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**Question Paper Code : 41044**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Sixth Semester

Mechanical Engineering

080120034 — DESIGN OF TRANSMISSION SYSTEMS

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Use of Standard Design Data Book is permitted.

Assumptions and assumed data have to be stated clearly.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the possible ways by which a chain drive may fail?
2. What is crowning of pulley?
3. What are the standard interchangeable tooth profiles?
4. List out the various methods of manufacturing gears.
5. Why is a gear tooth subjected to dynamic loading?
6. In worm gear drive, only the wheel is designed. Why?
7. What is kinematic arrangement as applied to gear boxes?
8. What are preferred numbers?
9. Define overhauling in power screws.
10. Why a service factor is used for calculating the design capacity of a clutch?



PART B — (5 × 16 = 80 marks)

11. (a) Select a v-belt drive to transmit 10 kW of power from a pulley 200 mm diameter mounted on an electric motor running at 720 rpm to another pulley mounted on a compressor shaft to run at 200 rpm. The appropriate centre distance is 600 mm. The load factor for service is 1.3. Find the number of belts and corrected centre distance.

Or

- (b) Select a roller chain for a small fan. The motor speed is 900 rpm and the fan speed is 500 rpm. Power to be transmitted is 7.5 kW.
12. (a) Design a pair of cast steel spur gears to connect two shafts and to transmit 9 kW at 900 rpm of pinion. The gear is to rotate at 450 rpm. The pitch line velocity of the gears is not to exceed 9 m/s. The gear pair is required to last for atleast 10,000 hrs. Check for bending and wear loads.

Or

- (b) Design a pair of steel helical gears to transmit 6 kW at 600 rpm of pinion. The gear ratio is 3:1. The centre distance is to be 240 mm. The drive has to work for 6 hours per day for 4 years.
13. (a) Design a pair of right angled bevel gears to transmit 15 kW at 750 rpm to another gear to run at 250 rpm. Not less than 20 teeth are to be used on either gear. The pressure angle is 20°. Assume a gear life of 12000 hrs.

Or

- (b) Complete the design of a worm gear speed reducer unit which consists of a hardened steel worm and phosphor bronze gear. The centre distance is 200 mm and transmission ratio is 10:1.
14. (a) The minimum and maximum speed of a six speed gear box are to be 150 rpm and 500 rpm. Construct the speed diagram, and the kinematic layout of the gear box. Determine the number of teeth on all gears and the centre distance between the shafts.

Or

- (b) Sketch the speed diagram and the kinematic layout for an 18 speed gear box for the following data: Motor speed = 1400 rpm; minimum output speed = 16 rpm; maximum output speed = 800 rpm. List the speeds of all the shafts when the output speed is 16 rpm.



15. (a) Select the thread proportions of a screw rod of a screw jack to sustain an axial compressive load of 40 kN for an supported length of 300 mm. The allowable stresses for screw are 120 MPa in compression and 72 MPa in shear.

Or

- (b) Design a cone clutch whose face is lined with asbestos to transmit 10 kW at 700 rpm. The mean diameter of friction lining is 220 mm. Coefficient of friction is 0.24 and the cone angle is  $24^\circ$ .