

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE, APRIL - 2024**

**ELECTRIC AND HYBRID VEHICLES**

[Maximum marks: 75]

[Time: 3 Hours]

**PART A**

**I. Answer all the following questions in one word or one sentence. Each question carries 1 mark**

**(9 x 1 = 9 Marks)**

		Module outcome	Cognitive level
1	Define Electric vehicle.	M1.01	R
2	Write the components of EV.	M1.01	R
3	What is meant by 'Range' of an EV?	M2.01	R
4	Define Transmission efficiency.	M2.01	R
5	PMSM is a type of EV motor. PMSM stands for .....	M2.04	R
6	Write the functions of a Rectifier.	M3.01	R
7	Define the term 'C-rate' in a battery.	M4.01	R
8	Write the cathode, anode of Metal air based battery.	M4.02	R
9	Write any two advantages of Ultra capacitor.	M4.03	R

**PART B**

**II. Answer any eight questions from the following. Each question carries 3 marks.**

**(8 x 3 = 24 Marks)**

		Module outcome	Cognitive level
1	Write the use of DC/DC converter in EV.	M1.02	U
2	Draw the layout of PHEV and mark its parts.	M1.03	R
3	Compare IC engine vehicle and Electric vehicle.	M1.04	R
4	Define Tractive effort.	M2.01	R
5	Draw the block diagram of an inverter. Also write its function.	M3.01	U
6	What is meant by in wheel drive? Draw its simple figure.	M3.03	R
7	Draw the EV power train architecture with motor, fixed gear, differential as a single unit.	M3.04	R
8	Write a short note about hybrid braking in EV.	M3.05	U
9	Write any three EV battery troubles.	M3.06	R
10	Describe about state of charge (SOC) and state of health (SOH) of a battery.	M4.01	R

**PART C**

**Answer all questions. Each question carries seven marks**

**(6 x 7 = 42 Marks)**

		<b>Module outcome</b>	<b>Cognitive level</b>
III	Explain the working of Battery Electric Vehicle (BEV) with sketch.	M1.03	U
	<b>OR</b>		
IV	Write a short note about Hybrid Electric Vehicle (HEV). Also writes its advantages.	M1.03	R
V	Describe the performance of EV during moving up and down a hill.	M2.02	U
	<b>OR</b>		
VI	Write the advantages of BLDC motor over Brushed DC motor.	M2.03	U
VII	Explain squirrel cage induction motor with sketch.	M2.04	U
	<b>OR</b>		
VIII	Write a short note about PMSM motor.	M2.04	U
IX	Explain the general configuration of EV with sketch.	M3.04	U
	<b>OR</b>		
X	Explain Regenerative braking with sketch.	M3.05	U
XI	Explain the charging and discharging of Nickel metal hybride (NMH) battery with sketch.	M4.02	U
	<b>OR</b>		
XII	Explain the charging and discharging of Lithium-ion battery with sketch.	M4.02	R
XIII	Explain Ultra high speed flywheel based energy storage with sketch.	M4.03	U
	<b>OR</b>		
XIV	Explain the working principle of Fuel cell with sketch. Also name the different types of Fuel cell.	M4.04	U

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