Question Paper

Exam Date & Time: 21-Jun-2024 (02:30 PM - 05:30 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FOURTH SEMESTER B.TECH END SEMESTER MAKEUP EXAMINATIONS, JUNE 2024

VEHICLE TRANSMISSION SYSTEMS [AAE 2228]

Marks: 50 **Duration: 180 mins.**

A

Answer all the questions.

Instructions to Candidates: Answer ALL questions Missing data may be suitably assumed

1)		Define coefficient of rolling resistance. What are the factors that affect rolling resistance?	(4)
	A)		
	B)	What is drawbar pull and surplus power?	(2)
	C)	Compare hydraulic and mechanical operation of clutches. Describe a mechanically operated clutch in detail with the help of simple diagrams.	(4)
2)		A truck weighs 100111N and the engine develops 97 kW at 2400 rpm. The transmission efficiency is 90% in top gear of 3.4:1 and 85% in third gear of 8.4:1. The performance of the vehicle is such	(4)
	A)	that it will just reach a speed of 86.8 km/hr at 2400 rpm at wide open throttle when running on the level in still air, and at the same engine speed in third gear it will just climb a gradient of 1 in 14.If the total resistance in N is given by the formula $R=KW + K_a AV^2+W\sin\Theta$,where A is in m^2 :V in km/hr and W in N ,calculate K and Ka and hence the engine power required for climbing a grade of 1 in 40 at 48 km/hr in top gear. How much more weight can be added to the vehicle to use the engine power fully under the above condition. Front area of truck =5.575 m^2.	
	B)	Sketch a gear shift valve and explain how the gear shifts are taking place in an automatic transmission.	(4)
	C)	What is the function of stator in a torque converter? When does maximum torque multiplication occur in a torque converter?	(2)
3)		With the help of neat sketch explain what is single stage, two stage and three stage transmission?	(4)
	A)		
	B)	What are the factors responsible for overturning of a vehicle? How is vehicle speed related to engine speed?	(3)
	C)	Sketch the layout of 3 forward speed synchromesh gear box and explain the shifting mechanism and power flow for different gears.	(3)
4)		Discuss the construction and working of CVT also state its drawbacks in comparison to conventional gearbox.	(4)
	A)		
	B)	Explain the construction and working of piston type motor. Also men-tion advantages and	(3)

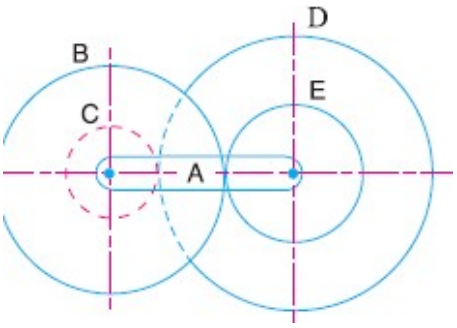
disadvantages of the same.

C) What causes gear lock in one gear? What causes clutch judder? (3)

5) The engine of a car employing a single plate friction clutch develops maximum torque of 150 Nm. External diameter of the clutch plate is 1.2 times its internal diameter. Determine the dimensions of the clutch and the axial force provided by the springs. The maximum allowable pressure intensity for the clutch facings is 100 kPa and coefficient of friction is 0.3. Assume uniform wear. (4)

A)

B) In a reverted epicyclic gear train, the arm A carries two gears B and C and a compound gear D - E. The gear B meshes with gear E and the gear C meshes with gear D. The number of teeth on gears B, C and D are 75, 30 and 90 respectively. Find the speed and direction of gear C when gear B is fixed and the arm A makes 100 rpm. clockwise. (4)



C) State the difference between fixed displacement pump and variable displacement pump wit suitable example. (2)

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