

Exam. Code: 0942
Sub. Code: 33872

2056

B.E. (Mechanical Engineering)
Sixth Semester

MEC-601: Design of Machines Elements – II

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions each from Section. Design data hand book is allowed in the examination.

x-x-x

- Q1. (a) What is the significance of bearing modulus in the design of journal bearing? 2*5=10
(b) State the reason for selecting even number of pitches or links for roller chain?
(c) What condition must be satisfied in order that a pair of spur gears have constant velocity ratio?
(d) Where are angular contact and self-aligning ball bearings used?
(e) How is self-energizing brake different from self-locking brake?

Section A

- Q2. A roller chain drive is used between a driver shaft running at 1440 rpm and a driven shaft running approximately at 720 rpm. The power transmitted is 15 kW. The drive is to be used for 2 shift /day with 8 hours /shift. The center distance is approximately 1000 mm and the chain tension can be adjusted by moving the motor in the rails. Design the drive. 10
- Q3. A 37.5 kW power is transmitted at 450 rpm to a shaft running at approximately 112 rpm through a spur gear drive. The load is steady and continuous. Design the gear drive and check the design. Assume the following materials: Pinion-heat treated cast steel; Gear-High grade cast iron. 10
- Q4. A semi-elliptical automobile leaf spring of 1.2 m span carries a load of 700 N. It has ten leaves of which two are running to full length. Width of each leaf is 60 mm. Determine suitable thicknesses of the leaves to keep deflection under load to 70 mm. Also determine the stress in the spring. 10

P.T.O.

(2)

Section B

- Q5. The radial load on a 180° hydro-dynamically lubricated journal bearing is 12 kN, journal speed is 960 rpm and allowable bearing pressure is limited to 1.5 N/mm^2 . Assuming a suitable fit, design the bearing for average clearance. Considering heat generated is dissipated from the bearing surface area, which is 25 LD. The bearing, which is placed in an oil bath, is cooled by moving air. Find oil flow rate, coefficient of friction, power loss, and temperature rise. 10
- Q6. Select a suitable ball bearing for the spindle of a drilling machine rotating at 1200 rpm. The bearing is subjected to a radial load of 3000 N and axial load of 2000 N. The machine is to operate for 8 hours/day for a service life of 5.5 years. Based on the strength, minimum diameter of the spindle is 55 mm. 10
- Q7. A plate clutch has 3 discs on the driving shaft and 2 discs on the driven shaft, providing 4 pairs of contact surfaces. The outer diameter of contact surface is 240 mm and inner diameter is 120 mm. Assuming uniform pressure and $\mu = 0.3$, find the total spring load for pressing the plates together to transmit 25 kW at 1575 rpm. If there are 6 springs each of stiffness 13 kN/m and each of contact surfaces have worn away by 1.25 mm, find the power that can be transmitted, assuming uniform wear. 10

X-X-X