Reg. No.



FIRST SEMESTER M.TECH. (ELECTRIC VEHICLE TECHNOLOGY) END SEMESTER EXAMINATIONS, JANUARY 2023

MODERN AUTOMOTIVE TECHNOLOGY [AAE 5185]

REVISED CREDIT SYSTEM

Time:	3 Hours	Date: 5 th January 2023	Max. Ma	arks: 50
Instructions to Candidates:				
	✤ Ansv	ver ALL the questions.		
	✤ Miss	ing data may be suitably assumed.		
1A.	With drive demo	a neat sketch, illustrate the features of a front engine, all power train layout for a four wheeled vehicle. List its mer erits.	-wheel its and	(03)
1B.	List two syste	the loads to be handled by drive axle and casing system. L key differences between semi floating and full floating driv ems.	ist any ve axle	(03)
1C.	A mo RPM. The 88% 0.76 m ² , Calcu i. ii. iii. iv.	otor vehicle weighs 7975 N and its engine develops 14.7 kW at At this engine speed, the road speed in top gear(direct) is 64 bottom gear reduction is 3.5:1 and the transmission efficient in top gear and 80 % in bottom gear. the diameter of the term and the projected frontal area is 1.2 m ² . K _a = 0.0314 N-hr road resistance is 0.023W, N where W-weight of the value the following. Speed of the vehicle on bottom gear. Tractive efforts available at the wheels on top and bottom gear. The tractive force at the wheels required to start up the vehicle level and attaining a speed of 48.28 kmph in 10 second	at 2500 kmph. ency is yres is ² /km ² - rehicle. gears. hicle on is.	(04)
2A.	With mecl	a neat labeled diagram, explain the selector and inter nanism used in selective transmission systems.	locking	(03)
2B.	With sync	With a neat sketch, illustrate the construction and working principle of a synchromesh unit. What are the advantages of synchromesh gear box?		(03)
2C.	A clu diam the s 25 k	A clutch has 3 discs on driving shaft and 2 on the driven shaft. The inner diameter of contact surface is 120 mm. The maximum pressure between the surfaces is limited to 0.1 N/mm ² . Design the clutch for transmitting 25 kW at 1575 rpm. Friction coefficient=0.3		
3A.	Illust relev	rate the working principle of a disc type centrifugal clutch vant diagram and its working characteristic.	with a	(03)

- 3B. A Spark Ignition engine develops 30 kW of indicated power. If the power available at the output shaft of the engine is 26 kW at an operating speed of 1000 rpm and fuel consumption is 0.35 kg/kWhr, CV=43900 kJ/kg, determine the following:
 - i. Brake Thermal efficiency
 - ii. Indicated thermal efficiency
 - iii. Mechanical efficiency
 - iv. Fuel consumption kg/hr
- 3C. A 4-cylinder, 4 stroke engine operating at 4500 RPM develops 40 kW brake power. The driveline has a drive pinion with 8 teeth and ring gear with 42 teeth. Transmission Efficiency is 90%.
 - Determine the power at road wheels when direct gear is engaged. i.
 - ii. If this vehicle is negotiating a road bend and the insides road wheels are making 230 rpm, calculate the speed of outer wheels, torgue and power at both inner and outer wheels.
- 4A. With a neat sketch, illustrate the working principle of an automotive (03) differential.
- 4B. What are the functions of final drive? Discuss the features of worm- wheel drive final drive systems.
- 4C. Calculate the speed of the engine if the vehicle is running at 11.3 kmph. The transmission is of two stage in which Clutch shaft pinion has 14 teeth and the low gear on the main shaft has 30 teeth. The gears which mesh with them on the lay shaft has 32 and 18 teeth respectively. Crown wheel has 42 teeth and bevel pinion has 7 teeth. Effective diameter of the tire= 19.5 cm.
- 5A. Define the following (i) Critical speed of shafts (ii) Circular pitch of gears (03) (iii) slip joint (iv) Thermal efficiency of engines
- 5B. Differentiate the following:
 - Variable velocity and constant velocity Universal joints i.
 - Single stage and 2-stage gear box ii.
 - iii. Clutch drag and clutch judder
- 5C. In an epicyclic gear train, when sun gear A makes one revolution Clockwise and internal gear D makes half revolution Counter Clockwise. How many revolutions does the arm make which has 2 similar pinions B and C attached. What is the direction of rotation of the arm? The gear A has 40 teeth and and gear D has 90 teeth.

(03)



(04)

(03)

(04)

(04)