

Total No. of Questions : 8]

SEAT No. :

PD-4367

[Total No. of Pages : 3

[6403] 166

T.E. (Mechanical)

**DESIGN OF TRANSMISSION SYSTEMS
(2019 Pattern) (Semester - VI) (302051)**

Time : 3 Hours]

[Max. Marks : 70

Instructions to the candidates:

- 1) Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Neat diagrams should be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data wherever necessary.

Q1) a) A single row deep-groove ball bearing is subjected to the following work cycle : [10]

Sr No.	Fraction of Cycle	Radial Load Fr(kN)	Axial Load Fa(kN)	Radial Factor X	Thrust Factor Y	Race Rotation
1	1/10	1.5	0.25	1.0	0	Inner
2	1/5	1.0	0.75	0.56	2.0	Outer
3	3/5	5.0	1.1	0.56	2.0	Inner
4	Remaining	1.0	-	1.0	0	Outer

If the desired rating life of the bearing is 15000 hours, select bearing from the following data.

Bearing No.	6011	6211	6311	6411
Dynamic Capacity C (kN)	28.1	43.6	71.5	99.5

What is the average speed of the bearing?

b) Explain the designation of rolling contact bearings and rating life of bearings. [7]

OR

P.T.O.

Q2) a) Explain the design variables and performance variables of hydrodynamic journal bearings. [9]

b) State the assumptions made in deriving Reynold's equation. Write Reynold's equation for 2-D flow and explain each term in it. [8]

Q3) a) With the help of neat sketch, explain the working of single plate clutch, state its advantages, limitations and applications. [10]

b) What are the two theories applied to friction plates? Why clutches are usually designed on the basis of uniform wear? [7]

OR

Q4) a) Find the effort applied at the end of the lever for Differential band brake. What is the condition of self-locking in differential band brake? Why should it be avoided in speed-control brakes? [9]

b) Draw a figure for is internal expanding shoe brake and write the assumptions on which its analysis depends? [8]

Q5) a) Draw the structure diagram for the following structural formulas and identify the optimum structural formula out of them. Draw the gearing diagram for the optimum structural formula. [10]

(i) 2(1) 3(2) (ii) 2(3) 3(1) (iii) 3(2) 2(1) (iv) 3(1) 2(3).

b) Explain the following terms with reference to machine tool gear box.
i) Range ratio ii) Number of transmission groups or stages iii) Transmission range. iv) Significance of geometric progression ratio. [8]

OR

Q6) a) A six speed gear box is to be connected to a motor. The spindle speed ranges between 150 rpm to 1000 rpm. The gear box is driven by 5 kW, 1000 rpm electric motor. [10]

i) Draw the structure and speed diagram for the arrangement;

ii) Draw the gearing diagram.

b) Explain in detail Geometric Progression and Harmonic Progression laws for stepped regulation of speeds in multi-speed gear boxes. [8]

Q7) a) What is hybrid Vehicle? What are the advantages and disadvantages of Hybrid Vehicles? **[10]**

b) Explain the components of HEV? **[8]**

OR

Q8) a) Explain Power Split Device with neat sketch? **[10]**

b) Explain how the performance analysis carried in Series HEV and parallel HEV? **[8]**

