*Total No. of Questions: 6* *Total No. of Printed Pages: 2*

**Enrollment No.....**

# Faculty of Engineering
## End Sem Examination May-2024
## AU3CO36 MAT Lab for Electric vehicle

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. Use of Mahadevan design data book is permitted in examination hall.

Q.1 i. What is an electric drive? **1**
(a) A machine that converts electrical energy into kinetic energy
(b) A machine that converts mechanical energy into electrical energy
(c) A machine that converts electrical energy into mechanical energy
(d) A machine that converts kinetic energy into electrical energy

ii. Predominantly, what are the two kinds of errors in MATLAB programs? **1**
(a) Syntax and runtime (b) Syntax and logic
(c) Logic and runtime (d) Syntax and algorithmic

iii. Hybrid cars normally have _____ range in only electric mode. **1**
(a) 10-20 km (b) 30-70 km (c) 100-150 km (d) No limit

iv. Sodium Nickle chlorides battery uses _____ electrolytes. **1**
(a) One (b) Two (c) Three (d) Four

v. Which of the following invertors suitable for single motor and multi motor drive? **1**
(a) Current source inverters (b) Cycloconverters
(c) Voltage source inverters (d) Both (a) and (c)

vi. Harmonics in DC Drive as compare to ac drive is- **1**
(a) Zero (b) Moderate (c) Low (d) High

vii. Smart grid technologies are aimed at improvement of- **1**
(a) Only power transmission system
(b) Only power distribution system
(c) Both (a) and (b)
(d) None of these

viii. At the start of the engine, the charging voltage is _____. **1**
(a) Lower (b) Higher (c) Same (d) Zero





ix. Which of the following is the example of micro-hybrid? **1**
(a) Mahindra Scorpio (b) Tata Nexon
(c) Tata Tiago (d) Honda Civic

x. Objective behind using hybrid cars- **1**
(a) Reduction in fuel consumption (b) Reduction in emission
(c) Increase power and torque (d) All of these

Q.2 i. How many types of electric vehicles are there and name them? **2**
ii. Explain electric vehicle & its components. **3**
iii. Explain hybrid electric vehicle design and application. **5**
OR iv. What is MATLAB? Explain all data types used in MATLAB. **5**

Q.3 i. Why lithium-ion batteries used in electric vehicles? **2**
ii. Define electrical vehicle dynamics in short. **3**
iii. Why is a battery management system needed in an electrical vehicle? **5**
OR iv. What are the primary functions of the battery management system for an EV battery? **5**

Q.4 i. What is an electric motor? **2**
ii. Explain different types of electric motors and their applications. **3**
iii. What are the applications of power electronics in electric vehicle? **5**
OR iv. What are the control strategies used in EVs? **5**

Q.5 i. What is the meaning of charging infrastructure? **2**
ii. What are the three methods of charging an EV? **3**
iii. What is the impact of EV on integration with grid system? **5**
OR iv. Describes the model of the smart charging algorithm simulated in MATLAB. **5**

Q.6 i. What is Vehicle-to-Grid (V2G) Technology? **2**
ii. What is an autonomous electric vehicle? **3**
iii. What are emerging trends and technology future of electric vehicle in India? **5**
OR iv. Do all electric cars have autonomous driving? **5**

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Marking Scheme

MATLAB for Electric Vehicle (T)- AU3CO36 (T)

| | | | |
|---|---|---|---|
| Q.1 | i) | What is an electric drive? | **1** |
| | c) | **A machine that converts electrical energy into mechanical energy** | |
| | ii) | Predominantly, what are the two kinds of errors in MATLAB programs? | 1 |
| | a) | **Syntax and runtime** | |
| | iii) | Hybrid cars normally have _____km range in only electric mode. | 1 |
| | b) | **30-70km** | |
| | iv) | Sodium Nickle chlorides battery uses_____electrolytes | 1 |
| | c) | **three** | |
| | v) | Which of the following invertors suitable for single motor and multi motor drive | 1 |
| | c) | **Voltage source inverters** | |
| | vi) | Harmonics in DC Drive as compare to ac drive is | 1 |
| | a) | **Zero** | |
| | vii) | Smart grid technologies are aimed at improvement of | 1 |
| | c) | **Both power transmission and distribution system** | |
| | viii) | At the start of the engine, the charging voltage is _____ | 1 |
| | b) | **Higher** | |
| | xi) | Is the example of Micro-Hybrid? | 1 |
| | b) | **Tata Nexon** | |
| | x) | Objective behind using Hybrid cars | 1 |
| | b) | **reduction in emission** | |
| Q.2 | i) | How many types of electric vehicles are there and name them? Any 4 | 2 |
| | ii) | Explain electric vehicle & its components<br>Definition 2 Marks ,Components 1 Marks | 3 |
| | iii) | Explain hybrid electric vehicle design and application<br>Explanation 4 Marks ,Application 1 Marks | 5 |
| OR | iv) | What is MATLAB? Explain all Data Types used in MATLAB.<br>Example 2 Marks ,Data 3 Marks | 5 |
| Q.3 | i) | Why lithium-ion batteries used in electric vehicles? Reasons 2 | 2 |
| | ii) | Define electrical vehicle Dynamics? Definition 3 | 3 |
| | iii) | Why is a battery management system needed in a electrical vehicle? Reasons any 5 | 5 |
| OR | iv) | What are the primary functions of the battery management system for an EV battery? Reasons 5 | 5 |
| Q.4 | i) | What is an electric motor? Definition 2 Marks | 2 |
| | ii) | Explain different types of Electric Motors and their applications? Any 5<br>Any 4 type 2 Marks +1 application | 3 |
| | iii) | What are the applications of power electronics in electric vehicle? | 5 |
| OR | iv) | What are the control strategies used in EVs? Any 5 | 5 |
| Q.5 | i) | What is the meaning of charging infrastructure? Meaning 2 Marks | 2 |
| | ii) | What are the three methods of charging an EV? 3 Marks | 3 |

| | | | |
|---|---|---|---|
| | iii) | What is the impact of EV on integration with grid system? 5 point | 5 |
| OR | iv) | Describes the model of the smart charging algorithm simulated in MATLAB Diagram 3,example 2 Marks | 5 |
| Q.6 | i) | What is Vehicle-to-Grid (V2G) Technology? Definition 2 Marks | 2 |
| | ii) | What is an autonomous electric vehicle? Explain 3 Marks | 3 |
| | iii) | What are Emerging trends and technology future of electric vehicle in India? 5 points | 5 |
| OR | iv) | Do all Electric cars have Autonomous Driving? What is this Exactly? explanation 5 | 5 |