**Karunya University**

**(Karunya Institute of Technology and Sciences)**

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

**Supplementary Examinations – June 2016**

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

**Subject Code: 14ME2028 Maximum Marks: 100**

**Answer ALL questions (5 x 20 = 100 Marks)**

(Use of Design Data Book is permitted)

1. For a 6307 ball bearing, the load varies as follows.

|  |  |  |  |
| --- | --- | --- | --- |
| Radial Load (N) | Axial Load (N) | Cycle time ratio | Speed in rpm |
| 6000 | 3000 | 0.5 | 400 |
| 7500 | --- | 0.3 | 650 |
| 4000 | 1000 | 0.2 | 900 |

The loads are steady. Find the expected average life of the bearing.

**(OR)**

2. Design a V-belt drive to the following specifications.

Power to be transmitted = 75 kW; Speed of driving wheel = 1440 rpm;

Speed of driven wheel = 400 rpm; Diameter of driving wheel = 300 mm;

Centre distance = 2500 mm; Service = 16 hours / day.

3. Select a suitable wire rope to lift 11 kN of debris from a well 60 m deep. The weight of the bucket is 4 kN. The weight is being lifted with a maximum speed of 150 m/min and the maximum speed is attained in 1 second. Also find the number of ropes that are required.

**(OR)**

4. Design a helical gear drive to transmit a power of 15 kW. Speed ratio is 6; pinion speed is 1200 rpm; helix angle is 25º. Choose the material for the pinion as 15 Ni2 Cr1 Mo15 and that of gear as C45. Assume the value of ψ as 0.5. Design the gear drive.

5. Two straight bevel gears are used in a speed reducer with a transmission ratio of 2. The input is from a 20 kW electric motor running at 950 rpm. Assume the material for the pinion and gear to be 15 Ni2 Cr1 Mo15. Design the bevel gears.

**(OR)**

6. In a 12 speed gear box, the speeds available at the spindle are 31.5, 45, 63, 90, 125, 180, 250, 355, 500, 710, 1000 and 1410 rpm. The structural formula is 2 X 3 X 2. Sketch the kinematic arrangement of the gear box and also the ray diagram.

7. A braking system of a lift mechanism needs a ratchet and pawl arrangement. The torque is 500 Nm; Number of teeth on ratchet is 18. Material may be assumed as steel / steel (hardened). Design the ratchet and pawl arrangement and also check for allowable pressure and bending stress. Assume allowable bending stress = 30 N/mm2 and ψ = 2.5.

**(OR)**

8. a. Determine the geometric dimensions of a six station Geneva wheel for the driving

crank radius of 100 mm.

b. Also find the instantaneous angular velocity and angular acceleration of the geneva wheel when the crank angle ϕ = 20º; crank radius is 88 mm; centre distance is 125 mm; speed of crank is 100 rpm.

9. **Compulsory:**

A multi plate clutch, effective on both sides transmits 30 kW at 360 rpm. Inner and outer radii of the clutch discs are 100 and 200 mm respectively. The coefficient of friction is 0.25. An axial load of 600 N is applied. Assuming uniform wear conditions, find the number of discs required and the maximum intensity of pressure developed.