

Roll No.

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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (ME) (Sem.-5)

MACHINE DESIGN-I

Subject Code : ME-301

M.Code : 59042

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. Write briefly :**

- (a) What do you understand by machine design?
- (b) Explain the concept of tearing and bearing.
- (c) What is stress concentration?
- (d) What is difference between static and dynamic loading?
- (e) Explain fatigue and endurance strength.
- (f) What are eccentric loaded welded joints? Give an example.
- (g) What are splines? Draw a figure.
- (h) What is bell crank lever? Draw a free hand drawing of a bell crank lever.
- (i) What is Soderberg equation?
- (j) What are different modes of failure of a riveted joint?

SECTION-B

2. Explain special features of different types of keys with neat sketches.
3. What are the main factors to be considered for selection of material for a machine component?
4. List the factors affecting the endurance limit.
5. Define factor of safety and list main factors considered in the selection of factor of safety.
6. Explain aesthetics and ergonomics consideration in design with the help of examples.

SECTION-C

7. Design a knuckle joint to withstand a tensile load of 25KN if the permissible stresses are 56MPa in tension, 40 MPa in shear and 70 MPa in compression.
8. Design a cast iron flange coupling for a mild steel shaft transmitting 90 kW at 250 rpm. The allowable shear stress in the shaft is 40 MPa and the angle of twist is not to exceed 1 degree in a length of 20 diameters. The allowable shear stress in the coupling bolts is 30 MPa.
9. A double riveted lap joint with zig-zag riveting is to be designed for 13mm thick plates. Assume $\sigma_t = 80\text{MPa}$, $\tau = 60\text{ MPa}$, $\sigma_c = 80\text{MPa}$. State how the joint will fail and find the efficiency of the joint.

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.