[6003] - 428

T.E. (Mechanical)

DESIGN OF TRANSMISSION SYSTEMS

(2019 Pattern) (Semester - II) (302051)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates:

1) *Answer four questions from the following.*
2) *Draw neat labeled diagrams wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Use of non programmable electronic calculator is permitted.*
5) *Assume suitable/standard data if necessary.*

Q1) a) Compare Hydrodynamic bearing with hydrostatic bearing? **[5]**

b) Derive the stribecks equation for basic static capacity of bearings. State the assumption made. **[6]**

c) A single row deep groove ball bearing subjected to following work cycle. If L_{10h} = 12000 hrs. at 95% reliability Find dynamic load carrying capacity at 90% reliability; and system reliability if such six bearings are there? **[6]**

F_r (kN)	F_a (kN)	X	Y	Race Rotating	C_s	Speed rpm	% Time
10	3.0	0.56	2	Inner	1.00	400	40
5.5	1.0	1	0	Outer	1.25	800	30
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OR

Q2) a) Explain with neat sketch hydrodynamic bearing. State the advantages, limitations and applications of the same. **[5]**

b) Derive the Petroff's equation for hydrodynamic bearing. Also state its limitation? **[6]**

c) State the assumptions and write the Reynold's equation for 2-D flow and explain the significance of each term in it? **[6]**

Q3) a) Explain Differential band brake with neat sketch. Find the effort applied at the end of lever for Differential band brake. **[4]**

b) What is the condition of self-locking in differential band brake? Why should it be avoided in speed-control brakes? Explain self-energizing block brake and self-locking block brake. **[6]**

c) Draw a figure for is internal expanding shoe brake and write the assumptions on which its analysis depends? State the observations made when the vehicle will be travelling in 'reverse' for anti - clockwise rotation of brake drum? **[7]**

OR

Q4) a) Why is the semi-cone angle of a cone clutch made 12.5º? **[4]**

b) What are the characteristics for material used for brake lining ? Name the materials used? **[6]**

c) Draw neat sketch diagram of centrifugal clutch and explain construction and working. What are the advantages, disadvantages and applications of centrifugal clutch? **[7]**

Q5) a) What is structural formula? Write any three structural formulae for twelve speed gear box. **[4]**

b) Differentiate between arithmetic, geometric and Harmonic progressions in case of design of gear box. **[6]**

c)) Draw structural diagrams for the following structural formulae and identify the optimum structural formula out of them. **[8]**

 i) 2(1) 3(2)

 ii) 2(3)3(1)

 iii) 3(2) 2(1)

 iv) 3(1) 2(3)

<div align="center">OR</div>

Q6) a) Explain the terms. **[5]**

 i) Range ratio with reference to machine tool gear box design.

 ii) Transmission range with reference to machine tool gear box.

b) Explain significance of geometric progression ratio. **[5]**

c) Read the structure diagram given below and answer the following questions: **[8]**

 i) What is geometric progression ratio and range ratio of this gear box?

 ii) Write structure formula for this gear box;

 iii) What is the speed of input shaft of the gear box?

 iv) Draw schematic layout diagram of the gearbox and calculate number of teeth on each gear by assuming 20 teeth on smallest gear of each stage.
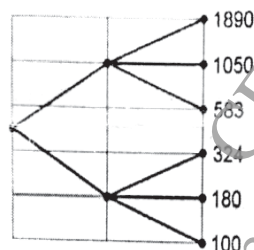
Q7) a) Explain any six components of Hybrid Electric Vehicles? **[6]**

b) Explain Power Split Device with neat sketch? **[6]**

c) Explain the basic modes of operations used of Hybrid Electric Vehicles? Define Degree of Hybridization. **[6]**

OR

Q8) a) Explain the sizing performance for HEV Components? Explain the optimal sizing in HEV components? **[6]**

b) What are the advantages and disadvantages of Hybrid Electric Vehicles? **[6]**

c) xplain the power Management for HEV system? Draw the flow chart for sizing methodology of powertrain? **[6]**

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