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Question Paper Code: U5101

M.E. DEGREE EXAMINATION, NOV 2025

M.E CAD/CAM

21PCD501 – METROLOGY AND NON DESTRUCTIVE TESTING METHODS

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1. (a) Explain the principle of operation of a Tool Maker's microscope and its advantages in measuring small, intricate parts. CO1- U (20)
Or
(b) Explain the role of microprocessors in modern metrology equipment and how they improve measurement accuracy and efficiency. CO1- U (20)
2. (a) Design an eddy current testing procedure for inspecting a metallic component with complex geometry, considering factors such as probe selection and scanning parameters. CO2- App (20)
Or
(b) Select the appropriate eddy current probe and frequency for inspecting a specific material and defect type, considering factors such as conductivity and depth of the defect. CO2- App (20)
3. (a) Design a magnetizing technique using a yoke for inspecting a complex-shaped ferromagnetic component. Consider the orientation of the yoke and the spacing between poles. CO3- App (20)
Or
(b) Select the appropriate magnetic particle inspection equipment for detecting sub-surface defects in a large, flat ferromagnetic plate. CO3- App (20)
4. (a) Analyze how the penetration capability of X-rays is affected by the energy of the X-ray beam and its impact on image quality. CO4- App (20)
Or

(b) Interpret an exposure chart to calculate the required exposure parameters for a specific radiographic inspection, considering the material and film type. CO4- App (20)

5. (a) Design a setup to produce ultrasonic waves using a piezoelectric transducer. Include the necessary components and their arrangement. CO5- App (20)

Or

(b) Perform a pulse-echo test on a test specimen to detect the depth of a flaw. Adjust the parameters (e.g., pulse width, gain) to optimize the detection. CO5- App (20)