

B.Tech. SEM -IV Production 2014 Course (CBCS) : WINTER - 2018

SUBJECT: DESIGN OF MACHINE ELEMENTS

Day: Friday
Date: 16/11/2018

W-2018-2365

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

N.B. :

- 1) All questions are **COMPULSORY**.
 - 2) Figures to the right indicate **FULL** marks.
 - 3) Assume suitable data, if necessary.
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Q.1 What are the traditional design methods? Which method of design is preferred for modern day manufacturing processes? **(10)**

OR

Q.1 Write short note on 'Factor of safety for different types of loading, its significance and selection'. **(10)**

Q.2 Square key is stronger against crushing than rectangular key justify the statement and explain the design procedure of parallel and taper keys. **(10)**

OR

Q.2 A shaft supported between two bearings 400 mm apart, carries an overhanging bevel gear at one end at a distance 150 mm from nearest bearing. The pitch circle diameter of bevel gear is 200 mm. The tangential, radial and axial forces acting on the bevel gear are 25 KN, 9.8 KN and 2.9 KN respectively. The shaft speed is 600 rpm. The ultimate and yield strengths of shaft material are 280 N/mm^2 and 135 N/mm^2 respectively. The combined shock and fatigue factors in bending and tension are 1.5 and 1.0 respectively determine:

- i) Shaft diameter using ASME code
- ii) Power transmitted by shaft

Q.3 What is the function of clutch? Derive an expression for energy equation or energy absorbed by brake. **(10)**

OR

Q.3 Write short note on: **(10)**

- i) Self energizing block brake
- ii) Self locking block brake
- iii) Advantages of disk brakes over drum brakes.

Q.4 Write short note on 'Selection of bearing from manufacturer's catalogue with suitable example'. **(10)**

OR

Q.4 Enumerate advantages and disadvantages of rolling contact bearings over sliding contact bearing. **(10)**

A single row deep groove ball bearing is subjected to a radial force of 8 KN and a thrust force of 3 KN. The shaft rotates at 1200 rpm. The diameter of the shaft is 75 mm and bearing No. 6315 ($C = 112000 \text{ N}$) is selected for this application.

P.T.O.

Q.5 Explain eccentric load on circular base in details. **(10)**

OR

Q.5 Write short note on “torque requirement for bolt tightening”. **(10)**

Q.6 Explain terminology of power screw. Derive an expression for torque analysis of square threads to raise the load. **(10)**

OR

Q.6 The lead screw of a lathe has ACME threads of 60 mm outside diameter and 8 mm pitch. It supplies drive to a tool carriage which needs an axial force of 2000 N. A collar bearing with inner and outer radii as 30 mm and 60 mm respectively is provided. The coefficient of friction for screw threads is 0.12 and for collar it is 0.1. Find the torque required to drive the screw and the efficiency of the screw. If the screw rotates at 30 rpm. Find the power required to drive the screw. **(10)**

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