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**Question Paper Code:U2911**

M.E. DEGREE EXAMINATION, APRIL 2024

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) Develop a bonding technique for joining composite components in aerospace applications, ensuring high structural integrity and durability. CO2-App (20)  
Or  
(b) Develop a plan for testing the mechanical properties of a unidirectional long fiber composite, including the selection of testing methods and equipment. CO2-App (20)
2. (a) Develop a strategy to mitigate residual stresses in a machined metal component to minimize distortion during use. CO3-App (20)  
Or  
(b) Apply the principles of linear elasticity to determine the strains induced in an anisotropic material under a given stress field. CO3-App (20)
3. (a) Describe the governing equations for anisotropic plates and how they differ from those for isotropic plates. CO1-U (20)  
Or  
(b) Analyze the factors influencing the dynamic behavior of composite plates. CO1-U (20)
4. (a) Analyze the different failure criteria used in composite materials. CO4-An (20)  
Or  
(b) Analyze the fracture mechanics approaches commonly used in the design of composite structures. CO4-An (20)

5. (a) Analyze the advantages and disadvantages of using metal matrix composites (MMC) in aerospace applications compared to traditional materials such as aluminum alloys. CO1-U (20)

Or

(b) Discuss how composite materials are used to improve fuel efficiency, reduce emissions, and enhance performance in aircraft and spacecraft. CO1-U (20)