## Exam Date & Time: 18-Jun-2022 (09:00 AM - 12:00 PM)



## IV SEMESTER B.TECH END SEMESTER EXAMINATIONS, JUNE 2022 AUTOMOTIVE TRANSMISSION SYSTEM [AAE 2271]

Marks: 50

## **Duration: 180 mins.**

А

## Answer all the questions.

Instructions to Candidates: Missing data may be suitably assumed

1)		Explain the basic principle of torque transmission in a vehicle clutch system and with suitable assumption derive the expression for the maximum torque transferred by a cone clutch by considering uniform wear rate.	(4)
	A)		
	B)	With neat sketch, explain the features, torque transmission method and performance curve of a fluid coupling.	(4)
	C)	List minimum of four types of failures observed in vehicle clutch system and explain the major reasons for the failures.	(2)
2)	A)	A centrifugal clutch is to transmit 25.8 kW at 750 rpm when engaged at 75 percent of the running speed. The inside diameter is 0.36 m and the radial distance of the centre of gravity of each shoe from the shaft axis is 0.15 m. Assume $\mu$ = 0.3. Determine the necessary weight of each shoe above clutch.	(3)
	B)	A Leyland truck has a gross vehicle weight of 89026 N. Engine displacement is 10 m <sup>3</sup> , power 77.3 kW at governed speed of 2400 rpm and maximum torque 345.8 Nm at 1400 rpm. Rear axle ratio is 6.166:1. Fourth speed reduction ratio in transmission is 1.605:1, drive line losses amount to 10.7 kW at 2400 rpm and 6.3 kW at 1400 rpm. Tyre size is 0.4572 m X 1.016 m (effective wheel diameter 0.950 m), frontal area of truck 6.95 m <sup>2</sup> . Calculate the grades, which the vehicle can climb in fourth gear in still air conditions, at governed engine speed, the air and rolling resistance equation assumed as R= KW+KaAV <sup>2</sup> . Where K=0.044, Ka=0.0462 and V in km/h.	(4)
	C)	Define total road load, identify the components of the total road load encountered by a moving automobile, and explain the parameters influencing the total road load.	(3)
3)	A)	An automotive gearbox of double reduction type, offers the following gear ratios approximately. 4.2:1, 2.56:1. 1.52:1 and 1:1. The inverse of diametral pitch of each gear is 3.25 mm. the smallest gear in the train may have 15 teeth. If the speed of the engine shaft is 55% greater than that of counter shaft of the gearbox, find (i) The centre distance between the shafts (ii) Teeth on gear wheels (iii) Actual gear ratios and (iv) show the	(4)

		layout of the gearbox	
	B)	What is free wheel? Discuss its importance in vehicle transmission system by considering torque convertor as an example.	(2)
	C)	Describe the working of synchromesh mesh gearbox and with neat layout (3 forward speed) explain the power flow path in first and third gear.	(4)
4)		Write a brief note on importance of lubrication system in vehicle transmission system.	(2)
	A)		
	B)	Explain the features of constant velocity Hooks joint and derive the expression for the maximum, minimum, unity velocity ratio and for the angular acceleration of the driven shaft.	(5)
	C)	Describe the operation of a limited slip differential, explaining clearly the situation necessitating the use of such differential.	(3)
5)		Explain the working of shift valves in an automatic transmission system by considering low gear and high gear shifting.	(2)
	A)		
	B)	With neat sketch explain the up-shift and down-shift process in variable bleed solenoid controlled CVT system.	(5)
	C)	With suitable sketch, explain the features of swash plate operated piston pump of a hydrostatic drive system.	(3)

-----End-----