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School of Engineering

M.TECH Mechanical Engineering in CAD/CAM and Robotics
Semester End Examination - Nov 2023

Duration : 180 Minutes
Max Marks : 100

Sem III - MCCR5029 - Fracture Mechanics

General Instructions

Answer to the specific question asked

Draw neat, labelled diagrams wherever necessary

Approved data hand books are allowed subject to verification by the Invigilator

- 1) Which theories form the basis of linear elastic fracture mechanics (LEFM)? K1 (2)
- 2) Formulate a risk-based inspection plan for critical infrastructure to detect and manage crack growth. K2 (4)
- 3) Given the stress-strain curve of a material, determine the yield strength and ultimate tensile strength (UTS). K2 (6)
- 4) Define the term "fracture surface" and explain its significance in fracture analysis. K3 (9)
- 5) Name the three primary modes of crack propagation in fracture mechanics. K3 (9)
- 6) How does crack propagation differ in brittle and ductile materials under tensile loading? K5 (10)
- 7) Analyze the influence of microstructure and grain size on the fatigue crack growth behavior of a material. K4 (12)
- 8) Critically appraise the fracture resistance of advanced ceramics for high-temperature applications. K5 (15)
- 9) Assess the impact of surface defects on the fatigue life of a metallic component. K5 (15)
- 10) Design a computational model to predict the crack propagation in a composite laminate under complex loading conditions. K6 (18)