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Question Paper Code:U5111

M.E. DEGREE EXAMINATION, NOV 2024

Professional Elective

21PCD511 – COMPOSITE MATERIALS AND MECHANICS

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART - A (5 x 20 = 100 Marks)

1. (a) Assess the structural integrity of a composite component after undergoing various bonding techniques, identifying any potential weaknesses or defects. C02-App (20)
Or
(b) Develop a bonding technique for joining composite components in aerospace applications, ensuring high structural integrity and durability. C02-App (20)
2. (a) Compare and contrast the rotation of stresses and strains in isotropic and anisotropic materials subjected to the same loading conditions. C03-App (20)
Or
(b) Develop a strategy to mitigate residual stresses in a machined metal component to minimize distortion during use. C03-App (20)
3. (a) Discuss the implications of buckling on the structural integrity and performance of the plate. C03-App (20)
Or
(b) Apply stability analysis techniques to determine the critical buckling load of a composite plate under various boundary conditions. C03-App (20)

4. (a) Use appropriate fracture mechanics equations and material properties to determine the maximum allowable crack length before catastrophic failure occurs. C03-App (20)
- Or
- (b) Apply fracture mechanics principles to analyze the critical crack length in a composite material specimen. C03-App (20)
5. (a) Discuss how composite materials are used to improve fuel efficiency, reduce emissions, and enhance performance in aircraft and spacecraft. C01-U (20)
- Or
- (b) Compare their respective properties, manufacturing processes, and typical applications in engineering. C01-U (20)