U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January 2024 Semester End Main Examinations

Programme: B.E.   Semester: VII
Branch: Mechanical Engineering   Duration: 3 hrs.
Course Code: 20ME7DEAUE   Max Marks: 100
Course: Automotive Engineering

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
1	a)		What are the functions of chassis? Sketch the Layout of Chassis and mention its main components.	CO1	PO1	**10**
	b)		With a block diagram explain Electronic engine management system.	CO1	PO1	**10**
			UNIT - II			
2	a)		How the following parameter affect the performance of the vehicles explain with performance curves and equations in brief a. Acceleration b. Gradability	CO2	PO1	**08**
	b)		A motor vehicle weighs 7975.5 N and its engine develops 14.7 kW at 2500 rpm. At this engine speed the road speed of the car on the top gear is 64.37 km/h. Bottom gear reduction is 3.5:1 and the efficiency of transmission is 88% on the top and 80% on bottom gear. The diameter of tyres is 0.762 m and the projected front area of the vehicle is 1.116 m2. The coefficient of air resistance is 0.0314 N-h2/km2-m2. $R=KAV^2$, where R is resistance in N, K is coefficient of resistance. A is the front are in m2. V is speed in km/h. Road resistance is 0.023W, N calculate (a) Speed of car on bottom gear; b) Tractive effort available at the wheels on top and bottom gear; (c) Gradient at which car can climb on bottom gear. (d) The tractive force at the wheels required to start up the car on the level and attain a speed of 48.28 km/hr in 10s. (Average air resistance may be taken as half the maximum and acceleration force to vanish at 48.28 km/h speed).	CO2	PO2	**12**
			UNIT - III			
3	a)		What are the stages of combustion in CI engines Explain briefly with graph, what is the effect of improper combustion.	CO1	PO1	**10**

					CO3	PO1	10

		b)	Sketch and explain the purpose and working of
			    i) Final drive unit
			    ii) Differential gear system
			By arrow marks indicate the direction of rotation of each gear when the vehicle is turning to the right.
					CO3	PO1	10

			OR				
	4	a)	Explain the construction and working of fluid flywheel. Enumerate the advantages of fluid flywheel over the other types of clutches.		CO3	PO1	10
		b)	Explain epicyclic gear box. How this can be used in Automatic gear box transmission system.		CO3	PO1	10
			UNIT - IV				
	5	a)	Mention the basic requirements of wheels. With a neat sketch explain the construction of disc type wheel.		CO3	PO1	10

		b)	Derive an expression for load transfer in four wheeler when
			    i. the rear wheels are braked
			    ii. the front wheels are braked
					CO4	PO2	10

			OR				
	6	a)	Define Camber, caster, king pin inclination scrub radius and their significance in steering geometry with sketches.		CO3	PO1	08
		b)	A motor car weighs 13341.5 N and has a wheel base of 2.65m. the c.g. is 1.27m behind the front axle and 0.76m above the ground level. Maximum braking on all four wheels on level ground will bring the vehicle uniformly to rest from a speed of 64km/hr in a distance of 25.9m. Calculate the value of an adhesion between the tyre and the road. Under the same condition, the vehicle descends a hill of gradient 1 in 20 and is braked on the front wheels only. Determine the load distribution between the front and rear wheels and the distance required to bring the car to rest.		CO3	PO2	12
			UNIT - V				
	7	a)	With a layout diagram explain the working features of hybrid vehicle.		CO4	PO1	08
		b)	Discuss purpose and operation of starting system used in automobile.		CO4	PO1	08
		c)	Describe the salient features of using Ethanol as an alternative fuel.		CO4	PO1	04

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