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C14–M–402

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BOARD DIPLOMA EXAMINATION, (C–14)

MARCH/APRIL—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. What are the factors considered for designing of a machine element?

2. Define factor of safety.

3. What are the stresses developed in bolts?

4. How a screw thread is designated? Give example.

5. Classify the types of riveted joints.

6. Differentiate between shaft and axle.

7. What is a key? Write its function.

8. Mention the types of couplings.

9. What are the desirable properties of bearing materials?

10. Write the functions of lubrication.

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. Derive the expressions for normal stress and shear stress on an inclined plane when two mutual perpendicular normal stresses along with tangential stress acting on a rectangular body. 10

12. An eye bolt has to lift a load of 100 kN. Ultimate strength of steel is 600 N/mm^2 and the factor of safety is 5. Design the eye bolt and draw a proportionate sketch. 10

13. Design a double riveted lap joint for joining two plates of 10 mm thick. The allowable stresses are 60 N/mm^2 in tension, 50 N/mm^2 in shearing and 80 N/mm^2 in crushing . Determine the efficiency of the joint. 10

14. A plate of 60 mm wide and 15 mm thick is welded on to another plate by a single transverse weld and a double parallel fillet weld. Find the length of the parallel weld if the plate is loaded by a static tensile load. Take allowable tensile stress of the plates as 90 N/mm^2 and weld shear stress as 65 N/mm^2. 10

15. A mild steel shaft transmits 50 kW at 300 r.p.m. Maximum torque transmitted exceeds mean torque by 30%. Maximum shear stress is 80 N/mm^2 and angle of twist should not exceed 1° in a length of 20 diameter. Modulus of rigidity is 80 GN/m^2. Compute the diameter of the shaft. 10

16. Design and draw a muff coupling which is used to connect two steel shafts transmitting 100 kW at 600 r.p.m. Design shaft and muff from strength point of view and other dimensions by empirical formulae. Shear stresses for muff and shaft are 30 N/mm^2 and 50 N/mm^2. Assume maximum torque to be 25% more than mean torque. 10

17. Write the advantages and disadvantages of sliding contact bearings over other types of bearings. 5+5

18. *(a)* Using a punch, a hole of 15 mm diameter is to be punched in an MS plate of 8 mm thick. Find the shear stress developed if the ultimate crushing strength is 500 N/mm^2. 5

(b) What is meant by bolt of uniform strength? Explain with a neat sketch. 5

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