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 – April/May – 2017**

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

**Note: Use of approved data books are permitted**

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

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| Q. No. | Sub Div. | Questions | Course  Outcome | Marks |
| 1. | a. | Define maximum tension in a belt. | CO1 | 2 |
| b. | Brief on the various factors influencing the bearing selection. | CO1 | 4 |
| 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 |
| (OR) | | | | |
| 2. | a. | What are the various types of joints used for joining the flat belts? | CO1 | 2 |
| b. | Load on a journal bearing for a generator is 12 kN; 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 | 4 |
| c. | The radial reaction on a bearing is 9000 N. It also carries a thrust of 5000 N. The speed of the shaft is 1000 rpm. The outer ring is stationary. Expected average life of the bearing is about 25,000 hours. The load on the bearing is smooth and the service is 8 hours/ day.  i. Select suitable roller bearing.  ii. What is the rated 90% life of the selected bearing?  iii. Compute probability of the selected bearing surviving 25,000 hours. (if the life of selected bearing is 90% of rated life) | CO2 | 14 |
| 3. | a. | Differentiate between open and cross belt drives. | CO1 | 2 |
| b | Define Helix angle. How does this angle differentiate the helical gear from spur gear? | CO2 | 2 |
| c. | Design a pair of helical gears to transmit 38 kW at 1500 rpm of the pinion. Reduction ratio is 5. Helix angle is taken as 15º. Consider the material for the pinion and the gear as C45 and the number of teeth on the pinion as 20. | CO4 | 16 |
| (OR) | | | | |
| 4. | a. | Why are double helical gears preferred than the single helical gears? | CO1 | 2 |
| b. | What are the different stresses induced on the wire ropes? Write the formula used to calculate those stresses. | CO1 | 4 |
| c. | Design a pair of spur gear to transmit 20 kW at a pinion speed of 1400 rpm. The transmission ratio is 4. Assume suitable materials and stresses. | CO4 | 14 |
| 5. | a. | List the materials used in bevel gears. | CO1 | 2 |
| b. | Where do we use skew gears? | CO1 | 2 |
| 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. | CO4 | 16 |
| (OR) | | | | |
| 6. | a. | How is the centre distance between the mating gears calculated in skewed gears? | CO1 | 2 |
| b. | A pair of worm gear is designated as 1/52/10/8. The worm transmits 800W power at 1000 rpm and the normal pressure angle is 20°. Determine the coefficient of friction of the worm gear and its efficiency. Also find the power lost in friction. | CO2 | 4 |
| c. | Design a straight bevel gear drive to transmit 7 kW at 1600 rpm for the following data.  Gear ratio:3, material for pinion and gear: C45 steel, Life: 10000 hours. | CO4 | 14 |
| 7. |  | Spindle of the pillar grill runs at 12 different speeds in the range of 100 rpm to 355 rpm. Design a three stage gear box with standard step ratio. Sketch the layout of the gear box, indicating the number of teeth on each gear and also sketch the ray diagram. The gear box receives 5 kW from an electric motor running at 360 rpm. | CO3 | 20 |
| (OR) | | | | |
| 8. |  | Draw the kinematic arrangement and speed diagram of a head stock gear box of a turret lathe having arrangement for a 9 spindle speed ranging from 31.5 rpm to 1050 rpm. Calculate the number of teeth on each gear, the minimum number of teeth on each gear is restricted to 25. Also, calculate the percentage deviation of the obtainable speed from the calculated one. | CO3 | 20 |
|  | | **Compulsory:** |  |  |
| 9. | a. | List out the types of followers based on the shape and motion. | CO1 | 2 |
| b. | Why are cone clutches better than the disc clutches? | CO1 | 2 |
| c. | What is ratchet and pawl mechanism and where it is employed? | CO1 | 2 |
| d. | A six station geneva wheel has a driving crank radius of 100 mm. Find the radius of the geneva wheel. | CO2 | 4 |
| e. | 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. | CO3 | 10 |

ALL THE BEST