23681

M. Tech 2nd Semester (EEE)

Examination – May - 2025

ADVANCED SWITCHGEAR AND PROTECTION

Paper : MTEEE-502

Time : Three hours]   [Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, Selecting at least *one* question form each Unit. All questions carry equal marks.

UNIT – I

1. Discuss the classification of circuit breakers based on the medium used for arc extinction. Give working principles, construction and application of Oil circuit breaker.   20

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2. What is meant by current chopping in circuit breakers ? What causes it and how can it be minimized ? **20**

UNIT – II

3. (a) Describe the essential qualities of protective relays. Why are these qualities important for effective system protection ? **10**

(b) What is the purpose of directional relays ? Where are they used ? **10**

4. Write short notes on :

(a) Attracted Armature Relay **10**

(b) Induction Cup Relay **10**

UNIT – III

5. Discuss the transformer protection scheme in detail. Explain differential protection, overcurrent protection, and Buchholz relay. **20**

6. Why is transmission line protection critical in a power system ? Explain various protection schemes used for high-voltage transmission lines. **20**

UNIT – IV

7. What is numerical protection ? Explain the numerical protection scheme used for transmission lines. **20**

8. Explain the architecture of a digital relay. What are the key functional blocks and how do they work together for protection ? **20**

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Examination – May, 2024

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Paper : MTEEE-502

Time : Three Hours]　　　　　[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting at least **one** question from each Unit.

UNIT – I

1. Explain the rating and current chopping in circuit breaker.　　20

2. Write short note on :　　20

   (i) Air Circuit breaker

   (ii) Minimum oil circuit breaker

UNIT – II

3. Why we need zone protection explain it briefly.　　20

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4. What are the characteristics of relay, explain in detail ? 20

UNIT – III

5. Explain the protection of transformer. 20

6. Write down about the protection of feeders. 20

UNIT – IV

7. Explain the architecture of digital relay. 20

8. Write short notes on : 20

   (a) Rectifier type relay

   (b) Block average compensator

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M. Tech 2nd Semester (EEE)
Examination – June, 2023

ADVANCED SWITCH GEAR AND PROTECTION

Paper : MTEEE-502

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in total by selecting at least *one* question from each Unit. All questions carry equal marks.

UNIT – I

1. (a) Explain theory of arc interruption.

   (b) Explain SF6 circuit breaker with neat sketch.

2. (a) What do you mean by current chopping in circuit breaker ? Explain in detail .

   (b) Explain air blast circuit breaker with neat sketch.

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UNIT – II

3. What are the various types of overcurrent relays ? Discuss their area of application in detail.

4. (a) What is an offset MHO characteristics ? Discuss how such a characteristic is realized ?

   (b) Differentiate Primary and Backup protections.

UNIT – III

5. Describe the various methods of transformer protection.

6. (a) What do you mean by Bus zone protection ? Explain.

   (b) Explain method used for protection of Feeder.

UNIT – IV

7. Discuss in detail different types of amplitude comparators with neat sketch.

8. Write technical notes on the following :

   (a) Protection of FACT Devices

   (b) Numerical Protection

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M. Tech. 2nd Semester (EEE)
Examination – May, 2025

AI TECHNIQUES

Paper : MTEEE-504

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : All questions carry equal marks. Question No. **1** is *compulsory*. In addition to the compulsory question, students will have to attempt *four* more questions, selecting *one* question from each unit.

1. Compulsory Question :

    (a) What are the key differences between humans and computers in the context of learning ?

    (b) Define the learning process in neural networks and mention types of learning tasks.

    (c) What is a Hopfield network and where is it used ?

(d) Define fitness function in genetic algorithms.

(e) Differentiate between classical and fuzzy sets.

(f) What is the meaning of uncertainty in fuzzy sets ?

(g) What is the purpose of rule base development in fuzzy logic systems ?

(h) Define defuzzification in fuzzy systems.

UNIT – I

2. Explain the structure of a biological neuron and compare it with an artificial neuron model.

3. Explain the Perceptron Convergence Theorem, its significance, limitations of the perceptron model, and applications.

UNIT – II

4. What is Back Propogation Network ? Explain the architecture and training process of a Back propagation Neural Network.

5. Discuss genetic modeling and the generational cycle. How do genetic algorithms converge ?

UNIT – III

6. Give the difference between Classical and Fuzzy set ? Explain classical sets and their properties with suitable examples.

7. Define fuzzy sets and explain operations on fuzzy sets with examples.

UNIT – IV

8. Explain the components of a fuzzy logic system with a neat diagram.

9. Describe the fuzzification process and different methods of assigning membership values.

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M. Tech. 2nd Semester (EEE)
Examination – May, 2024

AI TECHNIQUES

Paper : MTEEE-504

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Explain the concepts of humans and computers in AI.   10

    (b) Discuss learning strategies like :

        (i) Rote learning

        (ii) learning by instruction   10

2. (a) Draw and explain the structural organizations of human brain levels.   10

    (b) What is Perception model ? Explain its activation function, limitations and applications.   10

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3. (a) Define feed-forward recall. Draw the block diagram of error back propagation algorithm and explain the same. 10

(b) What is the use of generalized Delta Learning Rule ? Explain it. 10

4. (a) Explain convergence of genetic algorithm with the help of GA cycle. 10

(b) Explain about reproduction operators concept in genetic algorithms. 10

5. (a) Describe fuzzy set operations and relations. 10

(b) Discuss in detail about the development of rule base and decision making system with the help of fuzzy logic system. 10

6. (a) What is approximate reasoning ? State and explain important fuzzy inferring procedures. 10

(b) State the major implicit assumptions in a fuzzy control system design. 10

7. Explain the applications of AI techniques in the following fields

(a) Reactive Power Control

(b) Load Forecasting 20

8. How can an Artificial Neural Network be applied for speed control of ac motor ? Explain in detail. 20

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M. Tech. 2nd Semester (EEE)
Examination – June, 2023

AI TECHNIQUES

Paper : MTEEE-504

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

UNIT – I

1. (a) "Artificial neuron is resembling the functionalities of biological neuron" justify this statement in all functional aspects.   10

   (b) Define term Artificial Intelligence. What are application of AI in the various fields ? Explain its application.   10

2. Draw the architecture of the Feedforward neural network. What is the significance of the layers in the neural network ? Explain with its working. 20

UNIT – II

3. Describe the architecture and stability consideration in Hopefield network. How it settles into lowest energy state ? 20

4. Suppose a genetic algorithm uses chromosomes of the form $x = abcdefgh$ with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual x be calculated as : $F(x)$ $(a + b) - (c + d) + (e + f) - (g + h)$ and let the intial population consist of four individual with the following chromosomes :

$x_1 = 65413532$

$x_2 = 87126601$

$x_3 = 23921285$

$x_4 = 41852094$

Evaluate the fitness of each individual, showing all your workings, and arrange them in order with the fittest first and the least fit last. 20

UNIT – III

5. (a) What is Fuzzy sets ? Explain the Operations of Fuzzy sets with a suitable example. 10

(b) Discuss the various special features of the membership function. 10

6. (a) What are classical and Fuzzy sets ? List and discuss the operation on classical and fuzzy sets. 10

(b) If C and D are two fuzzy events of a sample space S, prove that : 10

$$P(C/D) + P(C^C/D) = 1$$

UNIT – IV

7. (a) Define defuzzification and explain the different defuzzification method. 10

(b) Let A = {$(x_1, 0.5)$, $(x_2, 0.7)$, $(x_3, 0)$} and B = (x_1, 0.8), (x_2, 0.2), (x_3, 1) are fuzzy sets with associated membership values. Find $A \cup B (x_1)$, $A \cup B (x_2)$, $A \cup B (x_3)$. 10

8. Explain the following AI application : 10 × 2 = 20

   (a) Load dispatch

   (b) Speed control of DC and AC motors

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M. Tech. 2nd Semester (EEE)
Examination – May, 2025

FACTS CONTROLLER

Paper : MTEEE-506

Time : Three Hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt at least *one* question from each Unit and attempt in total *five* questions. All question carry equal marks.

UNIT – I

1. (a) What are advantages, disadvantages and applications from FACTS Controllers ?

   (b) Explain different Transmission Interconnections.

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2. (a) Explain importance of Controllable Parameters.

   (b) Describe basic types of FACTS Controller.

UNIT – II

3. Explain Transformer Connections for 48 Pulse operation with necessary diagram.

4. (a) Explain working of three Level voltage source converter.

   (b) Explain basic concept of Voltage source converters.

UNIT – III

5. (a) Describe objectives of shunt compensation.

   (b) Explain methods of controllable VAR generation.

6. (a) Explain Power oscillation damping of static shunt compensation.

   (b) Explain voltage instability prevention in static shunt compensation.

UNIT – IV

7. Explain Power functional requirements of TSSC.

8. (a) Explain Static Series Compensators.

   (b) Explain TCSC in detail.

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M. Tech. 2nd Semester (EEE)
Examination – May, 2024

FACTS CONTROLLER

Paper : MTEEE-506

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) What are the benefits of FACTS controllers ? List different types of FACTS controllers.   10

   (b) Explain the functionalities and applications of STATCOM and SVC in enhancing power system performance.   10

2. (a) Describe the parameter trade-off of high power devices.   10

   (b) Analyse the requirements and characteristics of high-power devices, with a particular emphasis on voltage and current ratings.   10

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3. (a) Derive expression for square-wave voltage harmonics for a single-phase bridge converter. 10

   (b) Discuss the basic concept of voltage sourced converter with circuit diagram. 10

4. (a) Explain the three phase full-wave bridge converter with necessary waveforms. 10

   (b) Enumerate the relative merits and demerits of current source converters over voltage source converters. 10

5. (a) Explain the concept of end of line voltage support to prevent voltage stability in shunt compensation. 8

   (b) Explain how midpoint voltage regulation of a transmission line increases the power transfer capacity of the lines. Also explain how it provides power oscillation damping. 12

6. (a) Compare between Fixed Capacitor Thyristor Controlled Reactor (FC-TCR) with Thyristor Switched Capacitor Thyristor Controlled Reactor (TSC-TCR). 10

   (b) Describe any of the variable impedance type static VAR generators. 10

7. (a) Enumerate the operating features of STATCOM. 10

   (b) Explain with a neat block diagram general control scheme of Static Var Compensator (SVC) 10

8. (a) Explain about basic GTO-controlled series capacitor with principle of operation and necessary waveforms. 10

   (b) Explain with a neat functional diagram, implementation of Var Reserve (operating point) control for damping of Power oscillations in the system. 10

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M. Tech. 2nd Semester (EEE)
Examination – June, 2023

FACTS CONTROLLER

Paper : MTEEE-506

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* question in all, selecting *one* question from each Unit. All question carry equal marks.

UNIT – I

1. What are the various FACTS devices used in a power system network ? What are the limitations of conventional compensating devices ? How is the role of FACTS devices different in transmission system as compared to that in distribution system ?   20

2. (a) Discuss the problems relating to AC power transmission. Explain how they can overcome using FACTS techniques.   10

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(b) Explain the power flow in an AC meshed transmission system with necessary diagrams. 10

UNIT – II

3. With a neat circuit diagram and wave forms, describe the operation of three level voltage source converters. Derive the fundamental and harmonic voltage expressions for a three level converter. 20

4. (a) Discuss the merits and demerits of current source converter over voltage source converter. 10

(b) Draw and explain transformer connections for 24 and 48 -pulse operation. 10

UNIT – III

5. What are the objectives of line compensation ? Explain the effect of shunt and series compensation on power transmission capacity of a short symmetrical transmission line. 20

6. (a) Explain the midpoint voltage regulation for line segment of two machine power system with static shunt compensation. 10

(b) Describe the fixed capacitor. Thyristor controlled reactor type VAR generator with necessary characteristics and expressions. 10

UNIT – IV

7. Describe the working principle of the *two* types of Static Var Compensators (SVC) with neat schematic diagrams. 20

8. With neat sketches, explain the operating principle and V -I characteristic of Static Synchronous Compensator (STATCOM). 20

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Note :   Attempt *five* questions in all. All questions carry equal marks.

1. (a) How computer based plant automation is ?

   (b) Define distributed computer control.

2. Write a note on :

   (a) System implementation concepts.

   (b) Human interface.

3. Describe briefly :

   (a) Local area network

   (b) OSI model of ISO

4. (a) Explain manufacturing automation protocols.

   (b) Write about buses and communication network of DCS.

5. (a) Write about process oriented language.

   (b) What is application software ?

6. (a) Explain parameterization.

   (b) What is knowledge based software ?

7. (a) Describe reliability of software.

   (b) Mention various reliability design guidelines for DCS.

8. Mention application of reliability in :

   (a) Iron & Steel Plant.

   (b) Chemical Plant.

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M. Tech. 2nd Semester (EEE)
Examination – May, 2024

DISTRIBUTED COMPUTER CONTROL SYSTEM
Paper : MTEEE-508

Time : Three Hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting *one* question from each Unit.

UNIT – I

1. What do you mean by human interface explain it ?   20

2. Write short note on :   20

    (i)   Functional level

    (ii)   Computer based plant automation

UNIT – II

3. Write short note on :   20

    (i)   Transfer of process

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(ii) Manufacturing automation protocal

4. Explain the buses and communication network of DCS. 20

UNIT – III

5. Write short notes on : 20

(i) Process oriented language

(ii) Parameterization

6. Explain the real time operating system and communication software. 20

UNIT – IV

7. Explain the reliability concept of DCS. 20

8. Explain the application of chemical plant. 20

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M. Tech. 2nd Semester (EEE)
Examination – June, 2023
DISTRIBUTED COMPUTER CONTROL SYSTEM
Paper : MTEEE-508

Time : Three Hours] [Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

UNIT – I

1. Explain the concept of distributed computer control. 20

2. Write short notes on : 20

   (i) Database organization

   (ii) Classical approach to plant automation

UNIT – II

3. Write short notes on : 20

   (i)   Manufacturing automation protocol

   (ii) Local area network

4. Explain the buses and communication network of distributed control system. 20

UNIT – III

5. Write short notes on : 20

   (i)   Application software

   (ii) Parameterization

6. Explain the real time operating system and communication software. 20

UNIT – IV

7. Explain the application of power plant. 20

8. Explain the application of steel plant. 20

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Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all by selecting at least *one* question from each section.

SECTION – A

1. What is the Internal Rate of Return (IRR), and how is it calculated ? Compare IRR and NPV as investment evaluation techniques.   20

2. Discuss the advantages and disadvantages of using the benefit-cost ratio in decision-making. Explain how sensitivity analysis can be used in evaluating energy investments.   20

SECTION – B

3. Explain how transmission and distribution losses impact energy conservation efforts. What role do capacitor banks play in utility voltage regulation ?   20

4. How does efficient transformer operation contributes to energy conservation ? Discuss the impact of renewable energy integration on energy conservation.   20

SECTION – C

5. What are the key objectives of an energy-efficient lighting system ? Discuss the impact of inefficient lighting on energy consumption and costs.   20

6. What is the role of ballasts in fluorescent lighting systems ? Explain the importance of luminaire efficiency in energy conservation.   20

SECTION – D

7. Discuss the significance of indoor air quality (IAQ) in HVAC systems. What are the key factors influencing heating and cooling requirements in buildings ?   20

8. Explain the working principle of an instantaneous (tank less) water heater. Compare direct and indirect water heating systems.   20

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M. Tech. 2nd Semester (EEE)
Examination – May, 2024

DEMAND SIDE ENERGY MANAGEMENT

Paper : MTEEE-518

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) Write short note on energy audit instruments.   10

    (b) Explain detailed energy audit.   10

2. (a) (I) Explain pay back analysis. Mention its advantages and disadvantages.   5

      (II) A plant cost Rs. 7.56×105 and it is estimated that after 25 years it will have to be replaced by a new one, at that instant its salvage value will be Rs. 1.56×105.

Calculate : 5

  (i) Annual deposit to be made in order to replace the plant after 25 years;

  (ii) The value of the plant after 10 years on the following basis :

      (A) Straight line depreciation method.

      (B) Reducing balance method.

      (C) Sinking fund depreciation method at 8% annual compound interest.

  (b) Explain cash flow model. 10

3. (a) Explain briefly in relation to electrical energy consumption and conservation in India and in the world. 10

  (b) Explain in detail how to conserve electrical energy and explain some of the means to conserve energy. 10

4. (a) Explain briefly about the effect of harmonics on power factor with suitable examples. 10

  (b) (i) Write importance of power factor improvement in energy efficient motors. 5

      (ii) Explain in detail about location of capacitors in power factor improvement. 5

5. What are the need for an energy management program ? Explain building analysis with modification of existing systems. 20

6. (a) Discuss the technologies adopted in energy efficient lighting system. 10

  (b) List energy efficient lighting options and control. 10

7. (a) What are the energy conservation methods used in heating and cooling. 10

  (b) Explain transfer of Heat-Space heating methods. 10

8. Classify various electrical and magnetic energy storage systems and explain in detail. 20

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23685

M. Tech 2nd Semester (EEE)
Examination – June, 2023

DEMAND SIDE ENERGY MANAGEMENT

Paper : MTEEE-518

Time : Three hours]   *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in total by selecting at least *one* question from each Unit. All questions carry equal marks.

UNIT – I

1. (a) What do you mean by energy audit ? Explain in detail.

    (b) Discuss Cost benefit risk analysis.

2. Explain the concept of energy economics. Explain any *three* methods used in energy economics analysis for energy management.

UNIT – II

3. What do you mean by Energy conservation ? Explain any *two* conservation strategies in detail.

4. (a) Explain the concept of Electrical Load Management with example.

   (b) How Power factor of industries can be improved ?

UNIT – III

5. What do you mean by Electric lighting and explain the task lighting requirements, Lighting levels-system modifications non illumination ?

6. (a) What do you mean by building analysis ? Explain.

   (b) Explain Space Geometry.

UNIT – IV

7. Explain Space Heating, Ventilation, Air conditioning (HVAC).

8. Explain the following :

   (a) Cogeneration and Storage

   (b) Pumped hydro schemes