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

Enrollment No.....

Faculty of Engineering

End Sem Examination May-2023

EE3EL13 / EX3EL13 EV-Charging Infrastructure

Programme: B.Tech. Branch/Specialisation: EE/EX

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.

Q.1 i. What in the following is the role of the BMS system for electric vehicle batteries? **1**

(a) Controlled charging / discharging
(b) SOC / SOH calculation
(c) Cell balancing & thermal control
(d) All of these

ii. Cells are connected in parallel to- **1**

(a) Increase the voltage output
(b) Increases the internal resistance
(c) Decreases the current capacity
(d) Increases the current capacity

iii. Which of the following charging station is a fast charging station? **1**

(a) Level 1 (b) Level 2 (c) Level 3 (d) None of these

iv. A Li-ion battery having capacity of 2300 mAh with a C rate of 30 C. Calculate the maximum discharging current of the battery- **1**

(a) 1.15 Amp (b) 69 Amp (c) 4.6 Amp (d) 100 Amp

v. How long does it take to fully charge an electric vehicle with a 200 mile range, using a 120-volt Level 1 charger? **1**

(a) About 5 hours (b) About 15 hours
(c) About 25 hours (d) About 50 hours

vi. How many miles of range per hour will the average EV get while charging on a 32-amp, 240-volt, Level 2 charger? **1**

(a) About 5 hours (b) About 15 hours
(c) About 25 hours (d) About 50 hours

P.T.O.

vii. Components of charging station are- **1**
(a) Charging points (b) Masters
(c) Communication TCP/IP (d) All of these

viii. FCM stands for- **1**
(a) Final customer meter
(b) Forward capacity market
(c) Fast charge monadnock
(d) Fabric control module

ix. Types of EVs are- **1**
(a) Hybrid electric vehicles
(b) Plug-in hybrid electric vehicles
(c) Battery electric vehicles
(d) All of these

x. V2G stands for- **1**
(a) Vehicle to grid (b) Vehicle to smart grid
(c) Visit to grid (d) None of these

Q.2 i. Explain properties of batteries used in electric vehicles. **2**
ii. What is the need and importance of electric vehicle? **3**
iii. Explain about Lithium based batteries in energy storage system. **5**
OR iv. Explain about the battery management system in electric vehicle. **5**

Q.3 i. What are the different methods of charging an electric vehicle? **2**
ii. Explain salient features of charging technologies of EV. Explain AC charging. **8**
OR iii. What are different modes of charging batteries? Compare them in detail. **8**

Q.4 i. What is the purpose of a charging station? **3**
ii. Classify and explain of charging stations in details. **7**
OR iii. What are the components of charging station? Explain model layout for public charging facility. **7**

Q.5 i. Define central management center and web portal for booking slots requirements for EV charging infrastructures. **4**
ii. Explain smart grid and smart mobility in terms of charging infrastructure. **6**

OR iii. What is charging infrastructure for EV? What infrastructure is needed for electric cars? **6**

Q.6 Attempt any two:
i. State impact of introducing electric vehicle into grid. **5**
ii. Indian scenario for electric vehicle development by GOI. **5**
iii. State and explain the vehicle to grid (V2G) operation in EVs technologies. **5**

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Marking Scheme

EE_EX3EL13 Electrical Vehicle Charging Infrastructure

Q.1	i)	All of these	**1**
	ii)	Cells are connected in parallel to d) increases the current capacity.	**1**
	iii)	(c) Level 3	**1**
	iv)	(b) 69 Amp	**1**
	v)	How long does it take to fully charge an electric vehicle with a 200 mile range, using a 120-volt Level 1 charger? d) About 50 hours	**1**
	vi)	How many miles of range per hour will the average EV get while charging on a 32-amp, 240-volt, Level 2 charger? c) About 25 hours	**1**
	vii)	components of charging station are d) All of the above	**1**
	viii)	FCM stands for a) Final customer meter	**1**
	ix)	Types of EVs are d) All of the above	**1**
	x)	V2G stands for a) vehicle to grid	**1**

Q.2	i.	Explain properties of batteries used in electric vehicles. 2 mark	-	2
	ii.	What is the need importance of electric vehicle?	-1 mark -2 mark	3
	iii.	Explain about Lithium Based Batteries in Energy Storage System? Figure mark	-2	5
		Explain- mark	-3	
OR	iv.	Explain about the Battery Management System in Electric Vehicle? mark	-3	5
		Block diagram mark	-2	
Q.3	i.	What are the different methods of charging an electric vehicle? mark	-2	2
	ii.	Explain salient features of charging technologies of EV. mark	-4	8
		Explain AC charging. mark	-4	
OR	iii.	What are different modes of charging batteries? mark	-5	8
		Compare them in detail. mark	-3	
Q.4	i.	What is the purpose of a charging station? mark	-3	3
	ii.	Classify and mark	-2	7
		explain of charging stations in details. mark	-5	
OR	iii.	What are the components of charging station? mark	-2	7
		Explain model layout for public charging facility. mark	-5	

Q.5	i.	Define central management center and web portal for booking slots requirements for EV charging infrastructures.	-2 mark -2 mark	4
	ii.	Explain smart grid and smart mobility in terms of charging infrastructure.	-3 mark -3 mark	6
OR	iii.	What is charging infrastructure for EV? What infrastructure is needed for electric cars?	-4 mark -2 mark	6
Q.6		Attempt any two:		
	i.	Impact of EV introduce to gird -4 points		5
	ii.	Indian scenario for electric vehicle development by GOI.	-5 mark	5
	iii.	State and explain the vehicle to grid (V2G) operation in EVs technologies.	-2 mark -3 mark	5

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