



C14-M-402

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BOARD DIPLOMA EXAMINATION, (C-14)

MARCH / APRIL - 2019

DME - IV 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) Answer should be brief and straight to the point and shall not exceed five simple sentences.

- 1 What is Durability and Reliability ?
- 2 State any six factors to be considered for the design of machine element.
- 3 Define :
 - (a) Screw thread
 - (b) Lead of screw thread.
- 4 Mention the details of screw thread M18 × 1.5-9h.
- 5 State any three ways of failures of a riveted joint.
- 6 What is the difference between a spindle and axle ?
- 7 A propeller shaft turns at 160 rad/sec and transmit power of 50 KW. If the shear stress is not to exceed 15 N/mm². Find diameter of the shaft.
- 8 A hollow steel shaft 200 mm external diameter and 125 mm internal diameter transmits 1600 KW at 180 rpm. Calculate the shear stress at inner and outer surface take $G = 0.8 \times 10^5$ N/mm².
- 9 Write any three properties of Bearing Material.
- 10 Write short note on friction circle.

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PART - B

10×5=50

- Instructions :**
- (1) Answer any **FIVE** questions.
 - (2) Each question carries **TEN** marks.
 - (3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- 11 (a) Explain the step by step procedure for designing a machine element. 7
- (b) Define : 3
- (1) Hardness (2) toughness (3) creep.
- 12 (a) Explain maximum principal stress (Rankine's) theory.
- (b) Design and sketch an eye bolt to lift a load of 60 KN. If the tensile stress is not to exceed 100 N/mm².
- 13 A steam engine has a working pressure of 0.85 N/mm² and the effective cylinder diameter is 300 mm. The cylinder is screwed by 10 studs. The allowable tensile stress in the bolts is taken as 22 N/mm². Find the force exerted on the cylinder cover and compute the size of stud.
- 14 A single riveted double cover butt joint in a structure is used for connecting two plates 12 mm thick. The diameter of rivet is 24 mm. The permissible stresses are 120 N/mm² in tension, 100 N/mm² in shear and 200 N/mm² in bearing. Calculate the necessary pitch and efficiency of joint.
- 15 Two steel plates 100 mm wide and 12.5mm thick are to be joined by double lap weld joint. Find the length of the weld if the maximum tensile stress is not to exceed 75N/mm² and maximum tensile load carried by the plates is 100 KN.
- 16 (a) Determine the minimum diameter of the shaft made from the material which will transmit the power of 9.5 KW when rotating at 1200 rpm the failure occurred when the shear stress 140 N/mm² using factor of safety 4.
- (b) Draw the Gib head key with proportions.

- 17 Design a protective cast iron flange coupling for a steel shaft transmitting 15 KW at 200 rpm having an allowable shear stress of 40 N/mm^2 . The working stress in the bolts 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 .
- 18 The thrust propeller shaft in a marine is absorbed by 4 collars. The rubbing surfaces of these collars have outer diameter 300 mm and inner diameter of 200 mm. If the shaft runs at 100 rpm, the bearing pressure being 0.5 N/mm^2 , and coefficient of friction 0.03, determine the power absorbed by collars. Assume uniform pressure.
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