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

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**End Semester Examination – Nov/Dec – 2018**

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

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

**(Use of Design Data Book is permitted)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | What are the various factors influencing the bearing selection? | CO1 | 4 |
| b. | Design a journal bearing for a centrifugal pump with the following data:  Diameter of the journal bearing: 150 mm,  Load on the bearing: 40 kN,  Speed of journal bearing: 900 rpm. | CO4 | 16 |
| (OR) | | | | |
| 2. | a. | 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 | 4 |
| b. | Select a suitable V-belt and design the drive for a wet grinder. Power is available from a 0.5 kW motor running at 750 rpm. Drum speed is to be about 100 rpm. Drive is to be compact. | CO4 | 16 |
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| 3. | a. | Under what conditions, chain drives are preferred over V-belt drives? | CO2 | 4 |
| b. | Select a wire-rope for a vertical mine hoist to lift a load of 20 kN from a depth of 500 meters. A rope speed of 3 m/s is to be attained in 10 seconds. | CO2 | 16 |
| (OR) | | | | |
| 4. | a. | Why are double helical gears preferred than the single helical gears? | CO1 | 4 |
| b. | 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 | 16 |
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| 5. | a. | Distinguish between Crown gear and Miter gear. | CO1 | 2 |
| b. | 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 | 18 |
| (OR) | | | | |
| 6. | a. | When skew gears are used? How the center distance between the mating skew gears are calculated? | CO1 | 2 |
| b. | Design a worm gear drive to transmit 20 kW at 1440 rpm. Speed of the worm wheel is 60 rpm. The worm is made of hardened steel and the wheel is made of chilled phosphor bronze. The number of starts on the worm is to be considered as 3. | CO4 | 18 |
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| 7. |  | 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 |
| (OR) | | | | |
| 8. | a. | A six speed gear box has output speeds from 460 to 1400 rpm. Find out the six speeds in rpm. | CO2 | 4 |
| b. | 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 | 16 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | What is ‘Self energizing brake’? When it becomes self locking? | CO1 | 4 |
| b. | The braking system of a lifting mechanism needs a ratchet and pawl arrangement. Following data may be assumed. Torque: 500 N-m, Number of teeth: 18, Material may be Steel/ Steel hardened. Design Ratchet and Pawl and check for edge pressure and bending stress. | CO2 | 16 |