

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

BAU613A

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025

Hybrid Vehicle Technology

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Elaborate in detail social and environmental importance of hybrid electric vehicles.	10	L3	CO3
	b.	With a schematic diagram, describe the architecture of a series HEV.	10	L4	CO2
OR					
Q.2	a.	With the help of block diagram of a vehicle model explain the concept of total road force F_{RL} and the total tractive effort F_{te} .	10	L3	CO3
	b.	A vehicle accelerates to final velocity of 96.6 kmph in 10 seconds. Considering the following specifications, find the total resistance force on the highway without acceleration and with acceleration. Vehicle weight = 1364 kg ; Frontal area = 1.543 m^2 ; Drag coef = 0.109 ; Air density = 1.16 kg/m^3 ; Rolling coefficient = 0.02 ; Hill gradient = 0.5° .	10	L4	CO4
Module – 2					
Q.3	a.	Classify hybrid electric vehicles. Construct the layout and architecture of a parallel HEV. Mention its disadvantages.	10	L2	CO1
	b.	Sketch and explain the working of a regenerative braking.	10	L3	CO2
OR					
Q.4	a.	Briefly explain vibration and noise reduction in HEV's.	10	L2	CO1
	b.	What are the different controls in HEV's? Explain them briefly.	10	L3	CO2
Module – 3					
Q.5	a.	Discuss the construction and working of an induction motor. List any two advantages.	10	L3	CO2
	b.	What do you understand by a brushless motor? What advantages it offers? Explain the working of a brushless motor.	10	L3	CO3

OR

Q.6	a.	Discuss the selection procedure for the design and sizing of traction motors.	10	L3	CO2
	b.	Briefly explain how the thermal analysis of the following are made i) Radial conduction thermal resistance at the rotor core ii) Thermal resistance of the shaft.	10	L3	CO3

Module – 4

Q.7	a.	Explain the following parameters used for the characterisation of batteries. i) Battery capacity ii) Energy stored in battery iii) State of Charge in battery (SOC) iv) Depth of Discharge (DOD) of a battery.	10	L2	CO1
	b.	Sketch and explain the working of a flywheel energy storage system.	10	L2	CO2

OR

Q.8	a.	What is a fuel cell? Explain the construction and operating principles of a fuel cell.	10	L2	CO1
	b.	List out various fuel cell characteristics and discuss them.	10	L2	CO2

Module – 5

Q.9	a.	Mention relevant key considerations to match an electric drive and an IC engine.	10	L3	CO3
	b.	Discuss the factors to be considered to size the propulsion motor.	10	L4	CO4

OR

Q.10	a.	Classify the energy management strategies and explain them.	10	L3	CO3
	b.	List out the energy management strategies to overcome the protection issues of efficient implementation.	10	L4	CO4
