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



**End Semester Examination – Nov/Dec - 2017**

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

(**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 absolute viscosity and dynamic viscosity. How they are expressed in SI units? | CO1 | 2 |
| b. | What are the various factors influencing the bearing selection? | CO1 | 2 |
| c. | Design a journal bearing for a centrifugal pump with the following datas:  Diameter of the journal bearing: 150 mm,  Load on the bearing: 40 kN,  Speed of journal bearing: 900 rpm. | CO4 | 16 |
| (OR) | | | | |
| 2. | a. | The allowable bearing pressure in a bearing is 1.6 MPa. Load on the journal bearing is 150 N, due to a turbine shaft of diameter 250 mm running at 1800 rpm. Determine the length of the bearing. | 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. | CO3 | 16 |
| 3. | a. | What is roller chain and silent chain? When they are used? | CO1 | 2 |
| b. | Two spur gears are to be used for a rock crusher drive and are to be of minimum size. Gears are to be designed for the following requirements: Power to be transmitted- 18 kW, Speed of the pinion- 1200 rpm, Angular velocity- 3.5:1, Tooth profile- 20° stub. Assume that the gears are made of case hardened alloy steel. Design the drive. | CO4 | 18 |
| (OR) | | | | |
| 4. | a. | Name the different factors considered while calculating the service factor in a chain drive. | CO1 | 2 |
| b. | Design the herringbone gear for the given data: Power to be transmitted: 40 kW, Pinion speed: 1800 rpm, Gear ratio: 4, Helix angle: 20°. Select the suitable material. | CO4 | 18 |
| 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 |
| 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 |

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| (OR) | | | | |
| 8. | a. | Differentiate solid shaft and splined shaft. | CO1 | 2 |
| b. | A six speed gear box has output speeds from 460 to 1400 rpm. Find out the six speeds in rpm. What are the possible structural formula for a six speed gear box? | CO3 | 4 |
| c. | For a 12 speed gear box of a lathe, the speeds available (in rpm) are 100, 125, 160, 200, 250, 315, 400, 500, 630, 800, 1000 and 1200. Construct the ray diagram and draw the kinematic arrangement of the gear box. | CO3 | 14 |
|  | | **Compulsory:** |  |  |
| 9. | a. | Name different types of clutch. Why positive clutch is used? | CO1 | 2 |
| b. | What is referred as arresting gear? Why? | CO1 | 2 |
| c. | What is ‘Self energizing brake’? When it becomes self locking? | CO1 | 2 |
| d. | 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 | 14 |

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