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**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

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

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

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

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **09ME208 / 12ME224 / ME231** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **DESIGN OF TRANSMISSION SYSTEMS / DESIGN OF MECHANICAL TRANSMISSION SYSTEMS** | **Max. marks :** | **100** |

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| **Q. No.** | **Questions** | **Marks** |
| **PART-A (10X1=10 MARKS)** | | |
| 1. | What is known as Journal? | (1) |
| 2. | Specify the purpose of crowning a flat pulley. | (1) |
| 3. | What is meant by a 6x19 wire rope? | (1) |
| 4. | What is a herringbone gear? | (1) |
| 5. | When do we use bevel gears? | (1) |
| 6. | What kind of contact occurs between worm and worm wheel? | (1) |
| 7. | What are the possible arrangements to achieve 8 speeds in a gear box? | (1) |
| 8. | Define step ratio of a gearbox. | (1) |
| 9. | Name the various stresses induced in power screws. | (1) |
| 10. | Where is the Geneva mechanism used? | (1) |

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| **PART B (5 X 3= 15 MARKS)** | | |
| 11 | Differentiate between rolling contact bearings and sliding contact bearings. | (3) |
| 12 | List out the advantages of chain drives. | (3) |
| 13 | State the difference between a crown gear and a miter gear. | (3) |
| 14 | Write the structural formula for the 3 X 3 X 2 and 2 X 4 X 2 arrangements of gearbox. | (3) |
| 15 | Define the following terms for a cam: (i) Base circle (ii) Prime circle (iii) Pitch point | (3) |

**PART C (5 X 15= 75 MARKS)**

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| 16. | 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. | (15) |
|  | (OR) |  |
| 17. | 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. Choose ‘D’ type belt. | (15) |
| 18. | Design a chain drive to actuate a compressor from a 10 kW motor at 960 rpm. The compressor speed is 350 rpm. Minimum centre distance is 0.5 m. Compressor is to work for 8 hours/day. | (15) |
|  | (OR) |  |
| 19. | Design a pair of helical gears to transmit 10 kW at 1000 rpm of the pinion. The gear speed is 200 rpm. Reduction ratio is 5. Helix angle is taken as 15º. Consider the material for the pinion and the gear as 40 Ni 2 Cr 1 Mo 28 steel. | (15) |
| 20. | Design a bevel gear drive to transmit 7 kW at 1600 rpm .Take the gear ratio as 3. Material for the pinion and gear are C 45 steel. Assume the expected life as 10,000 hours. | (15) |
|  | (OR) |  |
| 21. | 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. | (15) |
| 22. | Spindle of a drilling machine runs at 12 different speeds in the range of 100 rpm to 355 rpm. Design a three stage gear box. Sketch the layout of the gear box, indicating the number of teeth on each gear. Also sketch the ray diagram. The gear box receives 5 kW from an electric motor running at 360 rpm. | (15) |
|  | (OR) |  |
| 23. | A gear box is to be designed with the following specifications. Power = 14.72 kW; Number of speeds = 18; Minimum speed = 16 rpm; Step ratio = 1.25; Motor speed = 1400 rpm. The 18 speeds are obtained as 2 X 3 X 3. Sketch the layout of the gear box and the speed diagram. | (15) |
| 24. | Design a ratchet wheel for a winch if the braking torque is 500 Nm; the allowable bending stress of wheel material is 30 N/mm2. Number of teeth is 18. Material may be assumed as steel/steel (hardened). | (15) |
|  | (OR) |  |
| 25. | Determine the geometric dimensions of a Geneva wheel for driving a crank of radius is 100 mm. The Geneva wheel has 6 slots. | (15) |

ALL THE BEST