Total No. of Questions : 8]

SEAT No. :

PF5028

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T.E. (Mechanical)

DESIGN OF TRANSMISSION SYSTEMS

(2019 Pattern) (Semester - VI) (302051)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

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

Q1) a) Single row deep groove ball bearing is subjected to the work cycle given below: **[10]**

Sr. No	Fraction of Cycle	Radial Load Fr(N)	Axial Load Fa(N)	Speed r.p.m	Service Factor
1	1/10	2000	1200	400	3.0
2	1/10	1500	1000	500	1.5
3	1/5	1000	1500	600	2.0
4	3/5	1200	2000	800	1.0

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

Bearing No.	6015	6215	6315	6415
Dynamic Capacity C (kN)	31	52	90	120

Assume radial and axial load factors to be 1.0 and 1.5 respectively and inner race rotates.

b) Derive the Stribeck equation for the static capacity of bearings. State the assumption made. **[7]**

OR

P.T.O.

Q2) a) Explain with neat sketch hydrodynamic bearing. State the advantages, limitations and applications of the same. **[10]**

b) Explain design variables and performance variables of hydrodynamic journal bearing? **[7]**

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

b) Draw neat sketch diagram of Centrifugal plate clutch and explain construction and working. **[7]**

OR

Q4) a) Explain the band brake with a neat sketch and find the effort applied at the end of the lever for Simple band brakes also state the advantages and disadvantages of band brakes. **[10]**

b) Explain with neat sketch design of disc brakes. **[7]**

Q5) a) Draw the speed diagram and layout for a six speed gear box having the following structural formula. **[10]**

i) 2(3) 3(1)

ii) 2(1) 3(2)

The output speed are 160 r.p.m. minimum and 1000 r.p.m. maximum. The motor shaft speed is 1440 r.p.m. Also draw the Gearing Diagram for the same.

b) Explain Basic Considerations in design of multi-speed gear box? **[8]**

OR

Q6) a) A nine speed two stage sliding mesh Gearbox having Geometric Progression value 1.585 is to be designed for the speed starting from 120 r.p.m. It is to be driven by three phase induction motor running at 1440 r.p.m. **[10]**

i) List all the speeds for the proposed Gear box.

ii) Write all the structure formulae.

iii) Draw Speed diagram for 3(1) 3(3).

iv) Draw the Kinematic Gearing Diagram.

b) Differentiate between structure diagram and speed diagram. **[8]**

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Q7) a) Explain Series and Parallel Configuration of HEVs with the help of Block diagram? **[10]**

b) Explain The basic modes of operations used HEV? **[8]**

OR

Q8) a) What is hybrid Vehicle? What are the advantages and disadvantages of Hybrid Vehicles? **[10]**

b) Explain the sizing performance for HEV components. Explain the optimal sizing in HEV components. **[8]**

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