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C14-M–402

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BOARD DIPLOMA EXAMINATION, (C-14)

MARCH/APRIL—2021

DME - FOURTH SEMESTER EXAMINATION

DESIGN OF MACHINE ELEMENTS - I

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

PART—A

4×5=20

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

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

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

1. List different stresses developed due to the application of loads.

2. List four mechanical properties of materials.

3. Draw a neat sketch of hexagonal headed bolt and label the parts with proportions.

4. Define the terms related to screw threads *(a)* major diameter and *(b)* minor diameter.

5. List the applications of riveted joints.

6. Differentiate between shaft and axle.

7. What is key? Write its function.

8. What are the requirements of a good coupling?

9. Classify the types of bearings.

10. List any four terms used in the design of journal bearings.

PART—B

15×4=60

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

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

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

11. List the factors considered for designing of a machine element. Explain any two.

12. An eye bolt has to lift a load of 120 kN. The permissible tensile stress in the bolt material is 100 N/mm . Design the eyebolt and draw a proportionate sketch.

13. Write the advantages and disadvantages of riveted joints.

14. Explain types of lap welded joints with a neat sketch.

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 the spindle is 84×10^3 N/mm^2, find the diameter of the spindle and shear stress induced in the spindle.

16. Design and draw a cast iron 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 20 N/mm^2. The design includes design of shaft, hub and flange.

17. Write the advantages and disadvantages of rolling contact bearings over other types of bearings.

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.

(b) Explain two types of screw fastenings with neat sketches.

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