Karunya University

(Karunya Institute of Technology and Sciences)

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – April / May 2013

Subject Title : DESIGN OF TRANSMISSION SYSTEMS   **Time: 3 hours**

Subject Code : 09ME208   **Maximum Marks: 100**

Answer ALL questions (10 x 1 = 10 Marks)

1. Mention the applications of hydrostatic bearing.

2. Define dynamic static load carrying capacity of ball bearing.

3. What are the five parts of roller chain?

4. What is herringbone gear?

5. In which gear drive is self-locking possible?

6. What is virtual or formative teeth of bevel gear?

7. In what way kinematic arrangement is linked with speed diagram?

8. Define step ratio of a gear box?

9. Mention some applications of ratchet and pawl mechanism.

10. Differentiate between the base circle and prime circle of a cam drive.

Answer ALL questions (5 x 3 = 15 Marks)

1. **Distinguish** between hydrostatic and hydrodynamic bearing?

2. List out the different types of chains and write the types of failures in roller chain?

3. What kind of contact occurs between worm and worm wheel? How does it differ from other types of gears?

4. Briefly explain the construction and use of speed diagram in gear box design.

5. Briefly explain the working principle of a geneva mechanism.

<u>Answer ALL questions (5 x 15 = 75 Marks)</u>

1. Design a journal bearing for a steam turbine, whose shaft is supported on two bearings one at each side of the turbine, and is coupled with a generator for power production. The weight of turbine with shaft is measured as 40 kN and the shaft rotates at 1500 rpm. Diameter of the shaft is 100mm.

<div align="center">(OR)</div>

2. A motor driven blower is to run at 650 rpm driven by an electric motor of 7.5 k.W at 1800 rpm. Design the V belt drive.

3. Design a chain to transmit 7.5 kW at 960 rpm of the sprocket pinion. A speed reduction of 2.5 to 1 is desired. The drive is horizontal and the motor is mounted on an adjustable base. A service of 12 hours per day is envisaged.

<div align="center">(OR)</div>

4. A spur gear drive is used to drive a cam-shaft by the crank-shaft with speed reduction of 2 in a 5kW Engine. The centre distance is to be not more than 160 mm. Design the drive for 12,000 hours. Crank-shaft speed is 1500 rpm.

5. Design a bevel gear drive to transmit 7.36 kW at 1440 rpm and the gear ratio is 3. Take the Material for pinion and gear as C45 surface hardened.

<div align="center">(OR)</div>

6. Design a worm gear drive to transmit 22.5 kW at a worm speed of 1440 rpm. Velocity ratio is 24:1. An efficiency of at least 85% is desired. The temperature rise should be restricted to 40^0C.

7. A gear box is to be designed with the following specification:
   Power = 14.72 kW. Number of speeds = 18, Minimum speed 16 rpm. Strep ratio = 1.25.
   Motor speed = 400 rpm. The 18 speeds are obtained as 2 X 3 X 3. Sketch the layout of the gear box and the speed diagram. Calculate the diameter of the shafts and the number of teeth on the gears.

<div align="center">(OR)</div>

8. A 12 speed gear box is to be designed for a machine tool with a step ratio of 1.4. The maximum output speed is to be 1000 rpm. Power to be transmitted is 5 k.W. Draw the layout of gears & speed diagram and determine the number of teeth of gears.

9. The centre distance between Geneva wheel and driving crank is 60mm and the number of slots are 6. Determine the geometric dimensions of Geneva disc and calculate the power required to drive the wheel if the angular velocity is 6.28 rad / sec and the mass moment of inertia of the geneva wheel is 0.1 kg. m^2

<div align="center">(OR)</div>

10. Design a ratchet wheel for a winch if the braking torque is 150 Nm, brake drum diameter is 350 mm and the allowable bending stress of wheel material is 30 N/mm^2.