Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination Dec 2024

AU3EL19 EV Charging Infrastructure

Programme: B.Tech. Branch/Specialisation: AU

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	CO	PO	PSO
Q.1	i.	From where the tractive effort is generated in EV? (a) Battery (b) Converter (c) Driving Shaft (d) Motor	**1**	1	1	1	1
	ii.	_____vehicles are powered by battery only. (a) Conventional (b) BEV (c) HEV (d) PHEV	**1**	1	1	1	1
	iii.	Which type of EV charging is known for being the fastest? (a) DC Fast Charging (b) Level 1 charging (c) Level 2 charging (d) Solar charging	**1**	1	3	2	1
	iv.	Which of the following is a feature of Level 1 EV charging? (a) Uses a 240-volt AC outlet (b) Requires a dedicated charging station (c) Uses a standard 120-volt household outlet (d) Charges a vehicle in less than an hour	**1**	1	3	2	1
	v.	Which factor is most important when determining the location of an EV charging station? (a) Proximity to residential areas (b) Availability of renewable energy sources (c) Traffic patterns and vehicle flow (d) Cost of land	**1**	1	4	1	1

vi.	What is a key consideration when planning EV infrastructure in urban areas? (a) Minimizing the number of charging stations (b) Ensuring accessibility and convenience (c) Avoiding high-traffic locations (d) Using only DC Fast Chargers	**1**	1	4	11	1			
vii.	What is a common business model for EV charging infrastructure providers? (a) Free charging services supported by government funding (b) Subscription-based services (c) Fixed monthly fees with unlimited charging (d) Pay-per-use charging	**1**	1	3	11	1			
viii.	Which of the following is a key revenue stream for EV charging station operators? (a) Advertising at charging stations (b) Selling EV charging equipment (c) Government grants (d) Maintenance services	**1**	1	3	5	1			
ix.	What is one of the expected trends in EV charging technology? (a) Decrease in charging speeds (b) Increased adoption of wireless (inductive) charging (c) Phasing out of public charging stations (d) Reduction in the use of renewable energy sources	**1**	1	5	1	1			
x.	Which technology is expected to enhance the convenience of EV charging in the future? (a) Plug-and-charge technology (b) Autonomous vehicle chargers (c) Manual charging connectors (d) Fossil fuel-based backup chargers	**1**	1	5	3	1			
Q.2	i. How BEV is different from HEV?	**2**	1	1	1	1			
	ii. Compare EV, HEV and PHEV technologies.	**3**	1	1	1	1			
	iii. Draw the architecture of Series and Series -Parallel hybrid electric drive train and explain any one of them.	**5**	1	2	1	1			

OR	iv. Explain the global trends in EV charging infrastructure.	**5**	2	5	1	1			
Q.3	i. Name different types of EV charging technologies.	**2**	1	2	1	1			
	ii. Explain Level 1 and Level 2 charging in detail and compare it with DC charging system.	**8**	2	3	1	1			
OR	iii. Explain wireless charging in detail. Also, write benefits and challenges of wireless charging.	**8**	2	5	1	1			
Q.4	i. Briefly describe the factors influencing charging station location.	**3**	2	2	3	1			
	ii. Explain Interoperability and compatibility in designing charging network.	**7**	2	1	3	1			
OR	iii. Explain the emergency protocols and procedures to be followed while designing EV charging station.	**7**	2	4	2	1			
Q.5	i. State the importance of public and private partnerships in developing a business model for charging infrastructure.	**4**	3	4	6	1			
	ii. Explain monitoring and troubleshooting of charging infrastructure.	**6**	2	4	2	1			
OR	iii. Explain User interface and payment systems for better customer experience in charging infrastructure.	**6**	2	3	11	1			
Q.6	Attempt any two:								
	i. Explain advanced battery technologies for EV charging.	**5**	2	1	1	1			
	ii. Explain automated charging process in detail.	**5**	2	2	1	1			
	iii. Explain the policies and technological trends shaping the future in EV charging.	**5**	2	5	5	1			

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Marking Scheme

AU3EL19 (T) EV Charging Infrastructure(T)

Q.1	i)	**Ans:-** (d) Motor	**1**
	ii)	**Ans:-** (b) BEV	**1**
	iii)	**Ans:-** a) DC Fast Charging	**1**
	iv)	**Ans:-** c) Uses a standard 120-volt household outlet	**1**
	v)	**Ans:-** c) Traffic patterns and vehicle flow	**1**
	vi)	**Ans:-** b) Ensuring accessibility and convenience	**1**
	vii)	**Ans:-** d) Pay-per-use charging	**1**
	viii)	**Ans:-** a) Advertising at charging stations	**1**
	ix)	**Ans:-** b) Increased adoption of wireless (inductive) charging	**1**
	x)	**Ans:-** a) Plug-and-charge technology	**1**

Q.2	i.	How BEV is different from HEV?	**2**
		BEV different from HEV (write in short) -2 Marks	
	ii.	Compare EV, HEV and PHEV technologies.	**3**
		Comparison of EV,HEV and PHEV technologies -3 Marks	
	iii.	Draw the architecture of Series and Series -Parallel hybrid electric drive train and explain any one of them.	**5**
		Architecture of series HEV -1.5 Marks	
		Architecture of series-parallel HEV -1.5 Marks	
		Explain (any one) -2 Marks	
OR	iv.	Explain the global trends in EV charging infrastructure.	**5**
		Explanation -5 Marks	

Q.3	i.	Name different types of EV charging technologies.	**2**
		Different types of EV charging technologies. -2 Marks	
	ii.	Explain Level 1 and Level 2 charging in detail and compare it with DC charging system.	**8**
		Level 1 charging -3 Marks	
		Level 2 charging -3 Marks	
		Comparison with DC charging -2 Marks	
OR	iii.	Explain wireless charging in detail. Also, write benefits and challenges of wireless charging.	**8**
		Wireless charging explanation -4 Marks	
		Benefits of wireless charging -2 Marks	
		Challenges of wireless charging -2 Marks	

Q.4	i.	Briefly describe the factors influencing charging station location.	**3**
		Factors influencing charging station location (any 3) - 3 Marks	
	ii.	Explain Interoperability and compatibility in designing charging network.	**7**
		Interoperability -3.5 Marks	
		Compatibility -3.5 Marks	
OR	iii.	Explain the emergency protocols and procedures to be followed while designing EV charging station.	**7**
		Explanation of protocols -3.5 Marks	
		Explanation of procedures -3.5 Marks	

Q.5	i.	State the importance of public and private partnerships in developing a business model for charging infrastructure.	**4**
		Importance of public and private partnerships -4 Marks	
	ii.	Explain monitoring and troubleshooting of charging infrastructure.	**6**
		Monitoring of charging infrastructure -3 Marks	
		Troubleshooting of charging infrastructure -3 Marks	
OR	iii.	Explain User interface and payment systems for better customer experience in charging infrastructure.	**6**
		User interface system -3 Marks	
		Payment system -3 Marks	

Q.6

	i.	Explain advanced battery technologies for EV charging.	**5**
		Explanation -5 Marks	
	ii.	Explain automated charging process in detail.	**5**
		Explanation -5 Marks	

P.T.O.

[2] [3]

iii. Explain the policies and technological trends shaping the future in EV charging. **5**

Explanation -5 Marks

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