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



**End Semester Examination – Nov / Dec – 2019**

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

*Note: Use of Approved Design Data book and Data sheets are permitted.*

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

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 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. | 3 | 20 |
| **(OR)** | | | | |
| 2. |  | Select a suitable ball bearing for the following data. The radial load is 7.5 kN and axial load is 4.5 kN. The shaft speed is 2000 rpm and L10 life required is 4.9 x 108 revlolutions. The inner ring of the bearing roatets. | 2 | 20 |
|  |  |  |  |  |
| 3. |  | 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. | 4 | 20 |
| **(OR)** | | | | |
| 4. |  | Design a spur gear drive to transmit 22 kW at 900 rpm, speed reduction is 2.5. Materials for pinion and wheel are C15 steel and cast Iron grade 30 respectively. Take pressure angle of 20̊ and working life of the gear as 10,000 hours. | 3 | 20 |
|  |  |  |  |  |
| 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. | 3 | 20 |
| **(OR)** | | | | |
| 6. |  | Design a worm gear drive to transmit 22.5 kW at worm speed of 1440 rpm. Velocity ratio 24:1. An efficiency of atleast 85% is desired. The temperature rise should be restricted to 40̊ C. Determine the required cooling area. | 4 | 20 |
|  |  |  |  |  |
| 7. |  | A single dry plate clutch, effective on both sides is rewuired to transmit 25 kW at 1500 rpm. Detemine the inner and outer diameter of friction surface, if the co-efficient of friction is 0.25; ratio of diameters is 1.5 and the maximum pressure is not to exceed 0.2 N/mm2. Assume the theory of uniform wear. | 2 | 20 |
| **(OR)** | | | | |
| 8. | a. | Determine the gearmetric dimensions of a 6-station Geneva wheel for the driving crank radius of 100 mm. | 1 | 10 |
| b. | Design a ratchet wheel for a winch. Data given: Braking torque = 150 Nm; Brake drum diameter = 350 mm; [σb]wheel = 30 N/mm2. | 4 | 10 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. |  | 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 = 400rpm. 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. | 2 | 20 |