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

Total No. of Questions : 18

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 SIX questions carrying TEN marks each and students have to attempt any FOUR questions.

SECTION-A

Answer briefly : **(2×10=20)**

1. What are the advantages of hollow shafts over solid shafts?
2. Define Factor of Safety.
3. How stress concentration is reduced?
4. What is Fit and tolerance?
5. What is Tearing and Crushing.
6. What is spring Index?
7. Define Creativity. Write various steps in creative process.
8. What is fatigue failure? How it happens?
9. What is a sunk key? Also name the various types of sunk keys.
10. What do you understand by leverage?

SECTION-B

11. Discuss the various factors to be considered for the selection of materials for the design of machine elements.

12. a) Make a neat sketch of foot lever. Explain its design procedure in detail.

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

13. a) Determine the length and thickness of a sunk key for a shaft of 0.09 m diameter.

Assuming that, the shearing resistance of the material of the key is the same as that of the shaft. Width of the key is 25 mm and $fs = 0.4 \times fc$.

b) Design an oval flanged pipe joint for a pipe having 50 mm bore. It is subjected to an internal fluid pressure of 7 N/mm^2. The maximum tensile stress in the pipe material is not to exceed 20 MPa and in the bolts 60 MPa.

14. Find the diameter of a solid steel shaft to transmit 20 kW at 200 r.p.m. The ultimate shear stress for the steel may be taken as 360 MPa and a factor of safety as 8. If a hollow shaft is to be used in place of the solid shaft, find the inside and outside diameter when the ratio of inside to outside diameters is 0.5.

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

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

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.