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PRESIDENCY UNIVERSITY BENGALURU

SCHOOL OF ENGINEERING

MAKEUP EXAMINATION - JULY 2024

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| **Semester :4** | **Date :04-07-2024** |
| **Course Code : EEE3036** | **Time : 01:30pm to 04:30pm** |
| **Course Name :** | **Max Marks :100** |
| **Program : B. Tech** | **Weightage :50%** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

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| **PART A** | | | |
| **ANSWER ANY 4 QUESTIONS 4Q X 5M=20M** | | | |
| 1 | Outline the characteristics for a potential EV battery. | (CO 1) | [Knowledge] |
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| 2 | Differentiate the  Active and Passive balancing in BMS. | (CO2) | [Knowledge] |
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| 3 | List some hybrid Electric Vehicle models in Market | (CO1) | [Knowledge] |
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| 4 | Classify the topologies in BMS. | (CO2) | [Knowledge] |
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| 5 | A 12 v battery is rated for 48 AH. If it must an average of 2A, how long will the battery last before it needs recharging. | (CO3) | [Knowledge] |
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| 6 | State and define the key battery parameters (i) Battery capacity (ii) C rate (iii) SoC. | (CO4) | [Knowledge] |
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| **PART B** | | | |
| **ANSWER ANY 5 QUESTIONS 5Q X 10M=50M** | | | |
| 7 | Explain the importance of a Battery Management System in EV. | (CO1) | [Comprehension] |
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| 8 | List out various battery technologies available for EV and HEV applications and explain the following battery technologies in detail with relevant chemical equations. (i) Lead-acid battery (ii) Nickel-Cadmium battery (Ni-Cd) (iii) Lithium-ion battery (Li-ion) (iv) Lithium-polymer battery (Li-poly). | (CO2) | [Comprehension] |
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| 9 | State the requirements of energy storage devices applied in automotive applications. Define and explain the following energy storage requirements. (i) Specific Energy (ii) Specific Power (iii) Energy Efficiency | (CO2) | [Comprehension] |
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| 10 | A 15 volts battery capacity of 600 Ah that is theoretically at 80 % SoC and depth of discharge of 50 %.  (i) Find the charge stored.  (ii) Find the energy delivered to the load.  (iii) How much would be the charge stored by the battery if the battery capacity is reduced to 400 Ah and find the net reduction in charge? | (CO3) | [Comprehension] |
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| 11 | Explain the concept of Isolation control and thermal control in a BMS based battery pack. | (CO3) | [Comprehension] |
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| 12 | Mr. Peter wants to apply serial bus communication to save copper wires in Electric Vehicle. Suggest any standard architecture with neat and clean diagram to send the data sequentially to communicate with other devices in BMS. | (CO4) | [Comprehension] |
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| 13 | Summarize the  IoT-Based Battery Management System for EVs. | (CO4) | [Comprehension] |
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| **ANSWER ANY 2 QUESTIONS 2Q X 15M=30M** | | | |
| 14 | Ather 450X scooter having a battery capacity of 3.7kwhLithium ion battery with the nominal voltage of 51.1V. Design a battery pack (i) obtain the number of series (ii)Number of cells in  parallel combination in battery pack. (iii) Total Number of cells required | (CO2) | [Apply] |
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| 15 | Explain in details about the type cell balancing technique used in Mahindra and Mahindra (M&M) Electric Vehicles. | (CO3) | [Apply] |
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| 16 | Tata Nexon Ev car having a battery pack of 40.5 kWh High energy density Lithium ion , Liquid cooled battery . For communication bus in battery pack with BMS using   MCP2515 CAN Bus Module. Mention the Specifications & Features of MCP2515 CAN Bus. Module | (CO4) | [Apply] |
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