| Hall Ticket Number : | | | | | | | | | | |
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**R-14**

**Code: 4P6222**

M.Tech. II Semester Regular & Supplementary Examinations June 2017

# Advanced Power System Analysis

( Electrical Power Systems )

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 12 = 60 Marks )

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**UNIT–I**

1. a) Define the term sparsity in detail, along with suitable examples 3M

   b) Discuss about the triangular factorization. 5M

   c) Discuss about the Optimal Ordering & different schemes to obtain it. 4M

**OR**

2. a) Describe the flexible storage scheme for storing matrix as Compact Arrays 6M

   b) Explain the algorithm for Gauss elimination method 6M

**UNIT–II**

3. Form the ZBUS for the given network connections. (Take bus-1 as Reference)

| Element | Self impedence | | Mutual impedence | |
|---|---|---|---|---|
| | Bus no (p-q) | $Z_{pq\ pq}$ | Bus no (m-n) | $Z_{pq\ mn}$ |
| 1 | 1-2(a) | 0.5 | | |
| 2 | 1-3 | 0.5 | 1-2(a) | 0.3 |
| 3 | 3-4 | 0.25 | | |
| 4 | 1-2 (b) | 0.6 | 1-2(a) | 0.4 |
| 5 | 2-4 | 0.75 | | |

12M

**OR**

4. a) How the $Z_{BUS}$ is modified when a branch of impedance $Z_B$ is added from a new bus – P to the reference bus. Explain with suitable example. 8M

   b) What are the approximations made in impedance diagram 4M

**UNIT–III**

5. Develop the load flow equations suitable for solving fast decoupled method and draw the flow chart. 12M

**OR**

6. a) Briefly explain fast decoupled power flow method 6M

   b) Explain sensitivity factors for P – V bus adjustment 6M

**UNIT–IV**

7. Derive the equations for total fault current and bus voltage for the following faults through fault impedance ZF

   i ) LLG FAULT II) LL fault 12M

**OR**

8. Explain the formation of bus impedance matrix with mutual coupling for a sample four bus system and its significance to solve the fault analysis 12M

**UNIT–V**

9. a) Explain the Eulers method of transient stability analysis 8M

   b) Explain what is transient stability problem 4M

**OR**

10. Describe step by step algorithm for solving stability analysis of multi machine system using classical synchronous machine model. 12M

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**R-14**

**Code: 4P6223**

M.Tech. II Semester Regular & Supplementary Examinations June 2017

# Advanced Power System Protection

( Electrical Power Systems )

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 12 = 60 Marks )

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**UNIT–I**

1. a) Explain the duality between amplitude and phase comparators. 6M
   b) Explain the operation of circulating current type amplitude comparator with neat diagram. 6M

**OR**

2. a) Derive the general equation for two input phase comparators. 6M
   b) Explain the operation of instantaneous amplitude comparator with neat diagram. 6M

**UNIT–II**

3. a) Explain the operation of block spike phase comparator with neat diagram. 6M
   b) Explain the operation of inverse definite time over current relays with neat diagram. 6M

**OR**

4. a) Explain the operation of vector product type phase comparator with neat diagram. 6M
   b) Explain the operation of instantaneous over current relays with neat diagram. 6M

**UNIT–III**

5. a) Explain the operation of harmonic restraint relay with neat diagram. 6M
   b) Explain the realization of reactance relay using sampling comparator. 6M

**OR**

6. a) Explain duo bias transformer differential protection with neat diagram. 6M
   b) Explain the operation of angle impedance relay with neat diagram. 6M

**UNIT–IV**

7. a) Explain in detail the switched distance schemes. 6M
   b) Explain the effect of power swings on the performance of distance relays. 6M

**OR**

8. a) Explain in detail the poly phase distance schemes. 6M
   b) Explain the effect of line length and source impedance on the performance of distance relays. 6M

**UNIT–V**

9. a) Explain the over current relay with neat block diagram and flow chart. 6M
   b) Explain the measurement of reactance with neat diagram. 6M

**OR**

10. a) Explain the impedance relay with neat block diagram and flow chart. 6M
    b) Explain the realization of offset MHO characteristics with neat diagram. 6M

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**R-14**

**Code: 4P7221**

M.Tech. II Semester Regular & Supplementary Examinations June 2017

# Energy Conversion Systems

( Electrical Power Systems )

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 12 = 60 Marks )

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**UNIT–I**

1. Develop the expression for generation of electricity by photovoltaic effect with neat diagram. 12M

**OR**

2. Write the list of 20 test specifications for PV systems and explain any three in detail 12M

**UNIT–II**

3. a) Derive an expression for specific power output for practical MHD generator. 6M
   b) Write short notes on MHD technology? 6M

**OR**

4. Explain the principle and application of wind electric system. State the basic Components and their working in wind electric system. 12M

**UNIT–III**

5. a) With neat diagram explain the principal of tidal power 4M
   b) Explain the working of single basin tidal power model 8M

**OR**

6. With neat sketch explain the working of open cycle OTEC system for ocean thermal energy 12M

**UNIT–IV**

7. With neat sketch explain the Bio gas plant 12M

**OR**

8. a) Explain the factors affecting bio gas plants 4M
   b) What are the different biogas models in India? Explain briefly any one model. 8M

**UNIT–V**

9. a) Explain the principal of fuel cell? 4M
   b) Explain any one application of fuel cell with neat diagram. 8M

**OR**

10. a) Write short notes on pollution free energy systems 6M
    b) Explain pollution from coal and preventive measures 6M

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**R14**

**Code: 4P6228**

M.Tech. II Semester Regular & Supplementary Examinations June 2017

# Electrical Power Distribution & Automation

( Electrical Power Systems )

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 12 = 60Marks )

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## UNIT–I

1. a) Define and explain load factor, Coincidence factor, Contribution factor and loss factor. 6M
   b) A 120 MW substation delivers 120 MW for 3 Hrs, 60 MW for 8 Hrs and shut down for rest of each day. It is also shut down for the maintenance for 15 days each year. Calculate its annual load factor. 6M

**OR**

2. a) Write short notes on Load modeling and its characteristics. 6M
   b) The annual peak load input to a primary feeder is 1500 KW. The voltage drop and losses shows that the total loss at the time of peak load is 100 KW. The total annual energy supplied to the sending end of the feeder is $5.5 \times 10^6$ KWh.
   **(i)** Determine the annual loss factor
   **(ii)** Calculate the total annual energy loss and the annual cost if the unit charge is Rs. 2.50. 6M

## UNIT–II

3. a) Discuss the design consideration of Loop type primary feeders. 6M
   b) What are the types of common faults that occur in a distribution system? Explain them in detail. 6M

**OR**

4. a) Explain the principle of operation of **(i)** Circuit breakers **(ii)** Circuit reclosures 6M
   b) Explain the design consideration of radial type distribution feeder with neat diagrams in detail. 6M

## UNIT–III

5. a) What is the need of distribution automation? 6M
   b) Explain in detail the concept of Distribution Automation. 6M

**OR**

6. a) Discuss in detail about various functions of SCADA. 6M
   b) What are the benefits of Distribution Automation? 6M

## UNIT–IV

7. a) What are the functionalities of DAS? 6M
   b) Write short notes on outage management. 6M

**OR**

8. Explain in detail the Database structures and Interfaces in DMS 12M

## UNIT–V

9. a) What is power quality explain power quality with respect to distribution automation 6M
   b) Explain voltage control in Distribution Automation 6M

**OR**

10. a) Explain VAR control in Distribution Automation 6M
    b) Write short on Demand Side Management 6M

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**R-14**

**Code: 4P6226**

M.Tech. II Semester Regular & Supplementary Examinations June 2017

# Modern Power Electronics

( Electrical Power Systems )

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 12 = 60 Marks )

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**UNIT–I**

1. a) Explain the turn-on and turn-off characteristics of GCT. 6M
   b) Explain the series connection of power electronic devices and causes of voltage unbalance. 6M

**OR**

2. a) Compare the devices IGBT, SCR, GCT and GTO in terms of frequency of application, conduction losses, turn-on and turn-off times. 6M
   b) Develop a suitable circuit for static and dynamic voltage equalization in case of series connected GCTs. 6M

**UNIT–II**

3. a) Outline the principle of space vector modulation and interpret the evaluation of switching states and space vectors. 6M
   b) Explain with a circuit connection the operation of a 5-level H-bridge multilevel inverter. 6M

**OR**

4. a) What is discontinuous space vector modulation? List its features. 6M
   b) Compare the features of unipolar and bipolar PWM techniques as applied to inverter. 6M

**UNIT–III**

5. a) Mention the advantages, disadvantages and applications of diode clamped multilevel inverter. 6M
   b) Explain the operation of a 3-level diode clamped multilevel inverter with space vector modulation. 6M

**OR**

6. a) With a suitable figure describe relationship between $V_{ref}$ location and dwell time in case of space vector modulation technique. 6M
   b) List the causes of neutral-point voltage deviation in a diode clamped multilevel inverter. 6M

**UNIT–IV**

7. a) With neat circuit diagram and waveforms explain the operation of dc-dc buck-boost converter. Derive the expression for voltage ripple. 8M
   b) List the advantages and disadvantages of switch-mode power supply. 4M

**OR**

8. a) With a suitable schematic explain the use of electrical isolation in the feedback loop of SMPS. 6M
   b) Explain the operation of Cuk dc-dc converter in continuous mode. 6M

**UNIT–V**

9. a) Explain the operation of series-loaded resonant converter. 6M
   b) What is zero voltage switching (ZVS)? Explain the operation of resonant-dc-link inverters with ZVS. 6M

**OR**

10. a) Describe the causes and effects of any 3 power quality problems. 6M
    b) With a suitable block diagram explain the working principle of uninterruptible power supply. 6M

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**R14**

**Code: 4P6221**

M.Tech. II Semester Regular & Supplementary Examinations June 2017

# Operation & Control of Power System

(Electrical Power Systems)

Max. Marks: 60 Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 12 = 60Marks )

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## UNIT–I

1. a) Explain base point and participation factor with respect to economic load dispatch 6M

   b) Compare with unit commitment and Economic load dispatch 6M

**OR**

2. State the unit commitment problem and With the help of a flow chart, explain forward dynamic programming solution method of unit commitment problem. 12M

## UNIT–II

3. a) Explain the short term Hydro-thermal scheduling problem with necessary expressions. 6M

   b) Briefly describe long term Hydro-thermal scheduling problem with necessary expressions. 6M

**OR**

4. Explain pumped storage hydro scheduling with a Dynamic programming and linear programming method. 12M

## UNIT–III

5. a) Explain the static and dynamic characteristics of single area control system. 6M

   b) Develop the state variable model of a single area system and state the advantages of the model. 6M

**OR**

6. Draw the block diagram of uncontrolled two area load frequency control system and explain the salient features under static condition. 12M

## UNIT–IV

7. a) Discuss various factors affecting the economic interchange between interconnected utilities. 6M

   b) Describe various methods of power interchange methods. 6M

**OR**

8. a) Briefly describe about power pools. 6M

   b) Explain Wheeling in interconnected utilities. 6M

## UNIT–V

9. Briefly describe various methods of Contingency analysis of power system security. 12M

**OR**

10. a) Explain the power system security and control with neat flow chart. 6M

    b) Explain the algorithm of Orthogonal decomposition estimation method 6M

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