

6E7141

Total No. of Questions : 22

Total No. of Pages : 03

Roll No. : .....

**6E7141**

**B.Tech. VI-Sem. ( Main/Back ) Exam., May-2025**

**ELECTRICAL & ELECTRONICS ENGG.**

**6EX3-01 / Computer Architecture**

**EE, EX**

**Time : 3 Hours**

**Maximum Marks : 70**

**Instructions to Candidates :**

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

*(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

**[10×2=20]**

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

Q. 1. What is a register?

Q. 2. What is meant by parallel processing?

Q. 3. What is meant by micro-operation?

- Q. 4. Why do you need instruction format?
- Q. 5. What do you understand by RISC?
- Q. 6. What do you mean by control memory?
- Q. 7. What is meant by pipelining?
- Q. 8. What is auxiliary memory?
- Q. 9. Define vector processing.
- Q. 10. What do you mean by DMA?

**PART-B**

**[5×4=20]**

**(Analytical/Problem solving Questions)**

**Attempt any five questions**

- Q. 1. State the differences between MAR and MBR.
- Q. 2. Design a 4X3 ROM.
- Q. 3. Design a 4X3 RAM.
- Q. 4. Explain Memory transfer.
- Q. 5. Is there any difference among PROM, EPROM and PLA? Explain.
- Q. 6. Show propagation of multiple data processing in a pipeline.
- Q. 7. Design a bus system for 4 registers.

**PART-C**

**[3×10=30]**

**(Descriptive/Analytical/Problem-Solving/Design Questions)**

**Attempt any three questions**

- Q. 1. What are the arithmetic operations and how it can be implemented? Explain with diagram.

Q.2. Design a stage of Arithmetic Unit.

Q.3. Show the steps of multiplication algorithm for  $22 \times 19$ .

Q.4. Is there any difference between associative and set associative mapping related to cache memory?

Q.5. Apply Booth's algorithm for  $10100 \times 01101$ .

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Total No. of Questions : 22

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**6E7142**

**B.Tech. VI-Sem. ( Main/Back ) Exam., May-2025**

**ELECTRICAL AND ELECTRONICS ENGG.**

**6EX4-02 / Power System-II**

**EE,EX**

**Time : 3 Hours**

**Maximum Marks : 70**

*Instructions to Candidates :*

Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

*(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

**[10x2=20]**

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

Q.1. Define bus admittance matrix.

Q.2 What are computational issues in large scale power systems?



- Q.3. What is swing equation?
- Q.4. What is power angle curve?
- Q.5. What are automatic voltage regulators?
- Q.6. What is STATCOM?
- Q.7. What are SCADA systems?
- Q.8. What do you mean by Contingency Analysis?
- Q.9. Define generator cost curves.
- Q.10. What is demand side management?

**PART-B**

[5x4=20]

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1. Describe Gauss-Seidel method in detail.
- Q.2. Describe equal area criterion.
- Q.3. Compare Static VAR Compensators and STATCOMs.
- Q.4. Describe contingency analysis in detail.
- Q.5. Describe whole sale competition in detail.
- Q.6. Describe phenomena of loss of synchronism in single machine infinite bus system following three-phase fault.
- Q.7. Discuss tap changing transformers in detail.

**PART-C**

[3x10=30]

**(Descriptive/Analytical/Problem Solving/Design questions)**

**Attempt any three questions**

- Q.1. Describe Newton-Raphson method for solution of power flow equations in detail.
- Q.2. Analyze numerical integration of swing equations using Runge-Kutta 4th order method.
- Q.3. Describe excitation system control in synchronous generators in detail.
- Q.4. What are phasor measurement units? Describe wide-area measurement systems in detail.
- Q.5. Describe electricity market models in detail.

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Total No. of Questions : 22

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**6E7143**

**B.Tech. VI-Sem. ( Main/Back ) Exam., May-2025**

**ELECTRICAL AND ELECTRONICS ENGG.**

**6EX4-03 / Power System Protection**

**EE, EX**

**Time : 3 Hours**

**Maximum Marks : 70**

**Instructions to Candidates :**

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

*(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

**[10x2=20]**

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

**Q.1. Define a protection system. What are the main objectives of a protection system?**

**Q.2 What are the different zones of power system protection system? Differentiate primary and backup protection system.**



- Q.3. What is Plug setting multiplier (PSM) and time multiplier setting (TMS) for over current relay?
- Q.4. What is over current relay co-ordination?
- Q.5. What is distance protection? Name the Important relay used in the distance protection scheme.
- Q.6. How does digital protection differ from conventional power system protection?
- Q.7. What is relay testing in power system? Why relay testing is Important?
- Q.8. What is out-of-step protection in power system?
- Q.9. What is under frequency protection in power system and how does an under-frequency relay prevent system collapse?
- Q.10. What is the role of DFT in power system protection?

**PART-B**

[5x4=20]

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1. Explain the essential qualities of protection system. Also with the help of schematic diagram briefly explain the components of a protection system.
- Q.2. Discuss the sequence impedance and sequence networks of unloaded synchronous machine.
- Q.3. Explain the percentage differential protection of stator of synchronous generator in case of :
- (a) Internal fault
  - (b) External fault
- Q.4. What is computer aided protection in power system? Also explain the aliasing issues in power system protection.

- Q.5. What is undervoltage protection in power system? Also explain the causes of undervoltage and working principle of undervoltage relay.
- Q.6. What is the role of CT and PT in power system protection? Also define the different types of CT and PT errors.
- Q.7. Write short note on the following :
- (a) Electro-magnetic Transients (EMT) simulation
  - (b) Bus-Bar arrangement schemes

**PART-C**

[3x10=30]

**(Descriptive/Analytical/Problem Solving/Design questions)**

**Attempt any three questions**

- Q.1. Explain the overcurrent protection scheme of power system for :
- (a) Time graded system
  - (b) Current-graded system
- Q.2. Explain the working of distance protection scheme using impedance relay. Also discuss the directional units used with impedance relay.
- Q.3. Explain the phasor measurement units and wide area measurement system (WAMS). Also enumerate the application of WAMS for improving protection system.
- Q.4. (a) Explain the working of Buchholz relay with the help of diagram for transformer protection.
- (b) Explain the differential protection scheme of generator- transformer unit.
- Q.5. Write short notes on the following :
- (a) Effect of power swings on distance relaying
  - (b) Circuit-breakers

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Total No. of Questions : 22

Total No. of Pages : 04

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**6E7144**

**B. Tech. VI-Sem. (Main/Back) Exam. May-2025**

**Electrical Engg.**

**6EE4-04 Electrical Energy Conversion and Auditing**

**Time: 3 Hours**

**Maximum Marks: 70**

***Instructions to Candidates :***

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

*(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

**[10×2=20]**

**(Answer should be given up to 25 words only)**

**All questions are compulsory.**

**Q.1. Describe the term Maximum Demand.**

**Q.2. What is slip in terms of motor ?**



- Q.3. What is energy efficient Transformers ?
- Q.4. Discuss about Primary and Secondary Energy.
- Q.5. List down the various guidelines required for material and energy balance.
- Q.6. What is the difference between commercial and non-commercial energy.
- Q.7. State the importance of energy policy of Industries.
- Q.8. Explain Stator and Rotar  $I^2 R$  losses for EEMs.
- Q.9. What is Stray Load-Losses ?
- Q.10. What is the need of energy audit in any Industries ?

**PART-B**

[5×4=20]

**(Analytical / Problem solving questions)**

**Attempt any 05 questions.**

- Q.1. With single line diagram, explain Electrical distribution system.
- Q.2. What is variable speed drives ? Explain in detail.
- Q.3. Describe principle of thermal power generation.
- Q.4. Design and explain working principle of automatic power factor control.
- Q.5. Discuss about Greenhouse effect.
- Q.6. Why a cube of ice at  $0^\circ\text{C}$  is more effective in cooling a drink than the same quantity of water at  $0^\circ\text{C}$  ?
- Q.7. What are the three modes of heat Transfer ? Explain with examples.

**PART-C**

[3×10=30]

**(Descriptive / Analytical / Problem solving / Design questions)**

**Attempt any 03 questions**

- Q.1. Discuss and explain in detail Indian Energy Scenario. Also explain Energy Price in India.
- Q.2. What you think about energy conservation ? Explain Energy Conservation Act, 2001 and its features.
- Q.3. With neat sketch, explain energy efficient motors.
- Q.4. Explain Hybrid and Isolated operation of solar PV and wind system with neat diagram.
- Q.5. Why centrifugal machines offers the greatest savings when used with variable speed drives ? Explain with example.

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Total No. of Questions : 22

Total No. of Pages : 04

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**6E7145**

**B.Tech. VI-Sem. ( Main/Back ) Exam., May-2025**

**ELECTRICAL & ELECTRONICS ENGINEERING**

**6EX4-05: Electric Drives**

**EE, EX**

**Time : 3 Hours**

**Maximum Marks : 70**

**Instructions to Candidates :**

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

*(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

[10x2=20]

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

- Q.1. What happens to the speed of a separately excited DC motor if the armature voltage is increased?
- Q.2. A 220 V DC motor draws an armature current of 30A with an armature resistance of  $0.4\Omega$ . Find the back EMF.
- Q.3. Define duty ratio in the context of a chopper circuit.



- Q.4. What is regenerative braking?
- Q.5. What is the purpose of the inner current loop in a closed-loop DC drive?
- Q.6. Define plant transfer function in the context of DC drive control.
- Q.7. What happens to the torque-speed curve of an induction motor when voltage is reduced?
- Q.8. Define V/f ratio in the context of induction motor control.
- Q.9. Why does a slip-ring induction motor require external resistance for starting?
- Q.10. What is the impact of increasing rotor resistance on motor efficiency?

**PART-B**

[5x4=20]

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1. What is the significance of the operating point in a DC motor? How is it determined?
- Q.2. A chopper-fed DC drive is operating at a low duty cycle. What will happen to the motor's speed, torque, and efficiency? Explain.
- Q.3. Explain steady-state operation of a multi-quadrant chopper-fed DC drive.
- Q.4. What are the key differences between open-loop and closed-loop control in DC drives?
- Q.5. Explain the role of the equivalent circuit in analyzing the steady-state performance of an induction motor.
- Q.6. Why is constant V/f control used in induction motors, and how does it help maintain motor performance at different speeds?
- Q.7. Explain the working of a slip power recovery scheme.

**PART-C**

[3x10=30]

**(Descriptive/Analytical/Problem Solving/Design questions)**

**Attempt any three questions**

- Q.1. Derive the emf and torque equations of a DC machine and explain their significance. Explain the torque-speed characteristics of a separately excited DC motor and the effect of armature voltage variation.
- Q.2. Explain the working of a DC chopper and its application in speed control of a DC motor.
- Q.3. Explain the motoring and generating modes of operation of a separately excited DC machine.
- Q.4. Explain the control structure of a closed-loop DC drive with inner current and outer speed loops.
- Q.5. Explain the working principle of a three-phase Voltage Source Inverter (VSI) with a detailed circuit diagram, switching states, and waveforms.

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**6E7148**

Total No. of Questions : 22

Total No. of Pages : **04**

Roll No. : .....

**6E7148**

**B.Tech. VI-Sem. ( Main/Back ) Exam., May-2025**

**ELECTRICAL ENGINEERING**

**6EE5-13 Electrical and Hybrid Vehicles (El.-II)**

**Time : 3 Hours**

**Maximum Marks : 70**

***Instructions to Candidates :***

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

*(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

**[10x2=20]**

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

Q.1. What is the basic concept of electric traction?

Q.2. What do you mean by Hybridization?

Q.3. Express the basics of vehicle performance in convention vehicles.



- Q.4. By which technique we can control of Induction Motor drives very effectively?
- Q.5. How to match the electric machine and the internal combustion engine (ICE)?
- Q.6. What is the mean of sizing the drive system?
- Q.7. Summary the energy management strategies used in hybrid and electric vehicles.
- Q. 8 Discuss the concept of hybrid traction.
- Q. 9 Which electric components used in hybrid and electric vehicles?
- Q. 10. Formulate the fuel efficiency analysis in Hybrid and Electric Vehicles.

**PART-B**

[5x4=20]

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1. Discuss battery based energy storage and its analysis.
- Q.2 Discuss the mathematical models to describe vehicle performance convention vehicles.
- Q.3. Compare different energy management strategies.
- Q.4. Explain the vehicle power source characterization, transmission characteristics of conventional vehicles.
- Q 5. Discuss the configuration and control of DC Motor drives in electric drive-trains.
- Q.6. Define the various electric drive-train topologies.
- Q.7. Briefly explain the various hybrid drive-train topologies.

**PART-C**

[3x10=30]

**(Descriptive/Analytical/Problem solving/Design questions)**

**Attempt any three questions**

- Q.1. Explain the power flow control in electric drive-train topologies.
- Q.2. Explain the social and environmental importance of hybrid and electric vehicles.
- Q.3. What are the implementation issues of energy management strategies?
- Q.4. Discuss the selecting the energy storage technology in detail.
- Q.5. Study the power flow control in hybrid drive-train topologies.

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6E1573

Total No. of Questions : 22

Total No. of Pages : 04

Roll No. : .....

**6E1573**

**B. Tech. VI-Sem. ( Back ) Exam. - 2025**

**ELECTRICAL ENGINEERING**

**6EE4-03 Power System Protection**

Maximum Marks : 120

Time : 3 Hours

**Instruction to Candidates :**

Attempt all 10 questions from Part-A, 05 questions out of 07 questions from Part-B and 04 questions out of 05 questions from Part-C.

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

*(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

[10x2=20]

(Answer should be given up to 25 words only)

All questions are compulsory

Q.1. What are the desirable features of power system protection?



- Q.2. What are the various types of over-current relay?
- Q.3. Explain the V-I characteristics of directional relay.
- Q.4. Write the various protection scheme for transformers.
- Q.5. What is necessity of a bus-bar protection?
- Q.6. What are the important rating of a circuit breaker?
- Q.7. What are the advantages of using digital techniques in power system protection?
- Q.8. Define the term "fault current" in a power system.
- Q.9. What is computer-aided protection in power systems?
- Q.10. What is under-frequency protection, and why is it critical for system stability?

**PART-B**

**[5x8=40]**

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1. Explain the role of instrument transformers in power system protection. How do they ensure safe operation of protection relays and circuit breakers?
- Q.2. Explain the concept of over-current relay coordination. Why is it essential to coordinate over-current relays to prevent unnecessary tripping of circuit breakers during faults?
- Q.3. Define the distance protection with neat sketch also. What are the advantages of distance protection over other types of feeder protection?
- Q.4. Explain the physical significance of sequence components of voltages in power system. Also develop the connection of sequence-network when a line to line fault occurs in a power system.

- Q.5. Explain the importance of CT/PT (Current Transformer/ Potential Transformer) modeling in power system protection. How do they affect relay accuracy?
- Q.6. Describe the concept of out-of-step protection in power systems. How does it work, and why is it critical during power system oscillations?
- Q.7. How do power swings impact distance relays in power systems? What techniques can be used to mitigate these impacts and prevent relay mal-operation?

**PART-C**

**[15x4=60]**

**(Descriptive/Analytical/Problem Solving/Design questions)**

**Attempt any four questions**

- Q.1. Write short notes on the following:
- (i) Generator Protection
  - (ii) Relay testing
  - (iii) Application of WAMS for improvement in protection system
- Q.2. Describe the process of simulating transients using EMT programs. What factors need to be considered to ensure an accurate simulation of protection behaviour during faults?
- Q.3. Explain the Bus-Bar arrangement protection schemes with neat sketch.
- Q.4. Explain the construction, principle of operation and application of SF6 circuit breaker.
- Q.5. Explain the role of Phasor Measurement Units (PMUs) and Wide-Area Measurement Systems (WAMS) in modern power system protection. How do WAMS improve the reliability and efficiency of protection systems?

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**Total No. of Questions : 22**

**Total No. of Pages : 04**

**Roll No. : .....**

**6E1575**

**B.Tech. VI-Sem. ( Back ) Exam. - 2025**

**Electrical & Electronics Engg.**

**6EX4-05/Electric Drives**

**EE,EX**

**Time : 3 Hours**

**Maximum Marks : 120**

***Instructions to Candidates :***

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and four questions out of five questions from Part-C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.  
(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

**[10x2=20]**

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

**Q.1. Define the EMF equation of a DC machine.**

**Q.2. Explain the torque-speed characteristics of a separately excited DC motor.**

- Q.3. What is the effect of armature voltage on the torque-speed curve?
- Q.4. Define duty ratio control in a DC chopper.
- Q.5. What is the significance of regenerative braking in a DC drive?
- Q.6. Explain the purpose of an inner current loop in a DC drive control structure.
- Q.7. What is flux weakening in an induction motor?
- Q.8. Define space vector modulation in inverter control.
- Q.9. How does external rotor resistance affect slip-ring induction motor performance?
- Q.10. What is slip power recovery in a slip-ring induction motor?

**PART-B**

**[5x8=40]**

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1. Derive the steady-state equation for a chopper-fed DC motor drive and discuss its efficiency.
- Q.2. A 220V separately excited DC motor has an armature resistance of  $0.5\ \Omega$ . Calculate the speed when the armature current is 10A and the back EMF is 200V.
- Q.3. Explain the four-quadrant operation of a DC drive with a suitable diagram.
- Q.4. A DC motor is fed by a chopper with a duty ratio of 0.6. If the input voltage is 230V, calculate the effective armature voltage.
- Q.5. Compare the torque-speed characteristics of a fan load and a pump load.
- Q.6. Explain slip regulation in constant V/f control of an induction motor.
- Q.7. Discuss the impact of power electronic control in slip-ring induction motors.

**PART-C**

**[4x15=60]**

**(Descriptive/Analytical/Problem Solving/Design questions)**

**Attempt any four questions**

- Q.1. Explain the closed-loop control of a DC drive with necessary block diagrams and derive its transfer function.
- Q.2. Discuss the impact of voltage and frequency variations on the torque-speed characteristics of an induction motor.
- Q.3. Design a PWM-based voltage-fed inverter for induction motor control and discuss the generation of three-phase PWM signals.
- Q.4. Explain the vector control method for induction motors and compare it with direct torque control.
- Q.5. Explain the effects of slip power recovery methods in industrial applications and analyze power electronic control techniques for enhancing efficiency.

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**Total No. of Questions : 22**

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**6E1578**

**B.Tech. VI-Semester (Back) Exam. - 2025**

**ELECTRICAL ENGINEERING**

**6EE5-13 / Electrical and Hybrid Vehicles**

**Time : 3 Hours**

**Maximum Marks : 120**

***Instructions to Candidates :***

**Attempt all ten questions from Part-A, five questions out of seven questions from Part-B and three questions out of five questions from Part-C.**

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used / calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.*

*(Mentioned in Form No. 205)*

1. ....

2. ....

**PART-A**

**[10x2=20]**

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

**Q.1. What do you mean by Hybrid Vehicles?**

**Q.2. What do you understand by Electric Traction?**

- Q.3. Note the advantages of electric vehicles with an applications.
- Q.4. What is the role of Internal Combustion Engine?
- Q.5. Write a definition of Energy Management System?
- Q.6. What do you understand by transmission characteristics.
- Q.7. Write down any two advantages of full efficiency.
- Q.8. Explain the definition of Reluctance Motor drive.
- Q.9. How we give the power flow in hybrid train?
- Q.10. What do you mean by sizing the power electronics?

**PART-B**

**[5x8=40]**

**(Analytical/Problem solving questions)**

**Attempt any five questions**

- Q.1. Explain the mathematical models of vehicle performance.
- Q.2. Write the difference between hybrid and electric vehicles?.
- Q.3. Explain the control of DC motor drive.
- Q.4. What do you understand by Fuel cell based energy storage system?
- Q.5. What is Drive System Efficiency?
- Q.6. Write the comparison of different energy management strategies.
- Q.7. Write a short note on Internal Combustion Engine (ICE).



**PART-C**

**[4x15=60]**

**(Descriptive/Analytical/Problem Solving/Design questions)**

**Attempt any four questions**

- Q.1. Explain the Hybrid electric drive trains with suitable examples.
- Q.2. Write the configuration and control of Induction Motor Drives? Also write its' applications.
- Q.3. How you can explain the Hybridization of different energy storage devices? Explain it by suitable example.
- Q.4. Explain the super capacitor based energy storage and its analysis.
- Q.5. Explain the case study of Design of a Hybrid Electric Vehicle (HEV) with proper example.

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