



C14-M-402

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BOARD DIPLOMA EXAMINATION, (C-14)
OCT/NOV—2016
DME—FOURTH SEMESTER EXAMINATION
DESIGN OF MACHINE ELEMENTS—I

Time : 3 hours]

[Total Marks : 80

PART—A

3×10=30

- Instructions** : (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define working stress and design stress.
2. Define principal plane.
3. What are the possible ways of failure of the bolts?
4. Define (a) pitch, and (b) lead.
5. What are the advantages of riveted joints?
6. What are the stresses induced in shafts?
7. Classify the types of keys.
8. What are the requirements of a good coupling?

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9. Classify the ^{*} types of bearings.

10. What is Sommerfeld number?

PART—B

10×5=50

Instructions : (1) Answer *any five* questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. What are the factors considered for designing of a machine element? Explain any four. 10

12. A steam engine cylinder of 250 mm effective diameter is subjected to a steam pressure of 1.2 N/mm^2 . The cylinder cover is connected by means of 6 bolts. The bolts are tightened with initial load of 1.5 times that of steam load. A copper gasket of stiffness factor 0.5 is used to make the joint leak proof. Find the size of the bolts so that the stress induced in the bolts is not to exceed 100 N/mm^2 . 10

* 13. Find the efficiency of single-riveted lap joint of 6 mm plates with 20 mm diameter rivets having a pitch of 50 mm. Assume permissible tensile stress in plate is 120 MPa, permissible shearing stress in rivets is 90 MPa and permissible crushing stress in rivets is 180 MPa. 10

14. A plate of 100 mm wide and 5 mm thick is to be welded on to another plate by means of parallel fillet welds. The plates are subjected to a load of 50 kN. Find the length of the parallel weld so that maximum stress does not exceed 56 MPa. Consider the joint under static loading. 10

15. A steel spindle transmits 10 kW at 800 r.p.m. The angular deflection should not exceed 0.25° per meter length of spindle. If the modulus of rigidity for the material of spindle is $84 \times 10^3 \text{ N/mm}^2$, find the diameter of the spindle and shear stress induced in the spindle. 10
16. Design a cast iron protective flange coupling to connect two shafts in order to transmit 60 kW at 750 r.p.m. The permissible stresses may be assumed as permissible shear stress for shaft, bolt and key material is 45 N/mm^2 ; permissible crushing stress for bolt and key material is 85 N/mm^2 ; permissible shear stress for CI is 30 N/mm^2 . 10
17. Write the advantages and disadvantages of rolling contact bearings over other types of bearings. 10
18. (a) An axle of diameter 80 mm is subjected to bending moment of 6000 N-m. Find the bending stress induced in an axle. 5
- (b) Explain various types of screw fastenings with neat sketches. 5
