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BOARD DIPLOMA EXAMINATION, (C-16)

OCTOBER/NOVEMBER—2024

DME – FOURTH SEMESTER EXAMINATION

DESIGN OF MACHINE ELEMENTS

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 various factors considered while designing a machine element?

2.   Find the diameter of hole to be drilled in M40 bolt to make it uniform strength.

3.   State any three assumptions made while deriving a torsion equation.

4.   Write the advantages of belt drive over gear drive.

5.   List any six applications of chain drive.

6.   A gear of 45 teth has pitch circle diameter of 350 mm. What is its module and circular pitch?

7.   Write the classification of bearings.

8.   Write the classification of followers.

9.   Draw a turning moment diagram of a flywheel.

10. Write the differences between flywheel and governor.

PART—B

10×5=50

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

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

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

11. An eye bolt has to lift a load of 120 kN. The permissible tensile stress in the bolt material is 100 N/mm^2. Design the eyebolt and draws a proportionate sketch.

12. A shaft of 50 mm diameter is transmitting 150 kW at 2000 r.p.m. A square key having 12 mm side 75 mm long is used for the shaft. Determine the induced shear stress and compressive stress in the key.

13. Design a cast iron flange coupling to connect two shafts in order to transmit 10 kW at 800 r.p.m. Permissible shear stress for shaft, bolt and key material is 45 N/mm^2. Permissible crushing stress for bolt and key material is 75 N/mm^2, permissible shear stress for CI is 20 N/mm^2.

14. A belt is required to transmit 20 kW from a pulley of 900 mm diameter at 450 r.p.m. The angle of lap is 160° and coefficient of friction is 0·4. If the safe working stress of the belt material is $1·25 \text{ N/mm}^2$, find the width of the belt. Thickness of belt is 10 mm.

15. Explain the gear tooth nomenclature with a neat sketch.

16. Classify bearings. Write the advantages and disadvantages of rolling contact bearings over sliding contact bearings.

17. Draw the cam profile for the knife edge follower, the outward and return strokes takes place with uniform acceleration and retardation. Out stroke 90°, dwell 30°, return stroke 120° and dwell for the remaining cam rotation. Stroke of the follower is 40 mm and minimum radius of the cam is 25 mm, axis of the follower passes through axis of the camshaft.

18. Explain with a neat sketch working of a watt governor.

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