops down to fill the vacancy c) The excitation of the outer orbital electrons of the target atom d) The spontaneous disintegration of the atomic nucleus	*1*	*K3*	*CO4*
13.	While inspecting a material using ultrasonic testing, what happens to the frequency of an ultrasonic wave when it travels from one medium to another? a) It increases b) It decreases c) It remains constant d) It becomes zero	*1*	*K3*	*CO5*
14.	During ultrasonic inspection, which scan should be selected to obtain a 2D cross-sectional view of the test object by plotting time-of-flight (depth) against the probe's linear position? a) A-scan b) B-scan c) C-scan d) Through-transmission	*1*	*K3*	*CO5*
15.	While selecting a wave for ultrasonic testing applications, which frequency range should be considered as ultrasonic waves a) 20 Hz to 20,000 Hz b) Below 20 Hz c) Above 20,000 Hz d) 1 Hz to 20 Hz	*1*	*K3*	*CO5*
16.	For inspecting a liquid medium using ultrasonic testing, which type of wave should be selected for effective wave propagation? a) Transverse waves b) Longitudinal waves c) Electromagnetic waves d) Torsional waves	*1*	*K3*	*CO5*

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

17.	Compare over damped and under damped system.	*3*	*K3*	*CO1*
18.	Compare CMM and UMM.	*3*	*K3*	*CO1*
19.	Develop the3σlimitsascontrollimitsinanycontrolchart.	*3*	*K3*	*CO2*
20.	Distinguish between random causes and assignable causes in SQC.	*3*	*K3*	*CO2*
21.	Compare the terms "Dwelltime and Developing time".	*3*	*K3*	*CO3*
22.	Examine the working principle of fluoroscopy in radiographic inspection.	*3*	*K4*	*CO4*
23.	Differentiate the properties of X-rays and Gamma rays relevant to radiographic testing.	*3*	*K4*	*CO4*
24.	Analyze the role of various elements associated with ultrasonic testing.	*3*	*K4*	*CO5*

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

25.	a)	Construct a procedure for testing of a ferrous material on microscope.	*12*	*K3*	*CO1*
		OR			
	b)	Identify the features of CMM and explainwith neat sketch.	*12*	*K3*	*CO1*

26.	a)	Illustrate the construction and interpretation on mean and range chart.	*12*	*K3*	*CO2*
		OR			
	b)	Develop a reliability testing procedure for a given product and give its importance.	*12*	*K3*	*CO2*
27.	a)	Evaluate the advantages and limitations of liquid penetrant testing in comparison with other NDT methods.	*12*	*K3*	*CO3*
		OR			
	b)	Develop ways of magnetizing a component for Magnetic particle Testing.	*12*	*K3*	*CO3*
28.	a)	Examine the characteristics of gamma source isotopes used in radiographic testing.	*12*	*K4*	*CO4*
		OR			
	b)	Analyze the different sources of radiation used in radiographic testing and the production of X-rays and gamma rays.	*12*	*K4*	*CO4*
29.	a)	Examine the basic instrumentation used in ultrasonic testing techniques and differentiate their functions.	*12*	*K4*	*CO5*
		OR			
	b)	Analyze and compare the advantages and limitations of acoustic emission testing with other NDT methods.	*12*	*K4*	*CO5*