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Question Paper Code: U3401

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

Professional Elective

Electrical and Electronics Engineering

21EEV401 ELECTRICAL VEHICLE ARCHITECTURE

(Regulations 2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (5 x 1 = 5Marks)

1. The life span of electric car batteries ----- CO1– U
(a) 8 years (b) 10 years (c) 8 years (b) 10 years
2. The chasis and wheel dynamics are treated separately in ----- CO1-U
(a) tireroad mechanics (b) quarter car model
(c) propulsion system (d) vehicle dynamics
3. ----- includes the gear, clutch, bearing, levels and shaft CO1-U
(a) Transmission assembly (b) Differential assembly
(c) IC engine (d) Electric motor
4. The power-split mode differs from the parallel mode in that one of the CO1-U
electric machines is operated as -----
(a) generator (b) motor (c) both (a) and ((b) (d) None of these
5. Which component of an electric vehicle cools down the electric motor CO1-U
and other components to prevent overheating
(a) Radiator (b) Exhaust Pipe (c) Cooling fan (d) Carburetor

PART – B (5 x 3= 15 Marks)

6. Classify the Hybrid vehicle based on architecture CO1- U
7. Write the assumptions are made for maximum gradability CO1-U
8. Draw the electromechanical brake system in a vehicle CO1-U

9. Write the purpose of global optimization CO1-U
10. Explain the level of charging in PHEV CO1-U

PART – C (5 x 16= 80 Marks)

11. (a) Enlist the different architecture of hybrid electric drive train and explain the series hybrid electric drive train CO1-U (16)
Or
(b) Discuss the history of electric vehicle CO1-U (16)
12. (a) Derive the tangential and fixed coordinates system in roadway fundamentals CO2-Ap (16)
Or
(b) Derive the process of creating a velocity profile for roadway with maximum acceleration on a given roadway slope CO2-Ap (16)
13. (a) Discuss the various types of transmission in electric vehicle CO1-U (16)
Or
(b) Explain in detail about the gear set and clutches in electric vehicle CO1-U (16)
14. (a) Discuss in detail about the any three modes of Mechanical Power-split Hybrid modes CO1-U (16)
Or
(b) With neat block diagram explain the 2*2 vehicle architecture of series –parallel hybrid vehicle, where IC engine is coupled to the front wheel CO1-U (16)
15. (a) Compare Electric vehicle and hybrid electrical vehicle CO5-An (16)
Or
(b) Analyze the various charging mechanism in PHEV CO5-An (16)