Roll No. ⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚⬚   Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ME) (2012 Onwards)   (Sem.–5)

DESIGN OF MACHINE ELEMENTS-I

Subject Code : BTME-501
M.Code : 70602

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. **Answer briefly :**

   a. Define 'Engineering Design'.

   b. What do you understand by 'embodiment design'?

   c. What human needs require considerations in a design problem?

   d. Write the difference between ductility and malleability.

   e. Define 'factor of safety'.

   f. Write the classification of joints.

   g. Write the equation to calculate the shear strength of solid and hollow shaft.

   h. List the functions of coupling.

   i. Define a lever.

   j. Write the classification of flange joints.

SECTION-B

2. Discuss the BIS method of designation of steels.

3. Explain the phenomenon of 'stress concentration'.

4. A 50 mm diameter shaft is welded to a flat plate by fillet weld. Determine the size of the weld if the shaft is required to transmit a torque of 1300 Nm. The permissible working shear strength of the weld material is 60 N/mm^2.

5. What is the function of couplings and clutches? How does a coupling differ from a clutch?

6. Explain the procedure of designing a fulcrum pin.

SECTION-C

7. A spherical pressure vessel with a 500 mm inner diameter is welded from steel plates of cold drawn C20 steel of ultimate strength 440 N/mm^2. The vessel is subjected to internal pressure which varies from 2 N/mm^2 to 6 N/mm^2. If the reliability of the vessel is 95 % and the required factor of safety is 3, design the vessel for infinite life period.

8. Two plates of 6 mm thickness are to be joined by a double -riveted zig-zag lap joint, if the allowable strength of mild steel are $\sigma_t = 100$ N/mm^2, $\tau = 70$ N/mm^2, $\tau_{cr} = 130$ N/mm^2.

9. Draw the fatigue curve and discuss its importance in the design of a machine element.

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.