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<b>7E1733</b>	Roll No. _____	7E1733	Total No. of Pages : 3
<p><b>B.Tech. VII - Sem. (Main/Back) Examination, January - 2023</b></p> <p><b>Electrical Engg.</b></p> <p><b>7EE5-12 : Power Quality and FACTS</b></p>			

Time : 3 Hours

Maximum Marks : 120  
Min. Passing Marks : 42

*Instructions to Candidates:*

*Attempt all Ten questions from Part A, Five questions out of Seven from Part B and Four questions out of Five 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/calculations must be stated clearly.*

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

**PART - A**

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

**All questions are compulsory** **(10×2=20)**

1. What is power conditioning? And why it is needed? (2)
2. Define voltage flicker. (2)
3. What is power quality? (2)
4. What are Harmonics? How do Harmonics affect the electrical system and load? (2)
5. Explain the objectives of FACTS controllers in the power system network. (2)
6. List the application of UPFC. (2)
7. What are the various power quality issues. (2)
8. What are the different power electronic switching devices? (2)
9. What is depth of the voltage dip? (2)
10. What do you mean by power frequency variation? (2)

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## PART - B

(Analytical/Problem solving questions)

Attempt any Five questions

(5×8=40)

1. Draw and explain the impedance versus delay angle characteristics of TCSC. (8)
2. Distinguish between shunt connected controllers with series connected controllers. (8)
3. What are the devices used for controlling harmonic distortion and explain their functions? (8)
4. Explain in detail about steady - state relationship or V-I characteristic of static VAR compensator. (8)
5. Discuss the operation of STATCOM with a neat diagram and characteristics. (8)
6. Write a comparison between IPFC and UPFC. (8)
7. Explain basic circuit arrangement of Static VAR Compensator (SVC) with its principle of operation. (8)

## PART - C

(Descriptive/Analytical/Problem solving/Design questions)

Attempt any Four questions

(4×15=60)

1. Discuss about the Computer Business Equipment Manufacturers Associations (CBEMA). Explain about the events described in the curve. (15)
2. What are the different voltage sag mitigation techniques? Explain in details. (15)
3. Discuss the following characteristics of power quality events. (5+5+5)
  - a. Short duration variations.
  - b. Long duration variations.
  - c. Discuss in detail about transients.

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4. Explain the following : (5+5+5)
- a. Sinusoidal PWM.
  - b. Space Vector Modulation.
  - c. Multilevel Converters.
5. Explain (5+5+5)
- a. Current Control Techniques for DSTATCOM.
  - b. Fault Current Limiter.
  - c. GTO Controlled Series Compensator
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**7E1732****7E1732****B.Tech. VII - Sem. (Main/Back) Examination, January-2023****Electrical Engg.****7EE5-11 : Wind and Solar Energy Systems****Time : 3 Hours****Maximum Marks : 120****Min. Passing Marks : 42****Instructions to Candidates:**

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

*Schematic diagram 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)*

**PART - A****(Answer should be given up to 25 words only)****All questions are compulsory.****(10×2=20)**

1. Define tip speed ratio (TSR) in wind turbine design.
2. Which is the best solution for homes and businesses out of amorphous, mono crystalline and polycrystalline solar panels?
3. What is Betz limit? Explain Betz lane.
4. What is solar PV module and solar array? Draw V-I characteristics of solar module.
5. Explain why parabolic dish collector gives maximum efficiency than flat plate collector.
6. What is a solar day? What is the difference between solar day and sidereal day?
7. What do you mean by stall control and pitch control?
8. Write the names of most common types of power quality problems.
9. What do you mean by fault ride-through?
10. What is the main source of formulation of wind? What is the name of the instrument using which the wind speed can be measured?

## PART - B

(Analytical/Problem solving questions)

Attempt any five questions

(5×8=40)

1. A single solar cell(10 cm ×10 cm) produces a voltage of 0.5 V and a current upto 2.5 A. If the solar isolation is 800 w/m<sup>2</sup>, calculate the efficiency of the solar cell.
2. Explain the basic introduction to the electricity generation from the wind energy using doubly fed induction generator with neat sketch. Give three reasons why DFIG is preferred.
3. Explain the behavior of solar PV and wind farm during grid disturbances.
4. Explain the working principle of permanent magnet synchronous generator (PMSG) with neat diagram. Also give various applications of PMSG.
5. What is parabolic through solar collector? Explain its working with neat diagram. Also write the applications of solar pond.
6. Discuss the working of different types of generator-converter topology for wind turbines with neat diagrams.
7. Discuss the power electronic converters used in wind energy conversion system. Also explain the converter control.

## PART - C

(Descriptive/Analytical/Problem solving/Design Questions)

Attempt any four questions.

(4×15=60)

1. Write a short note on the following:
  - a) Induction generator.
  - b) Fixed and variable speed wind turbines.
  - c) Power electronic converters.
2. What is hybrid and isolated operations of solar PV and wind systems? What are the various advantages over either single system. Explain the hybrid PV and wind systems for power generation with neat block diagram.
3. Write a short note on the following:
  - a) Solar radiation spectra.
  - b) Earth sun angles and observer sun angles.
  - c) Estimation of solar energy availability.
  - d) Central receiver solar thermal plant.
  - e) Working of Fresnel lens.

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4. What do you mean by grid codes? What are the essential requirements for wind power plants? Explain the voltage and frequency operating limits of grid supply in India.
  5. Discuss the power electronic converters for solar systems and solar PV converter control. Also explain fault ride-through for wind farms real and reactive power regulation.
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	<b>7E1730</b>	
<b>B.Tech. VII - Sem. (Main/Back) Examination, January - 2023</b> <b>Open Elective-I</b> <b>7EC6-60.1 : Principle of Electronic Communication</b>		

**Time : 3 Hours**

**Maximum Marks : 120**

**Min. Passing Marks : 42**

**Instructions to Candidates:**

*Attempt all TEN questions from Part A. FIVE questions out of Seven from Part B and Four questions out of FIVE 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 the following supporting material is permitted during examination. (Mentioned in form No. 205)*

**PART - A**

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

**ALL questions are compulsory. (10×2=20)**

1. What is overmodulation? (2)
2. What is the angle modulation? (2)
3. Define the wide band FM. (2)
4. What are the reasons for call-drop? (2)
5. What is the concept of total internal reflection in context to optical fibre? (2)
6. What is the multimode fibre? (2)
7. What wavelengths are used with multimode fibre? (2)
8. State Kepler's third law. (2)
9. Define prograde and retrograde orbits. (2)
10. What is geosynchronous and geostationary orbits? (2)

**PART - B**

**(Analytical/Problem Solving Questions)**

**Attempt any FIVE questions. (5×8=40)**

1. With the help of a block diagram describe the working of transmit receive earth station used for telephone traffic. (8)

2. A 12GHz receiver consists of an RF stage with gain  $G_1=30\text{dB}$  and noise temperature  $T_1=20\text{k}$ , a down converter with gain  $G_2=10\text{dB}$  and noise temperature  $T_2=360\text{k}$  and an IF amplifier stage with gain  $G_3=15\text{dB}$  and noise temperature  $T_3=1000\text{k}$ . Calculate the effective noise temperature and noise figure if the system. Take reference temperature as 290 k. (8)
3. Why does a satellite in highly inclined elliptical orbit spent most of its orbital period over higher latitude regions? What are the advantages and disadvantages of highly inclined orbit? (8)
4. Why LAN is placed closed to antenna of outdoor unit? (8)
5. Derive the expression for NA of a step index fiber. What will happen to NA if cladding is removed? (8)
6. What do you understand by intramodal dispersion? Derive the expression for material dispersion. (8)
7. In an FM system, the audio frequency is 1KHz and audio voltage is 2 volt. The deviation is 4KHz. If the AF voltage is now increased to 8 volt and its frequency dropped to 500Hz, find the modulation index in each case and the corresponding bandwidth using Carson's rule. (8)

### PART - C

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any FOUR questions.

(4×15=60)

1. Explain the following:
  - a) Frequency reuse. (8)
  - b) Trends in cellular radio systems. (7)
2. Explain the various features of CDMA and WCDMA. (15)
3. Explain the Token Ring LAN in detail. (15)
4. Explain the QPSK transmitter and receiver with mathematical expression. (15)
5. Explain the altitude control satellite with necessary diagram. Also explain the satellite wide band receiver. (15)

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7E1736

7E1736

**B.Tech. VII Sem. (Back) Examination, January - 2023**  
**Open Elective - I**  
**7EE6-60.2 Power Generation Sources**

**Time : 3 Hours**

**Maximum Marks : 120**

**Min. Passing Marks : 42**

**Instructions to Candidates:**

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

*Schematic diagram 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)*

**PART - A**

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

**All questions are compulsory.**

**(10×2=20)**

1. What is Magnus effect?
2. Explain the application of Hydro Power Plant.
3. Describe the applications of PV system.
4. What is a Wind Farm?
5. What do you understand by energy pack back period?
6. Where is fast breeder deployed?
7. What is pyrolysis used for?
8. Explain uses of boiler in Thermal Plant.
9. Explain the application of gasification process.
10. What do you understand by energy farming?

## PART - B

(Analytical/Problem solving questions)

Attempt any FIVE questions:

(5×8=40)

1. Explain the world energy status and explain current energy scenario in India.
2. Explain working principle of thermal power plant with neat and schematic diagram.
3. What is pumped storage technique? How does it helps in making power plants peak load power plants.
4. Explain open and closed OTEC cycles.
5. Give the design consideration and applications of biogas plants.
6. Explain the I-V characteristics of a solar cell and define fill factor and explain its significance.
7. Explain wind energy conversion system and its site characteristics.

## PART - C

(Descriptive/Analytical/Problem solving/Design questions)

Attempt any FOUR questions.

(4×15=60)

1. What is renewable energy sources, give its application and challenges, and also explain working of hybrid system?
2. Explain the following:
  - a) Solar - pond
  - b) Solar dryers
  - c) Solar furnaces.
3. Explain types of wind turbine with neat diagram and principle of each turbine in detail.
4. Explain the process of producing useful power by biomass further, by help of a diagram explain family biogas plant.
5. Write short notes on:
  - a) Social and environmental aspects of renewable energy sources.
  - b) Hydrogen energy production.
  - c) Energy planning.

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	<div style="border: 1px solid black; display: inline-block; padding: 2px 10px; font-weight: bold; font-size: 1.2em;">7E1735</div> <p><b>B.Tech. VII Sem. (Main/Back) Examination, January - 2023</b> <b>Open Elective - I</b> <b>7EE6-60.1 Electrical Machines And Drives</b></p>	

**Time : 3 Hours**

**Maximum Marks : 120**  
**Min. Passing Marks : 42**

***Instructions to Candidates:***

*Attempt all Ten questions From Part A, Five questions out of Seven from Part B and Four questions out of Five 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)*

**PART - A**

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

**ALL questions are compulsory.**

**(10×2=20)**

1. Why is EMF necessary for induction machines?
2. What is field Energy.
3. Why is Single Phase induction machines not self starting?
4. State one application of Single and 3 Phase induction machines.
5. Explain application of a four quadrant operations of Electrive drive.
6. Explain significance of Electrical Braking in Drive.
7. What is Duty Cycle?
8. What information can be received from motor Power rating?
9. Explain uses of VIF control for Drives.
10. Explain role of DC Chopper in Drives.

## PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.

(5×8=40)

1. By help of a diagram explain the constructional features of a DC machine.
2. Explain the concept of magnetically induced EMF and current losses.
3. Explain Torque and power equations for 3 phase induction machine.
4. Explain the various mode of operation of electric drives.
5. By help of suitable diagram and wave form explain uncontrolled rectifier control.
6. Describe the AC Controller based speed control for induction motor.
7. Explain slip-Torque characteristics of induction machine.

## PART - C

(Descriptive/Analytical/Problem solving/Design questions)

Attempt any Four questions.

(4×15=60)

1. For a rotating machine explain the Hysteresis and Eddy current losses? Describe how they are identify in machine and how they effect the over all efficiency of machine.
2. By help of suitable diagram explain and design an cyclo converter that fed induction motor drives with the potential of its speed control.
3. a) Describe various speed control mechanism for Electric Drive.  
b) Draft an closed loop control of a drive that can enhance its efficiency.
4. Write short notes on **any Four**:
  - i) EMF Equation
  - ii) Duty Cycle
  - iii) Braking
  - iv) Solid state control
  - v) Chopper Controller.
5. What is MTdc link? Give it's application and challenge. Further design a modular multi level convertor and explain its working.

7E7042

7E7042

**B.Tech. VII - Sem. (Back) Examination, January - 2023**  
**Electrical and Electronics Engineering**  
**7EX2A : Power System Analysis**  
**EE,EX**

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

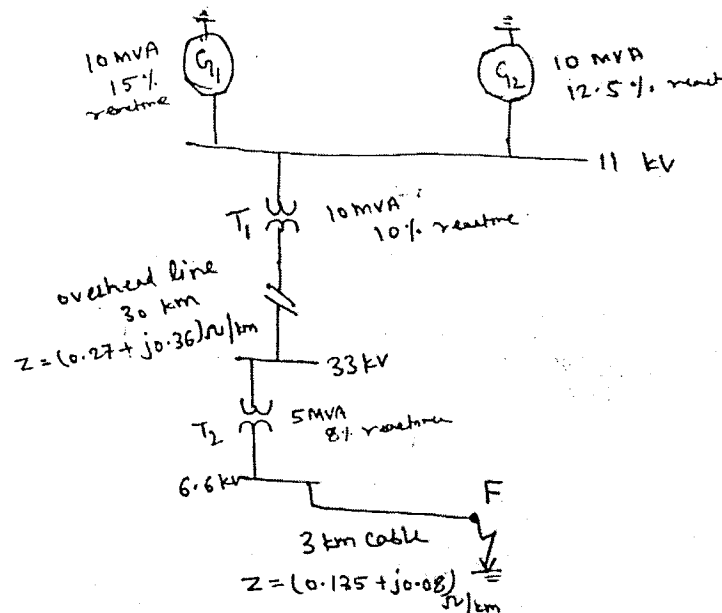
**Instructions to Candidates:**

Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry equal marks. (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)

**UNIT - I**

1. a) For the radial network shown in fig. Find the PU system upto fault point F. (8)



- b) What is the Bus Admittance matrix? Derive the general expression for the Bus Admittance matrix, take the suitable example to derive the same. (8)

**(OR)**

1. a) The parameters of a 4-Bus system are as follows.

(8)

Bus Code	Line Impedance (Z)	Charging Admittance (PU) $\left(\frac{Y_{P1}}{2}\right)$
1 - 2	$0.2 + j 0.8$	$j 0.02$
2 - 3	$0.3 + j 0.9$	$j 0.03$
2 - 4	$0.25 + j 1$	$j 0.04$
3 - 4	$0.2 + j 0.8$	$j 0.02$
1 - 3	$0.1 + j 0.4$	$j 0.01$

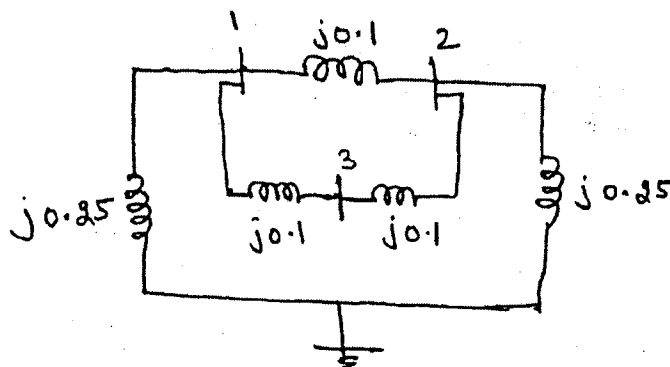
Draw the network and find the Bus Admittance matrix.

b) What is the per unit (PU) system? What are the advantages of per unit system? Also explain the single line diagram for three phase system. (8)

### UNIT - II

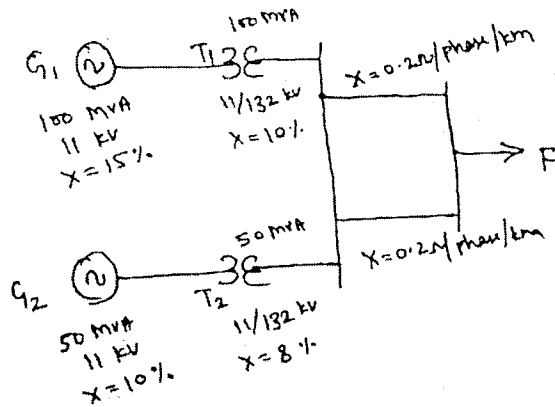
2. a) Explain the short circuit conditions of synchronous machine under no load conditions in detail. Also draw the equivalent circuit under short circuit conditions. (8)

b) For the network shown in the diagram build the  $Z_{Bus}$  matrix. (8)



(OR)

2. a) Diagram shows a generating station feeding a 132 kv system. Determine the total fault current, fault level for a 3 phase fault at the receiving end bus. The line is 200 km long. (8)



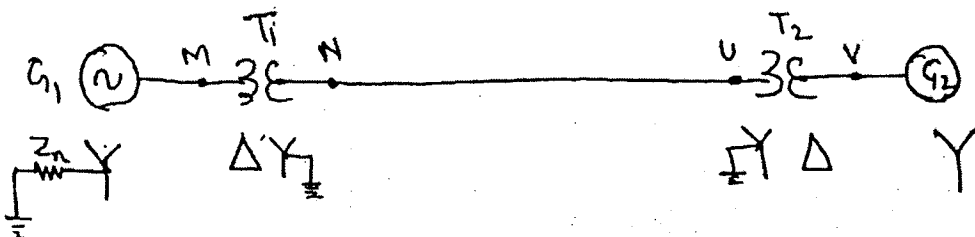
- b) What is the Impedance Bus matrix ( $Z_{Bus}$ )? Explain the Direct Determination method of  $Z_{Bus}$ . (8)

### UNIT - III

3. a) Explain with vector diagram. How unbalanced voltages can be resolved into sequence components write down expression for unbalanced phase voltages ( $V_a, V_b, V_c$ ) in term of positive, negative and zero sequence of phase "a". Also express sequence components of phase "a" in terms of the three phases a, b, c. (8)
- b) Explain how the sequence network represents the single line to ground (LG) fault in power system. Derive the expression for fault current and voltages. (8)

(OR)

3. a) Explain the sequence impedance model and sequence impedances of Transmission line. (8)
- b) For the power system whose single line diagram is shown in fig sketch the zero sequence network. (8)



## UNIT - IV

4. Analysis the line to line fault using symmetrical components. Make the connections of sequence networks under fault conditions. Also derive the expression for fault current and voltage. (16)

(OR)

4. Analysis the double line to ground fault, using symmetrical components make the connections of sequence network under fault conditions. Also derive the expression for fault current and voltages. (16)

## UNIT - V

5. a) Prove the power flow equations

$$P_i = \sum_{j=1}^n |V_i| |V_j| |Y_{ij}| \cos(\delta_i - \delta_j - \alpha_{ij})$$

$$Q_i = \sum_{j=1}^n |V_i| |V_j| |Y_{ij}| \sin(\delta_i - \delta_j - \alpha_{ij})$$

Also define the different types of Buses. (8)

- b) Explain the Gauss seidel method for load flow analysis under the condition when PV Buses are absent in the system. (8)

(OR)

5. a) Derive the expression of Jacobian element J1, J2, J3 and J4 in polar coordinates for n bus system. Which has bus 1 is a slack bus, bus 2 to m is PQ Buses and (m+1) to n is PV Buses? (10)

- b) Write the advantages and disadvantages of Gauss seidal method. (6)

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7E7043

7E7043

**B.Tech. VII - Sem. (Back) Examination, January - 2023**

**Electrical And Electronics Engg.**

**7EX3A Artificial Intelligence Techniques**

**EE, EX**

**Time : 3 Hours**

**Maximum Marks : 80**

**Min. Passing Marks : 26**

**Instructions to Candidates:**

*Attempt any five questions, selecting one question from each unit. All questions carry equal marks. 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)*

**UNIT - I**

1. a) Discuss the different application areas of Artificial intelligence. (8)
- b) What are Knowledge based expert systems? Also elaborate its importance in Engineering in details. (8)

**(OR)**

1. a) Differentiate between Machine learning, Expert system and AI. (8)
- b) What are building tools and shells? Write its importance. (8)

**UNIT - II**

2. a) Explain forward and backward chaining control strategies with the help of appropriate examples. (10)
- b) Write a short note on Representation of knowledge using logic rules/frames. (6)

**(OR)**

2. a) Discuss the control strategies with examples. (8)
- b) Write a short note on (Any two): (2×4=8)
  - i) Procedural versus
  - ii) Generate and test hill climbing.
  - iii) Breath first search.

### UNIT - III

3. a) Describe biological neuron and Synapses. (8)  
b) What are the different types of activation functions? (8)
- (OR)
3. a) Differentiate between single layer and multilayer perceptions. (8)  
b) What are the limitations of perceptions? (8)

### UNIT - IV

4. a) Explain the back propagation algorithm. What are the two different passes of back propagation algorithm? (10)  
b) Explain support vector machine. (4)
- (OR)
4. a) Describe: (2×4=8)  
i) Supervised learning  
ii) Unsupervised learning  
b) Explain Kohonen's self organizing map in detail. (8)

### UNIT - V

5. a) Define the concept of Fuzzy logic. Also explain the fuzzy relation and membership functions. (10)  
b) Write a short note on Defuzzification. (6)
- (OR)
5. a) Design a flow chart of genetic algorithm in game playing. (8)  
b) Write a short note on (Any Four) : (4×2=8)  
i) Scaling and Fitness  
ii) Mutation  
iii) Reproduction  
iv) Population  
v) Crossover.
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**B.Tech. VII - Sem. (Back) Examination January - 2023**  
**Electrical and Electronics Engg.**  
**7EX4A : Non Conventional Energy Sources**  
**EE, EX**

Time : 3 Hours

Maximum Marks : 80  
Min. Passing Marks : 26

**Instructions to Candidates:**

*Attempt any FIVE questions, selecting one question from each unit. All questions carry equal marks. 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)*

**UNIT - I**

1. a) List the various conventional and non - conventional energy sources. Explain the energy scenario in India. (8)
- b) How the world's energy problem can be tackled and what will be its environmental impact? (8)

**(OR)**

1. a) Explain the basic components of a tidal power plant and state the advantages and limitations of tidal power generation. (8)
- b) Compare single basin tidal energy power plants with double basin system. Discuss the prospects of tidal energy in India. (8)

**UNIT - II**

2. a) Describe the effect of temperature on the performance of flat plate collector. How concentrating collector is different from flat plate collector? (8)
- b) What are the various angles in solar radiation geometry? How does solar radiation affect tilted surfaces? (8)

**(OR)**

2. a) What is the purpose of a heliostat? How does heliostat device help to improve the solar concentration of devices? (8)
- b) Explain briefly the different types of concentrating type collectors. (8)

### UNIT - III

3. a) Discuss the basic principle of wind energy conversion. Differentiate between horizontal axis and vertical axis wind turbines. (8)
- b) What are the criteria for site selection of a wind power plant? What are the different controls required in operation of wind turbine? (8)

(OR)

3. a) What is the geothermal energy? State the applications of geothermal energy. (8)
- b) Explain Geothermal binary cycle power plant with neat diagram. What are the advantages and disadvantages of geothermal energy? (8)

### UNIT - IV

4. a) Discuss the various requirements for nuclear fusion. What's the difference between Nuclear Fission and Nuclear Fusion? (8)
- b) What is the purpose of the magnetic confinement of plasma in fusion reactors? (8)

(OR)

4. a) Discuss the main categories of biomass. What are the concerns associated with usage of biofuels? (8)
- b) Describe the various biomass conversion technologies. (8)

### UNIT - V

5. a) What are the factors that affect biogas generation? What are the environmental impacts of producing biogas? (8)
- b) Explain the function of Deenbandhu biogas digester with a neat sketch and also mention its merits and demerits. (8)

(OR)

5. a) What is pyrolysis? Discuss the conditions which are necessary for biomass pyrolysis? (8)
- b) Why methanol and ethanol are receiving attention as alternative fuels? Explain the various methods of ethanol production. (8)

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**7E7045**

**B.Tech. VII-Sem. (Back) Examination, January - 2023**  
**Electrical and Electronics Engg.**  
**7EX5A : Power System Engineering**  
**EE, EX**

Time : 3 Hours

Maximum Marks : 80  
Min. Passing Marks : 26**Instructions to Candidates:**

Attempt any **FIVE** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. 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)

**UNIT - I**

1. Derive condition for economic load dispatch neglecting losses. Also define penalty factors and loss coefficients in economic operation of power system. (16)

**(OR)**

1. What are the system constraints for economical operation of power system? Two units have following cost function.

$$F_1 = 120 + 22P_1 + 0.05P_1^2 \text{ Rs/hr.}$$

$$F_2 = 120 + 16P_2 + 0.06P_2^2 \text{ Rs/hr}$$

Where  $P_1$  and  $P_2$  in MW. The generator limits are

$$20 \leq P_1 \leq 100 \text{ MW}$$

$$20 \leq P_2 \leq 100 \text{ MW}$$

Find the economical dispatch for a total demand of 180 MW. (16)

**UNIT - II**

2. Derive the swing equation representing the rotor dynamics of a synchronous machine. (16)

**(OR)**

2. Explain in detail about the steady state and dynamic stabilities. (16)

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### UNIT - III

3. Explain the phenomena of critical clearing angle and critical clearing time with help of suitable example. What are the factors affecting stability and also discuss the methods to improve stability. (16)

(OR)

3. Explain Equal area criterion and its applications to transient stability under basic disturbances in detail. (16)

### UNIT - IV

4. a. Describe in detail the working of DC excitation system. (8)  
b. Write short notes on :  
i. Reserve capacity of power stations  
ii. Cold reserve  
iii. Hot reserve  
iv. Spinning reserve (8)

(OR)

4. a. Draw the block diagram and explain the brushless excitation system. (8)  
b. What is the need of reserve capacity of power stations? Explain spinning and maintenance reserves. (8)

### UNIT - V

5. a. Discuss about the perfect location of series capacitor on transmission line. Which equipment is used for the protection of capacitor? (8)  
b. Write about the advantages and problems of interconnected power systems. (8)

(OR)

5. Write short notes on (16)  
a. Power system security  
b. Voltage stability
-

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**B.Tech. VII sem(/Back) Exam 2023**  
**Electrical & Electronics Engg.**  
**7EX6.2A Computer Aided Design of Electrical Machines**  
**EE,EX**  
**7E7047**

**Time: 3Hours**

**Maximum Marks: 80**

**Min Passing Marks: 26**

Attempt any **five questions**, selecting **one question** from **each unit**. All Questions carry equal marks. (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. \_\_\_\_\_ UNIT -I

- Q. 1 a) Explain the basic principles and specifications of Electrical Machine Design? (8 marks)  
 b) Describe the factor affecting the size and rating of electrical machine design? (8 marks)

OR

- Q.1 a) Explain properties of magnetic and insulation materials deployed for electrical machine design? (8 marks)  
 b) Explain magnetizing current and draw its characteristics? (8 marks)

**UNIT -II**

- Q. 2 A) Describe the heat dissipation and heat flow equations? (8 marks)  
 B) Explain Newton Law of cooling and also give its applications? (8 marks)

OR

- Q.2 A) Explain how are turbo alternators are cooled using hydrogen gas? (8 marks)  
 B) What do you understand by rating of a electrical machine why is it so important also explain concept of short and intermittent rating? (8 marks)

**UNIT -III**

Q. 3 By help of suitable diagram the construction and working of Power and Distribution transformer also give its applications and challenges? (8 marks)

OR

Q.3 A) Explain the core and yoke cross section in a transformer by help of diagrams? (8 marks)

B) Explain type and design of transformer winding also explain this advantages application and challenges? (8 marks)

#### UNIT -IV

Q. 4 By help of a flow chart explain design of a synchronous machine and do explain each step separately? (16 marks)

OR

Q.4 A) Explain how choice of electrical loading is selected in a power generating plant generators? (8 marks)

B) By help of suitable diagram explain how stator core and winding is drafted in synchronous motor? (8 marks)

#### UNIT -V

Q. 5 A) Explain the phenomena of drafting output equations while design an induction machine? (8 marks)

B) Describe the air gap length in an induction machine how is it important for machine design? (8 marks)

OR

Q.5 By help of a flow chart explains design of a Induction machine and do explain each step separately? (16 marks)

**7E7132****7E7132**

**B.Tech. VII - Sem. (Back) Examination January- 2023**  
**Electrical Engineering**  
**7EE6.3A : Economic Operation of Power Systems**

**Time : 3 Hours****Maximum Marks : 80****Min. Passing Marks : 26****Instructions to Candidates:**

*Attempt any Five questions, selecting One question from each unit. All questions carry equal marks. (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)*

**UNIT - I**

1. a. What is Depreciation? Explain diminishing value method with their mathematical expression? (8)
- b. The cost of a plant is Rs 5,00,000 and its estimate life is 15 years. After the useful life the scrap value of the plant is Rs. 40,000. Calculate
  - i. Annual deposit in order to replace the plant after 15 years. (4)
  - ii. The value of plant after 5 years. (4)

Solve by using sinking fund method of 6% annual compound interest?

**(OR)**

1. a. Explain the selection of types of power plant in detail? (8)
- b. A steam station has two 110 MW units. The cost data is as under
 

Unit - 1	Unit - 2.
$UC_1 = \text{Rs } 18,000 \text{ per kW}$	$UC_2 = \text{Rs. } 30,000 \text{ per kW}$
$FCR_1 = 10\%, CF_1=0.55$	$FCR_2 = 10\%, CF_2 = 0.60$
Fuel consumption = 0.7 kg/kWb	Fuel consumption = 0.65 kg/kWb
Fuel cost = Rs. 1,500 per 1,000 kg	Fuel cost = Rs. 1,500 per 1,000 kg
$OM_1=20\%$ of annual fuel cost	$OM_2=15\%$ of annual fuel cost
Utilization factor = 1	Utilization factor = 1

Calculate

  - i. Annual plant cost and generation cost of unit 1 and 2. (4)
  - ii. Overall generation cost of the station (4)

## UNIT - II

2. a. Describe the 'Economic Scheduling' considering transmission loss. (8)  
 b. Discuss the input, output curve and head rate characteristics of thermal power plant. (8)

(OR)

2. a. Explain Coordinate equations of thermal power plant with their mathematical expression. (8)  
 b. The fuel costs of a two units plant are given by

$$C_1 = 100 + 2P_1 + 0.005P_1^2$$

$$C_2 = 200 + 2P_2 + 0.01P_2^2$$

Where  $P_1$  and  $P_2$  are in MW. The plant supplies a load of 450 MW? Find economic load scheduling of the two units and the incremental full cost. Neglect the loss. (8)

## UNIT - III

3. a. Describe any three scheduling methods with regard to hydro thermal coordination. (8)  
 b. What are the advantages of combined operation of hydro - thermal power plant? Explain the working of reservoirs of hydro and thermal power plant? (8)

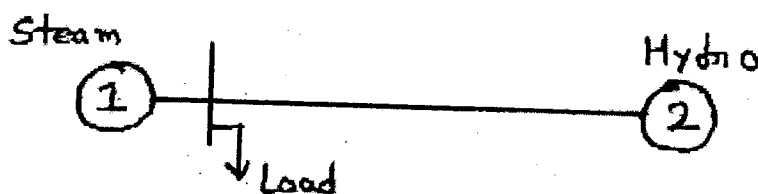
(OR)

3. a. What is the kirchmayer's method of obtaining the optimum scheduling of a hydrothermal system? (8)  
 b. A two plant system having a steam plant near load centre and a hydro plant at a remote location is shown in figure. The load is 700 MW for 14 hour a day and 500 MW for 10 hours a day. The characteristics of units are : (8)

$$C_1 = (24 + .02P_1)P_1 \text{ R/hour}$$

$$W_2 = (6 + .0025P_2)P_2 \text{ m}^3/\text{Sec}$$

$$\text{Loss coefficient } B_{22} = .0005.$$



Find the generation schedule, daily water used by hydro plant and daily operating cost of thermal plant for  $r_2 = 2.5 \text{ Rs. per hour/m}^3 \text{ Sec.}$

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**UNIT - IV**

4. a. What is synchronizing power? How does it help in keeping the machines in step? (8)
- b. Explain the effect of change in excitation on alternator without load. (8)

**(OR)**

4. Explain Active and Reactive power control in parallel operation of generator using following point :
- i. Active and reactive power control when an alternator is connected with an infinite Bus - bar. (8)
- ii. Active and reactive power control when two alternators are connected in parallel. (8)

**UNIT - V**

5. a. Explain the basic concepts of physical and financial efficiencies of electrical goods and services. (8)
- b. Describe the break - even and minimum cost analysis. What is meant by linear and non - linear breakeven. (8)

**(OR)**

5. Explain supply and Demand in Electrical Engineering economics using with following point.
- i. The law of Supply and Demand. (4)
- ii. Supply and demand relationship. (4)
- iii. Equilibrium and Disequilibrium Condition. (4)
- iv. Shift and Movement condition. (4)