

Instructions:

- (1) Question No.1 is compulsory and Answer 3 Questions remaining 5 Questions.
- (2) Assume suitable data wherever necessary
- (3) Concepts explanation with suitable case study justification
- (4) Diagram and sketches explanations are right to reserve full marks

Q1 Answer Any Four Questions

- a) Write a short note on Nano Metrology. 20
- b) Explain Eddy current testing methods.
- c) Write a note on CMM and enlist its types.
- d) Explain Surface irregularities with sketches measuring parameters R_a , R_z , R_y and RMS.
- e) What is Metrology? Explain different types of standards.

- Q2** a) Derive an expression for determination of effective diameter of threads by using two wire method. 10

- b) Define Interferometry. Explain Laser Interferometer with neat sketch. 10

- Q3** a) Explain the floating carriage micrometer with principle, construction, and measurement of threads. 10

- b) Explain Significance of Quality & Quality Control in Industries with suitable examples. 10

- Q4** a) Explain the pneumatic comparator with principle, construction, and operation in detail. 10

- b) Explain various SQC Tools in quality engineering in detail. 10

- Q5** a) Calculate the limits, tolerances, and allowances on a 25 mm shaft and hole pair designated H7/g6 to get a precision fit. The fundamental tolerance is calculated by the following equation: $i = 0.453 \sqrt[3]{D} + 0.001D$ 10

$$i = 0.453 \sqrt[3]{D} + 0.001D \quad \text{correction} \quad i = .45 [D^{(1/3)}] + 0.001 D$$

The following data is given:

- (i) Upper deviation of shaft = $-2.5D^{0.34}$
- (ii) 25 mm falls in the diameter step of 18–30 mm
- (iii) IT7 = $16i$
- (iv) IT6 = $10i$
- (v) Wear allowance = 10% of gauge tolerance.

- b) Explain the Parkinson Gear Tester with sketches in Gear profile checking process. 10

Q6 Answer Any Two Questions 20

- a) Explain Autocollimator with sketches and its working principle in detail.
- b) What is acceptance sampling? Explain OC Curve in detail.
- c) Explain in detail - Design of GO and NO-GO gauges procedure with diagram.