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M.Tech.(ME) PT (Sem.–2,4)

ADVANCE MACHINE DESIGN

Subject Code : MME-505

M.Code : 38206

Time : 3 Hrs. Max. Marks : 100

INSTRUCTION TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1. Name different failure theories used in machine design. Explain any two in detail giving suitable examples.

2. a) Explain why fatigue consideration are important in design?

   b) Explain different fatigue design criteria with examples.

   c) Explain different stages of fatigue damage process.

3. a) How combined creep and fatigue failure is prevented?

   b) Explain surface fatigue design of rolling contact bearings.

4. What do you mean by fracture mechanics approach to design? Explain in detail with the help of suitable example and neat sketches.

5. a) What do you understand by probabilistic approach to design?

   b) What is quasi-static fracture? Explain different modes of crack propagation.

6. a) What do you mean by Finite Elements in FEM? Explain in detail the basic concept involved in FEM.

   b) Explain design of machine components through interactive programming.

7. a) What do you mean by reliability factor KR in machine design? What kind of functional relationship exist between KR and reliability?

b) As forged 50 mm diameter 1040 steel rod has Su = 689 MPa and Sy = 516 MPa. It is subjected to constant amplitude cyclic bending. Determine the following values using appropriate fatigue models:

i) Fully reversed bending fatigue strength at 106 cycles.

ii) S_a and Sm for 10^6 cycles if R = 0.

iii) S_a and Sm for 10^4 cycles if R = 0.

8. Write short note on :

a) Hertzian contact stresses

b) Rupture theory

c) Design for reliability

d) Theory of limit design.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.