(DME 312)

B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Third Year)

MECHANICAL ENGINEERING

Paper - II : Design of Machine Elements

Time : 3 Hours Maximum Marks : 75

Answer question No.1 compulsory *(15)*

Answer ONE question from each unit *(4 × 15 = 60)*

1) a) State commonly used materials for rivets.

   b) Define the efficiency of compound screw.

   c) What are the applications of cotter joint?

   d) Explain Self locking screws.

   e) What are the various factors influence the endurance limit of a material?

   f) What is reinforcement in weld? What are advantage of it?

   g) What is fatigue stress concentration factor?

UNIT – I

2) a) Discuss about phases of design.

   b) Explain :
   i) Thermal stress
   ii) Hoop stress

OR

3) a) Explain the following theories of failure.
   i) Maximum principal (normal) stress theory
   ii) Maximum shear stress theory.

   b) Explain the terms reliability, maintainability and availability in the design of mechanical component.

UNIT - II

4)   A square threaded transmission screw used in a screw jack has a root diameter of 80mm and a lead of 12mm. It is double thread and is designed to lift a load of 120KN. The coefficient of friction is 0.15. Determine the following.

   a)   Pitch of the screw

   b)   Mean radius of thread

   c)   Efficiency of screw

   d)   Unit compressive stress in the screw.

   e)   Bearing pressure on the projected area of the threads in contact.

   f)   Is the screw self locking.

<p align="center">OR</p>

5)   a)   Explain the Goodman method for combination of stress.

   b)   A 5 cm diameter shaft is made from carbon steel having ultimate tensile strength of 6300Kgf/cm^2. It is subjected to a torque which fluctuates between 20000Kgf-cm to 8000Kgf-cm. Using Soder berg method, calculate the factor of safety. Assume suitable values for any data needed.

UNIT - III

6)   Design a double riveted butt joint with two cover plates for the longitudinal seam of a boiler shell of 800mm diameter. The maximum steam pressure is 1.2MPa. The allowable stresses are T = 30MPa, σ_1 = 37MPa, σ_c = 55MPa. The efficiency of the joint is 70%. The corrosion allowance is 1mm.

<p align="center">OR</p>

7)   A bracket carrying a load of 15kN is to be welded as shown in figure. Find the size of weld required if the allowable shear stress is not to exceed 80MPa.
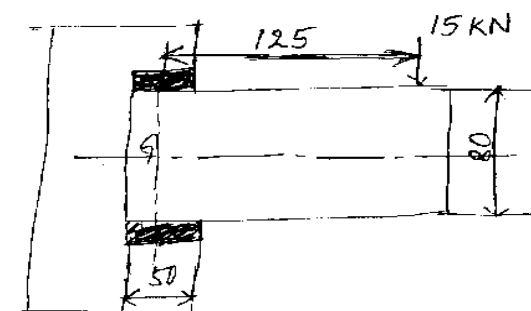
UNIT – IV

8) Explain the following:

    a) Design of socket and spigot cotter joint.

    b) Distinguish among through bolt. Carriage bolt, tap bolt stud and set screw.

OR

9) Design a knuckle joint to transmit 150kN. The design stresses may be taken as 75MPa, in tension, 60MPa in shear and 150MPa in compression.

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