C14-M-402

4478

BOARD DIPLOMA EXAMINATION, (C-14)

OCT/NOV—2018

DME—FOURTH SEMESTER EXAMINATION

DESIGN OF MACHINE ELEMENTS-I

Time : 3 Hours] [*Total Marks* : 80

PART—A 3×10=30

Instruction : (1) Answer **all** questions. Each question carries **three** marks.

(2) Answers should be brief and straight to the point and shall not exceed **five** simple sentences.

1. Define the terms durability and reliability. 1.5+1.5=3

2. List out any six factors to be considered while designing a machine element. 0.5×6=3

3. How is a screw thread is designated, give an example. 3

4. List out the various types of screw fastenings. 3

5. State three advantages of welded joints over riveted joints. 3

6. Explain the terms of shaft, axle, and spindle. 1+1+1=3

7. What is a key ? State its functions. 3

8. What are the types of couplings ? Give an example of each type. 3

9. Write the difference between radial bearing and thrust bearing. 3

10. Write the types of rolling contact bearing. 3

PART—B 10×5=50

Instruction : (1) Answer any **five** questions and each question carries **ten** marks.

(2) Answers should be comprehensive and the criteria for valuation is the content but not the length of the answers.

11. A bolt is subjected to an axial pull of 8 kN and transverse shear force of 3 kN. Determine the diameter of the bolt required based on,

(*i*) the maximum principal stress theory, and

(*ii*) the maximum shear stress theory.

Take elastic limit in simple tension equal to 270 N/mm2 and factor of safety is 3. 5+5=10

12. Design and draw an eye bolt to lift a load of 100 kN, when permissible tensile stress of the material is 100 MPa. Give the proportions of the eye bolt designed. 10

13. (a) A bar of 25 mm diameter is subjected to a direct tensile force of 60 kN. Calculate the normal and shear stresses on a plane at 35° to the flat end of the bar. 5

(b) Two machine components are fastened together tightly by means of a M50 bolt. If the load tending to separate them is neglected. Calculate the stress induced in the bolt due to initial tightening. 5

14. Two Plates of 10 mm thick are joined by a double riveted lap joint. The diameter of the rivets is 15 mm and pitch is 75 mm. If tensile stress is 110 N/mm2, shear stress is 85 N/mm2, and bearing stress is 140 N/mm2. Determine the efficiency of the riveted joint. 10

15. A plate 150 mm wide and 12.5 mm thick is lapped over and welded to a gusset plate. Determine the minimum length of a 8 mm side fillet weld that will be necessary if the plate is subjected to an axial stress of 160 N/mm2. Take an allowable shearing stress through the throat of the weld as 120 N/mm2. 10

16. A mild steel shaft transmits 20 kW power at 200 RPM and is subjected to a bending moment of 560 Nm. The allowable shear stress and tensile stress are 42 N/mm2 and 56 N/mm2. What size of the shaft will be required if it is subjected to gradually applied loads. 10

17. Design and draw a muff coupling which is used to connect two steel shafts transmitting 80 kW at 150 RPM, allowable shear and crushing stresses for the shafts and key material are 40 N/mm2 and 100 N/mm2 respectively. The permissible shear stress in the muff is 15 N/mm2 and maximum torque transmitted is 25 % greater than the mean torque. 10

18. A flat foot step bearing 300 mm diameter supports a load of 25 kN. If the coefficient of friction is 0.05 and the speed 150 RPM. Calculate the power lost at the bearing under uniform pressure and uniform wear. 10

***