	MANIPAL	INSTITU	JTE OF	TECHNO	DLOGY
1225	MANIPAI				

Reg. No.



VII SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, DECEMBER 2020

SUBJECT: ELECTRIC AND HYBRID VEHICLES [AAE4021]

REVISED CREDIT SYSTEM

(00/00/0000)

Duration: 3 Hours

Max. Marks: 50

Instructions to Candidates:

Answer all the questions

Draw sketches using pencil and instruments

1A)	Define the following (i) Gradeability of a vehicle (ii) Vehicle Traction. How are these evaluated for the automobiles?	(04)
1B)	Define (i) Hybridization factor (ii) Motor speed ratio (iii) Copper loss in motors.	(03)
1C)	With a block diagram, discuss the features of an electric vehicle configuration with axle mounted motor and fixed gearing arrangement.	(03)
2A)	Show pictorially HEV power trains based on location of motor w r t gearbox and discuss their features.	(04)
2B)	With power flow diagrams, illustrate different modes of operations of a series hybrid electric vehicle.	(06)
3A)	With a neat sketch, explain the constructional and working of an induction motor. What are its advantages as a traction motor?	(06)
3B)	Define the following battery parameters. (i) Specific power (ii) Energy density (iii) Battery capacity (iv) Ragone plots	(04)
4A)	With a relevant diagram, illustrate the working principle of a Fuzzy logic control strategy in a hybrid electric vehicle for the selection of power trains under different working conditions.	(06)
4B)	What are speed coupling devices? With a diagram, illustrate the working principle of a speed coupler based on epicyclic gear trains.	(04)
5A)	Explain the process involved in the selection of internal combustion engine capacity while designing the power train of a hybrid electric vehicle.	(04)

5B)	With a circuit diagram and overall chemical reaction, explain the working principle of a Zinc-air battery.	(04)
5C)	Calculate the Tractive Effort applied in a rear wheel driven electric car with an effective tyre radius of 330 mm. Motor supplies a torque of 2000 N-m, Transmission efficiency = 80%, friction coeffient= 0.7, Fixed gear ratio= 5.2:1, Axle ratio= 4.3:1. Normal reaction at the driving wheels= 1000000 N.	(02)

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