Code: 20A03503T

R20

B.Tech III Year I Semester (R20) Supplementary Examinations August 2023

METROLOGY AND MEASUREMENTS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1		Answer the following: (10 X 02 = 20 Marks)	
	(a)	Describe the significance of measurement.	2M
	(b)	Write the procedure for Wringing of slip gauges.	2M
	(c)	State the limitations of optical flat.	2M
	(d)	List the factors affecting surface roughness.	2M
	(e)	Name the various types of pitch errors found in screw thread. Explain any one of them.	2M
	(f)	Calculate the chord length and its distance below the tooth tip for a gear of module 4 and 20° pressure angle.	2M
	(g)	Explain the scale and dynamic error for a transducer.	2M
	(h)	Explain in brief the working of delta type strain gauge rosettes.	2M
	(i)	Discuss briefly the basic methods of measurement of force.	2M
	(j)	What are advantages and disadvantages of piezoelectric transducers?	2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2	A hole and mating shaft are to have a nominal assembly size of 50 mm. the assembly is to have a maximum clearance of 0.15 mm and a minimum clearance of 0.05 mm. the hole tolerance is 1.5 times the shaft tolerance. Determine the limits for both hole and shaft: by using (i) hole basis system (ii) shaft basis system.	10M
	OR	
3	What are sine bars? How are they used for angular measurement?	10M
4	How will you distinguish between ‘smooth’ and flat surface? Explain with the help of sketches.	10M
	OR	
5	Explain the working principle, construction and application of auto-collimator.	10M
6	What are the various characteristics that you would measure in a screw thread? Also list the instruments/ apparatus that are required for measuring these characteristics.	10M
	OR	
7	State the various sources of errors in manufacturing gears.	10M
8	A resistance wire strain gauge with a gauge factor of 2 is bonded to a steel structural member subjected to a stress of 100 MN/m^2. The modulus of elasticity of steel is 200 GN/m^2. Calculate the percentage change in the value of the gauge resistance due to the applied stress. Comment upon the results.	10M
	OR	
9	What are the capacitive transducers? Write the uses of capacitive transducer.	10M
10	What do you understand by hydraulic and pneumatic load cells?	10M
	OR	
11	List out various pressure measuring devices & explain the working of Mc Leod pressure Gauge with help of neat sketch.	10M

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B.Tech III Year I Semester (R20) Regular & Supplementary Examinations January 2024

METROLOGY AND MEASUREMENTS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1		Answer the following: (10 X 02 = 20 Marks)	
	(a)	Compare systematic and random errors.	2M
	(b)	What are taper gauges?	2M
	(c)	Define: Flatness, and Surface Roughness.	2M
	(d)	What is interferometer? State its applications.	2M
	(e)	List errors in screw threads.	2M
	(f)	What is Gear tooth terminology?	2M
	(g)	What is photo-electric transducer?	2M
	(h)	Define strain gauge rosettes.	2M
	(i)	What are Absorption dynamometers?	2M
	(j)	How low pressure measurement is done? List methods.	2M

PART – B

(Answer all the questions: 05 X 10 = 50 Marks)

2	Explain Taylor's principle of gauge design.	10M
	OR	
3	Define limit, fits and tolerances. Draw a block diagram showing various elements of a generalised measurement system.	10M
4	Explain the process of Measurement of flatness using straight edges method.	10M
	OR	
5	Give differences between surface roughness and surface waviness. How numerical assessment of surface finish is done? Discuss.	10M
6	Draw and discuss Elements of threads and their terminology.	10M
	OR	
7	Define the following terms related to gear measurements: Pitch, backless, pressure angle, tooth thickness, and gear diameter.	10M
8	How Measurement of Displacement is done? Discuss any one method.	10M
	OR	
9	Classify strain gauges for strain measurements. Explain construction and working of resistance strain gauge.	10M
10	How measurement of force is done? Discuss any one method in detail.	10M
	OR	
11	Discuss measurement of torque using Torsion Bar Dynamometer.	10M

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