B.TECH. SEM -IV PRODUCTION 2014 COURSE (CBCS) :
SUMMER - 2018
SUBJECT : DESIGN OF MACHINE ELEMENTS

Day : **Saturday** **S-2018-2309** Time : **10.00 AM TO 01.00 PM**
Date : **09/06/2018** Max. Marks : 60

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 are the various design consideration that need to be considered while defining the problem in a design process? **[10]**

OR

Define 'Mechanical Property' of an engineering material. State any six mechanical properties, give their definitions and one example of the material possessing the properties. **[10]**

Q.2 What is the function of coupling, with the help of neat sketches? Describe the types of various shaft couplings mentioning the use of each type. **[10]**

OR

Find the diameter of a solid shaft to transmit 20kw at 200rpm. The ultimate shear stress for the steel may be taken as 360 MPa and factor of safety as 4. If a hollow shaft is to be used in place of solid shaft, find the inside and outside diameter when the ratio of inside to outside diameter is 0.5. **[10]**

Q.3 Describe, with the help of a neat sketch, a centrifugal clutch and deduce an expression for the total frictional torque transmitted. How the shoes and springs are designed for such a clutch? **[10]**

OR

a) What are the various characteristics of the material used for brake lining? **[05]**

b) A solid cast iron disk, 1 min diameter and 0.2m thick, is used as a fly wheel. It is rotating at 350 rpm. It is brought to rest in 1.5 sec. by means of a brake. Calculate: **[05]**
i) The energy absorbed by the brake.
ii) The torque capacity of the brake.

Q.4 How to select bearing from 'Manufacturers Catalogue'? **[05]**

OR

P.T.O.

A single – row deep groove ball bearing is subjected to a radial force of 8kN and a thrust force of 3kN. The shaft rotates at 1200rpm. The expected life L_{10h} of the bearing is 20,000h. The minimum acceptable diameter of the shaft is 75mm. Select a suitable ball bearing for this application. **[10]**

Q.5 A bracket is bolted to a column by 6 bolts of equal size as shown in figure. It carries a load of 50kN at the distance of 150mm from the centre of column. If the maximum stress in the bolt is to be limited to 150N/mm^2 determine diameter of the bolt. **[10]**

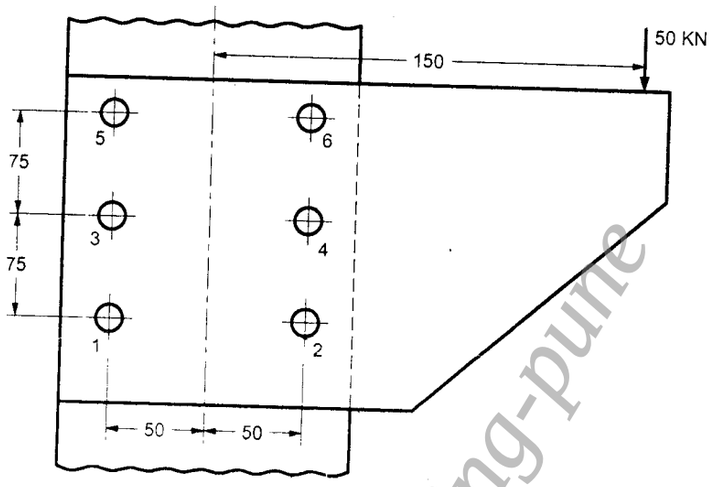

Fig.

OR

Explain Eccentric load in plane of bolts with neat sketch. **[10]**

Q.6 Calculate torque required to raise the load against thread friction. **[10]**

OR

The following data is given for a screw Jack: **[10]**

Nominal diameter of screw	= 40 mm
Pitch of square threads	= 7 mm
Coefficient of thread friction	= 0.15
Coefficient of collar friction	= 0.1
Effective mean diameter of collar	= 70 mm

The operator can comfortably exert a force of 150N at a radius of 1.2m to raise the load.

Assuming a single start threads, calculate:

i) Maximum load that can be lifted.
ii) Efficiency of the screw.
iii) Overall efficiency

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