C16-M-**405**

6450

BOARD DIPLOMA EXAMINATION, (C-16)

MARCH / APRIL — 2021

DME — FOURTH SEMESTER EXAMINATION

DESIGN OF MACHINE ELEMENTS

Time : Three Hours]   [*Maximum Marks* : 80

PART-A   3×10=30

Instructions :   (*i*)   Answer **all** questions.

            (*ii*)   Each question carries **three** marks.

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

1. Define durability and reliability.

2. Find the diameter of the hole that must be drilled in a M24 bolt to make a bolt of uniform strength.

3. Define coupling and write its function.

4. Mention any three important factors required to select a suitable power drive.

5. What is Jockey Pulley?

6. Define module and circular pitch.

7. What arc anti friction bearings?

8. Draw the cam mechanism. State its applications.

9. Define the following terms :

    (*a*)   Fluctuation of energy

    (*b*)   Fluctuation of speed.

10. Write classification of governor.

PART-B   10×5=50

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

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

(*iii*) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. Design and draw a proportionate sketch of an eye bolt to lift a load of 80 kN. If the tensile stress is not exceed 400MPa. Take factor of safely is 4.

12. A MS shaft is subjected simultaneously to a torque of 28 kNm and bending moment of 22 kNm. Find the diameter of the shaft if maximum shear stress is 30 N/mm^2 and normal stress is 50 N/mm^2.

13. Design cast iron flange coupling for a steel shaft transmitting 15 kW at 200 r.p.m having an allowable shear stress of 40 N/mm^2. The working stress in the bolt should not exceed 30 N/mm^2. Assume that the same material is used for shaft and key and that the crushing stress is twice the value of its shear stress. The maximum torque is 25% greater than the full load torque. The shear stress for cast iron is 14 N/mm^2.

14. A belt 100 mm wide and 6 mm thick is used to transmit power. The density of the belt material is 1000 kg/m^3. If the angle of contact is 150°, coefficient of friction is 0.25 and the maximum permissible stress in the belt material is 1.75 MN/m^2. Find the greatest power which the belt can transmit and corresponding speed of the belt.

15. Explain the reverted gear train with neat sketch.

16. A foot step bearing has a shaft 140 mm diameter is counter bored with a hole of 70 mm diameter al the end. The shaft rotates at 120 rpm. Calculate (*a*) The axial load (*b*) Frictional Torque (*c*) Heat generated al the bearing if the allowable bearing pressure is 0.8 MN/m^2 by using Uniform wear theory. Take coefficient of friction, $\mu = 0.045$.

17. Draw the cam profile for the Knife edge follower with uniform velocity. Out stroke 120°, Dwell 30°, return stroke 90° and dwell for remaining period of cam rotation. Stroke of the follower is 30 mm and minimum of radius of the cam is 25 mm, axis of the follower passes through the axis of the cam shaft.

18. Describe the working principle of porter governor with a neat sketch.

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