C16/C-16S-M-404

5687

BOARD DIPLOMA SUPPLEMENTARY EXAMINATION, (C-16 / C-16S)

JUNE / JULY - 2020

DME - IV SEMESTER EXAMINATION

DESIGN OF MACHINE ELEMENTS - I

Time : 2 Hours]   [Total Marks : 80

PART - A   5×6=30

Instructions :   (1)   Answer any SIX questions.

(2)   Each question carries FIVE marks.

(3)   Each Answer should not exceed more than ONE page.

1   Define (a) Durability (b) Reliability.

2   State Rankine's theory of failure.

3   Define (a) link (b) kinematic pair.

4   How a screw thread is designated? Give an example ?

5   Write the formulas for any two stresses developed due to initial tightening load on a bolted joint.

6   What is meant by caulking and fullering in riveted joints ?

7   Define the terms (a) Shaft (b) axle.

8   What is a key ? State the function of key.

9   List out types of roller bearings.

10   Define the following terms for rolling contact bearings. (i) Rating life (ii) Basic load rating.

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PART - B   10×5=50

Instructions :   (1)   Answer any FIVE questions.

(2)   Each question carries TEN marks.

(3)   Each Answer should not exceed more than TWO Pages.

11   The state of stress at a point in the material consists of two normal stresses 200 MPa and 60 MPa (both are tensile) acting on two planes right angles to each other. They are accompanied by a shear stress of 30 MPa, Determine the two principal stresses and maximum shear stress.

12   (a)   Briefly explain the design procedure for designing a machine element.

(b)   What is inversion ? Explain any two inversions of Quadric cycle chain.

13   An eye bolt is used to lift a load of 100 kN. Design the eye bolt if the tensile stress is not to exceed 180 MPa, Draw a neat proportionate sketch of eye bolt.   http://www.sbtetonline.com

14   (a)   A steam engine cylinder of 200 mm effective diameter is subjected to a steam pressure of 1.2 MPa. The cylinder cover is connected by 6 bolts. Determine the size of bolts so that the stress in the bolt should not exceed 90 MPa.

(b)   State merits and demerits of welded joints.

15   Two plates of 9 mm thick are to be joined by a triple riveted, zig-zag lap joint. Diameter of rivet is 18 mm and pitch is 90 mm. The allowable stresses for tension, shear and crushing are 120 MPa, 60 MPa and 150 MPa respectively. Find the tearing, shearing and crushing strengths of joint. Find also the efficiency of joint.

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16 (a) Explain the function of coupling and give the classification of couplings.

(b) Write the design procedure for Muff coupling for a shaft of given size using empirical relations and draw a proportionate sketch.

17 A solid shaft made of steel is subjected to a bending moment of 4kNm and torsional moment of 10kNm. The shaft material has a ultimate tensile strength of 700 MPa and ultimate shear strength of 400 MPa. The factor of safety is 6. Determine the diameter of shaft using (a) Rankine's theory (b) Guest's theory.

18 The load on the journal bearing is 175 kN to a turbine shaft of 300 mm diameter running at 1500 rpm. Determine the following :

(i) Length of the bearing if the allowable bearing pressure is 1.6 MPa

(ii) Coefficient of friction and Amount of heat to be removed by the lubricant per minute if the bearing temperature is 60°C and viscosity of the oil at 60°C is 0.02kg/m-s and the bearing clearance is 0.25 mm.