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BOARD DIPLOMA EXAMINATION, (C-14)
MARCH/APRIL-2019
DME - FOURTH SEMESTER EXAMINATION

DESIGN OF MACHINE ELEMENTS – I

Time: 3 Hours]   [Max. Marks : 80

PART-A   **3x10=30M**

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) Define allowable stress and factor of safety.

2) What are the setps involved in designing a mechine element.

3) What size of an axial hole must be drilled in M24 bolt to make it uniform strength.

4) List out the various types of locking devices.

5) Define the efficiency of riveted joint.

6) What type of stresses is induced in the shafts.

7) What are the various types of keys.

8) State any three reasons for joining the shafts with coupling.

9) Write the difference between sliding contact and rolling contact bearings.

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10) What are the properties of good lubricant.

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

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

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

11) A steel shaft of diameter 100 mm is subjected to a bending moment of 1000 Nm, and a twisting moment of 5550 Nm. Find   5+5=10M
(i) Maximum normal stress,and
(ii) Maximum shear stress induced.

12) A steam engine cylinder of 250 mm effective diameter is subjected to a steam pressure of 1.2 N/mm^3. The cylinder cover is connected by means of 6bolts. The bolts are tightened with initial load of 1.5 times that of steam load. The copper gasket of stiffness factor 0.5 is used to make the joint leak proof. Find the size of the bolts so that the stress induced in the bolt is not to exceed 100 N/mm^2.   10M

13) (a) Find the diameter of a short cylindrical cast iron post to support a compressive load of 100 KN. Assume the factor of safety is 4, and ultimate compressive strength of cost iron is 550 N/mm^2.   5M

(b) Draw and mention the proportionate dimensions of hexagonal nut.

5M

14)   Design a lap joint to carry of 400 KN to connect 10mm thick plates. Rivets are placed in double row. Given tensile stress is 175 N/mm^2, shear stress is 110 N/mm^2, bearing stress is 250 N/mm^2.

10M

15) Two tie bars are connected together by 8 mm fillet welds around the end of bar and around the inside of a slot machine in the same bar. Estimate the strength of the joint if the shear stresses in the welds are limited to 75 N/mm². 10M

16) A shaft of 50 mm diameter is transmitting 150 KW at 2000 rpm. A square key having 12 mm side 75 mm long is used for the shaft. Determine the induced shear stress and compressve stress in the key.

17) Design a protective cast iron flange coupling for a steel shaft transmitted 15 KW at 200 rpm and having an allowable shear stress of 40 N/mm². The working stress in the bolts should not exceed 30 N/mm².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% grater than the full load torque. The shear stress for cast iron is 14 N/mm². 10M

18) A journal bearing 60 mm in diameter and 90 mm long runs at 450 rpm. The oil used for hydrodynamic lubrication has absolute viscosity of 0.06 Kg/ms, if the diametral clearnance is 0.1 mm, find the safe load on bearing. 10M

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