

**B.TECH. SEM -IV PRODUCTION 2014 COURSE (CBCS) :
WINTER - 2017**

SUBJECT : DESIGN OF MACHINE ELEMENTS

Day : **Thursday**
Date : **23/11/2017**

Time : **02.30 PM TO 05.30 PM**
Max. Marks : 60

W-2017-2101

N.B.:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.
- 4) Draw neat and labeled diagram **WHEREVER** necessary.
- 5) Assume suitable data if necessary.

Q.1 What is the basic procedure of machine design explain with suitable example? [10]

OR

What are the traditional design methods? Which method of design is preferred for modern day manufacturing processes? [10]

Q.2 How to calculate stresses in square keys? Design a square key to transmit 5kw power at 1440rpm. The shaft diameter is 20mm. The key has yield strength of 300N/mm². Assume a factor of safety as 3. [10]

OR

- a) How the shaft is designed when it is subjected to twisting moment only? [05]
- b) A line shaft rotating at 200rpm is to transmit 20kw. The shaft may be assumed to be made of mild steel with an allowable shear stress of 42MPa. Determine the diameter of the shaft, neglecting the bending moment on the shaft. [05]

Q.3 A plate clutch having a single driving plate with contact surfaces on each side is required to transmit 110kw at 1250rpm. The outer diameter of the contact surfaces is to be 300mm. The coefficient of friction is 0.4 [10]

- i) Assuming a uniform pressure of 0.17 N/mm²; determine the inner diameter of the friction surfaces.
- ii) Assuming the same dimensions and the same total axial thrust, determine the maximum torque that can be transmitted and the maximum intensity of pressure when uniform wear conditions have been reached.

OR

How does the function of a brake differ from that of a clutch? Discuss the different types of brake giving atleast one practical application for each. [10]

Q.4 Explain Stribeck's equation for static load carrying capacity. [10]

OR

P.T.O.

What is load life relationship for the dynamic load carrying capacity if the shaft rotates at 1450 rpm for the 5kN load acting on a ball bearing and the expected life for 90% of the bearings is 8000 hour? Calculate load carrying capacity of the bearing. [10]

Q.5 A steel plate subjected to a force of 8kN is fixed to a channel by means of three identical bolts as shown in figure. The bolts are made of 45 C8 (syt = 380 N/mm²). If the required factor of safety is 2.5, determine the size of the bolts. [10]

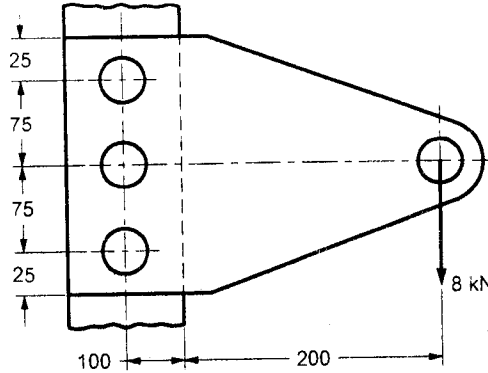


Fig.

OR

Explain the method of determining the size of the bolt when the bracket carries an eccentric load perpendicular to the axis of the bolt. [10]

Q.6 Explain terminology of double threaded power screw with neat sketch. [10]

OR

A sluice gate used in water pipelines consists of a gate raised by the spindle, which is operated by the hand wheel of radius 300 mm. The spindle has single start square threads. The nominal diameter of spindle is 36 mm and the pitch is 6 mm. The friction collar has inner and outer diameters of 32 mm and 50 mm respectively. The coefficient of friction at the threads and at the collar are 0.12 and 0.18 respectively. The weight of the gate is 7.5 kN and the frictional resistance to open the valve due to water pressure is 2.75 kN. Using uniform wear theory. Determine: [10]

- i) The torque required to raise the gate.
- ii) The force to be applied on hand wheel to raise the gate.
- iii) The overall efficiency

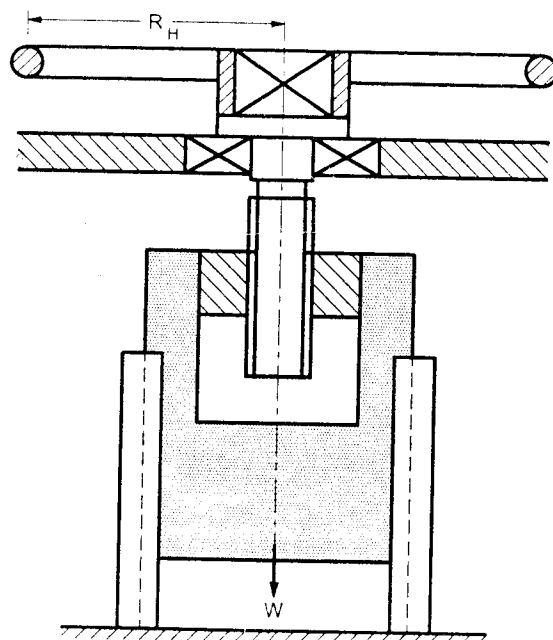


Fig.

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