Exam. Code: 0942
Sub. Code: 7058

2010

B. Engg. (Mechanical Engg.)

6th Semester

MEC-601: Design of Machines Elements-II

Time allowed: 3 Hours | Max. Marks: 50

NOTE: *Attempt **five** questions in all, including Q. No. 1 (Unit-I) which is compulsory and selecting two questions each from Unit-II & III. Assume any suitable data, wherever not given. Supplement your answer with suitable sketches wherever required. Use of design data book compiled by PSG College of Engg. & Tech. Coimbatore or Design Data Book by K. Mahadevan and Reddy (CBS Publishers) only is allowed in examination. Any other design data book is not allowed. Photocopies of book pages are not allowed. There should not be anything handwritten/corrections in Design Data Book.*

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UNIT-I

I. (a) Write a short note on hoisting and hauling chains.

(b) It is stated that the speed at which a belt should be run to transmit maximum power is that at which the maximum allowable tension is three times the centrifugal tension in the belt at that speed. Prove the statement.

(c) What are the various forces acting on a bevel gear?

(d) Explain the utility of the centre bolt, U-clamp, rebound clip and camber in a leaf spring.

(e) What is back stop action in band brakes? Explain the condition for it?

(5×2)

UNIT-II

II. Design a suitable wire rope drive to lift a load of 10 kN of debris from a well 60 m deep. The rope should have a factor of safety equal to 6. The weight of the bucket is 5 kN. The load is lifted up with a maximum speed of 150 metres/min which is attained in 1 second. Find also the stress induced in the rope due to starting with an initial slack of 250 mm. The average tensile strength of the rope may be taken as 590 d^2 N (where d is the rope diameter in mm) for 6×19 wire rope. The weight of the rope is 18.5 N/m. Take diameter of the wire (d_w) = 0.063 d, and area of the rope $(A) = 0.38\ d^2$. (10)

III. Design worm and gear speed reducer to transmit 22 kW at a speed of 1440 r.p.m. The desired velocity ratio is 24:1. An efficiency of at least 85% is desired. Assume that the worm is made of hardened steel and the gear of phosphor bronze. (10)

P.T.O.

IV. Design a journal bearing for a centrifugal pump running at 1440 r.p.m. The diameter of the journal is 100 mm and load on each bearing is 20 kN. The factor *ZN/p* may be taken as 28 for centrifugal pump bearings. The bearing is running at 75°C temperature and the atmosphere temperature is 30°C. The energy dissipation coefficient is 875 $W/m^2/^0C$. Take diametral clearance as 0.1 mm. (10)

UNIT-III

V. A semi-elliptical laminated spring is made of 50 mm wide and 3 mm thick plates. The length between the supports is 650 mm and the width of the band is 60 mm. The spring has two full length leaves and five graduated leaves. The spring carries a central load of 1600 N. Check this design against different types of failures. (10)

VI. A cone clutch is mounted on a shaft which transmits power at 225 r.p.m. The small diameter of the cone is 230 mm, the cone face is 50 mm and the cone face makes an angle of 15° with the horizontal. Determine the axial force necessary to engage the clutch to transmit 4.5 kW if the coefficient of friction of the contact surfaces is 0.25. What is the maximum pressure on the contact surfaces assuming uniform wear? (10)

VII. Discuss the design procedure applicable for designing a differential band brake. (10)

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