Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

**End Semester Examination – Nov/Dec – 2016**

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| **Code :** | **14ME2028** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **DESIGN OF TRANSMISSION SYSTEMS** | **Max. marks :** | **100** |

*Note*: Use of DESIGN DATA BOOK-P.S.G.Tech and approved data sheet are permitted.

Missing data may be suitably assumed.

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | Marks |
| 1. | a. | What is meant by ‘Crowning of pulley’? | CO1 | 3 |
| b. | Why V belts are preferred over the flat belts? | CO1 | 3 |
| c. | A 6207 radial bearing is to operate in the following work cycle:  Radial load of 4500 N at 150 rpm for 30 % of the time.  Radial load of 6750 N at 600 rpm for 10 % of the time.  Radial load of 2250 N at 300 rpm for 60 % of the time.  The inner ring rotates and the loads are steady. What is the expected average life of the bearing? | CO4 | 14 |
| (OR) | | | | |
| 2. | a. | What are the conditions to be followed, while installing a flat belt? | CO1 | 3 |
| b. | Load on a journal bearing for a generator is 1200 kgf; Diameter of the journal is 75 mm and its length is 130 mm; Speed of the journal is 1400 rpm. Find the viscosity of the oil in centipoise. | CO2 | 3 |
| c. | The specifications of a V-Belt drive are as follows:  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. Design the V- Belt drive. | CO4 | 14 |
| 3. | a. | Discuss about the following terms with respect to helical gears  i) Transverse circular pitch, ii) Normal circular pitch, iii) Axial pitch. | CO1 | 3 |
|  | b. | List the different components in the chain drive with the material used for every component. | CO1 | 3 |
|  | c. | Select a suitable wire rope from 6x37 group to lift a maximum load of 10 kN through a height of 60 m. The weight of the bucket is 2 kN. Maximum lifting speed is 2 m/s, which is attained in 3s. Drum diameter is 30 times the rope diameter. Factor of safety is 6. | CO4 | 14 |
| (OR) | | | | |
| 4. | a. | List out the reasons for failure of wire ropes. | CO1 | 2 |
|  | b. | By assuming suitable materials and stresses, design a pair of spur gear to transmit 20 kW at a pinion speed of 1400 rpm. The transmission ration is 4. | CO3 | 18 |
| 5. | a. | Differentiate between Crown gear and Miter gear. | CO1 | 3 |
|  | b. | Write short notes on Skew gears. | CO1 | 3 |
|  | c. | Two straight bevel gears are used in a speed reducer with a transmission ratio of 2. The wheel is supported on both sides and the pinion is over hanging. The input is from a 20 kW electric motor running at 960 rpm. Design the bevel gears. | CO4 | 14 |
| (OR) | | | | |
| 6. | a. | When bevel gears are preferred? List the materials used for bevel gears. | CO1 | 3 |
|  | b. | List out the advantages and disadvantages of worm gear. | CO1 | 3 |
|  | c. | The input of the worm gear shaft is 18 kW and 600 rpm. Speed ratio is 20. The worm is made of hardened steel and the wheel is made of chilled Phosphor bronze. Design the worm gear drive by assuming necessary data. | CO3 | 14 |
| 7. | a. | A six speed gear is to be designed for a lathe. The power input is 2 kW. The speed ranges from 110 rpm to 700 rpm. Take standard series and step ratio. Draw the speed diagram and kinematic arrangement. | CO4 | 10 |
|  | b. | Determine the geometric dimensions of a geneva wheel for the driving crank radius 50 mm. The geneva wheel has 6 stations. | CO4 | 10 |
| (OR) | | | | |
| 8. | a. | A six speed gear box has output speeds from 460 to 1400 rpm. Find out the six speeds in rpm. | CO2 | 3 |
|  | b. | What is referred as arresting gear? Why? | CO2 | 3 |
|  | c. | For 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. Draw the ray diagram and kinematic arrangement for the given speed. | CO4 | 14 |
|  | | **Compulsory:** |  |  |
| 9. | a. | An offset translating roller follower moving with Simple Harmonic Motion is driven by a cam rotating at 600 rpm. The maximum lift of the follower is 30 mm during 150° of the cam rotation. The prime circle diameter of the cam is 80 mm. If the amount of offset is 5 mm, determine i) pressure angle at a cam angle of 60°, ii) Pressure angle at a cam angle of 70°, if the follower is radial in nature, instead of offset type. | CO2 | 10 |
|  | b. | A power of 20 kW is to be transmitted through a cone clutch at 500 rpm. For uniform wear condition, find the main dimensions of the clutch and shaft. Also determine the axial force required to engage the clutch. Assume coefficient of friction as 0.25, the maximum normal pressure on the friction surface is not to exceed 0.08 MPa and the design stress for the shaft material as 40 MPa. | CO4 | 10 |