Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U3401

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2024

Professional Elective

Electrical and Electronics Engineering

21EEV401-ELECTRICAL VEHICLE ARCHITECTURE

(Common to Mechanical Engineering)

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer All Questions

PART A - (5 x 1 = 5 Marks)

1. A---------- is a vehicle that can run on just the engine, just the batteries or combination of two. CO1-U

   (a) Mild hybrid (b) Full hybrid (c) Micro hybrid (d) Fuel cell

2. A Mild hybrid uses --------- volt battery CO1-U

   (a) 12 (b) 24 (c) 48 (d) 60

3. Slip is the positive number from CO2-U

   (a) 0-5 (b) 0-1 (c) 0-2 (d) 0-4

4. The chasis and wheel dynamics are treated separately in ---------- CO2-U

   (a) tire road mechanics (b) quarter car model

   (c) propulsion system (d) vehicle dynamics

5. ---------- system belt is used for coupling CO3-U

   (a) torodial CVT (b) belt pulley (c) both (a) and (b) (d) None of these

PART – B (5 x 3= 15 Marks)

6. List the components in the electric car. CO1-U

7. Write the dynamic equation of motion in the tangential direction. CO2-U

8.		Define Gear ratio.	CO3-U	
9.		Draw the hybrid modes of operation of electric vehicles	CO4-U	
10.		Classify the Plug-in hybrid vehicle architecture.	CO5-U	

PART – C (5 x 16= 80 Marks)

11.	(a)	Explain the different power flow control modes of a series hybrid system with the help of block diagram.	CO1-U	(16)
		Or		
	(b)	Draw and explain architecture and power flow control of parallel hybrid architecture.	CO1-U	(16)
12.	(a)	Derive the tangential and fixed coordinates system in roadway fundamentals.	CO2-App	(16)
		Or		
	(b)	Derive the process of creating a velocity profile for roadway with maximum acceleration on a given roadway slope.	CO2-App	(16)
13.	(a)	Sketch and Explain the Gear Mechanism component of electric vehicle drive train with suitable diagram..	CO3-U	(16)
		Or		
	(b)	Explain in detail about the gear set and clutches in electric vehicle.	CO3-U	(16)
14.	(a)	Discuss in detail about the any three modes of Mechanical Power-split Hybrid modes.	CO4-U	(16)
		Or		
	(b)	Sketch and Explain the 2*2 vehicle architecture of series – parallel hybrid vehicle, where IC engine is coupled to the front wheel.	CO4-U	(16)
15.	(a)	Compare Electric vehicle and hybrid electrical vehicle	CO5-Ana	(16)
		Or		
	(b)	Analyze the various charging mechanism in PHEV	CO5-Ana	(16)