

23741

M.Tech. 1st Semester (Power Systems) CBCS Scheme

Examination, December-2024

POWER SYSTEM ANALYSIS

Paper-22MPS21C1

Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt five questions in all. Question No. 1 is compulsory. Attempt four more question from the Sections A, B, C and D by selecting at least one question from each section.

1. (a) Describe the classification of buses in a power system.
- (b) Define the incidence matrix in the context of power systems.
- (c) Discuss contingency ranking.
- (d) Discuss the differences between symmetrical and unsymmetrical faults.
- (e) Explain the significance of pre-fault currents in fault analysis. 5×4=20

23741-P-3-Q-9 (24)

[P.T.O.]

Section-A

2. (a) Discuss the steps involved in the formation of the Y-bus matrix using the incidence matrix method.

10

- (b) Explain the triangular factorization method for solving network equations.

10

3. Discuss the primitive network matrix and represent its forms. Prove $Y_{bus} = A^T [y] A$ using singular transformation ?

20

Section-B

4. Compare the performance and convergence characteristics of Gauss-Seidel and Fast Decoupled methods for load flow analysis.

20

5. Describe the Backward-Forward Sweep method used in radial distribution systems. Provide an example of a radial system and demonstrate step-by-step how the method can be applied to calculate bus voltages and power flows.

20

Section-C

6. Explain the significance of symmetrical components in power system. Derive the expression for symmetrical components of voltages in terms of phase voltages.

20

7. Discuss the methodology used for calculating fault currents for a single Line-to-Ground (LG) fault in a power system.

20

Section-D

8. Explain how contingency analysis helps operators in predicting the effects of a single line outage in a power system.

20

9. (a) Describe the various operating states of a power system with a neat sketch.

10

- (b) What are the key assumptions and challenges involved in state estimation using the method of least squares ?

10

23744

**M.Tech. 1st Semester (Power System) CBCS Scheme
Examination, December-2024
SMART GRID TECHNOLOGY
Paper - 22MPS21C4**

Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt five questions in all. Question no. 1 is compulsory. One question must be attempt from each section.

1. (i) Define smart grid technology.
- (ii) Why we need planning in smart grid?
- (iii) Describe the voltage stability constraints.
- (iv) Analyse the bottleneck in smart grid control.

20

Section - A

2. Explain the Forward / Backward sweep method for the load flow analysis. 20
3. Write down the algorithm of sensitivity matrix for mismatch calculation. 20

23744-P-2-Q-9(24)

[P.T.O.]

(2)

23744

Section - B

4. Explain various analysis of smart grid. 20
5. Explain the planning and design of smart grid systems. 20

Section - C

6. Explain the need of shunt compensation with suitable example. 20
7. Derive the Tie-line power sharing concept in details. 20

Section - D

8. Describe the load dispatch centre functions in contingency analysis and preventive. 20
9. Describe the load dispatch in control objectives of smart distribution system. 20

23745

M. Tech. (Power System) (CBCS Scheme) 1st Semester

Examination, December, 2024

POWER SYSTEM STABILITY

Paper : 22MPS21C5

Time allowed : 3 hours]

[Maximum marks : 100

Note: Attempt five questions selecting one from each section. Question No. 1 is compulsory.

1. (a) Why transient stability limit is less than that of steady state stability limit? 5
- (b) Define the critical clearing angle and critical clearing time. 5
- (c) Briefly discuss the use of swing equation. 5
- (d) Enlist the Voltage stability enhancement techniques. 5

Section-A

2. (a) Define steady state stability. Distinguish between steady state and transient stability. 10
- (b) Explain the rotor angle stability. 10

23745-P-2-Q-9 (24)

[P.T.O.]

3. Derive an expression for output power equation of asynchronous machine. 10

Section-B

4. Discuss any two eigen properties of state matrix. How eigen values affect the stability of a system. 20
5. Discuss any three methods to improve steady state and transient stability enhancement. 20

Section-C

6. Explain the equal area criterion with its two applications for single machine infinite bus system with the help of power angle curve. 20
7. Discuss about multi machine transient stability under faulted conditions. 20

Section-D

8. Describe the effect of on load tap changing transformer (OLTC) and load characteristics on voltage stability. 20
9. Write a short note on : 20
- (a) Static and Dynamic modelling of power system
- (b) VCPI

23742

M.Tech (Power System) 1st Semester -CBCS Scheme

Examination, December - 2024

ECONOMIC OPERATION OF POWER SYSTEMS

Paper - 22MPS21C2

Time allowed : 3 hours]

[Maximum marks : 100

Note : Attempt five question in all , selecting one question from each section. Question No. 1 is compulsory. All questions carry equal marks.

1. (i) What do you mean by transmission losses? 20
- (ii) What are the constraints in thermal units?
- (iii) Draw the hydroelectric plant models neatly.
- (iv) What is the need for Load Frequency Control (LFC)?

Section - A

2. Explain the economic importance and characteristics of steam units. 20
3. Explain economic dispatch using a dynamic programming approach. 20

23742-P-2-Q-9(24)

[P.T.O.]

Section - B

4. Explain the unit commitment solution Dynamic Programming Solution with a suitable example. 20
5. Discuss the comparison between economic dispatch and unit commitment. 20

Section - C

6. Explain the scheduling using Dynamic programming and linear programming. 20
7. Explain the gradient approach in hydrothermal problems. 20

Section - D

8. Draw a two-area system model of Load Frequency Control (LFC). 20
9. Explain the implementation of Automatic Generation Control (AGC). 20

23743

M. Tech. (Power System) 1st Semester (CBCS-Scheme)

Examination, December-2024

ELECTRICAL POWER DISTRIBUTION SYSTEM

Paper : 22MPS21C3

Time allowed : 3 hours]

[Maximum marks : 100

Note: Attempt five questions in all. Question No. 1 is compulsory. Attempt four more questions from the Section A, B, C and D by selecting at least one question from each section.

1. (a) Explain the role of a distribution system in the overall power grid. 4×5=20
- (b) Explain the role of Distribution Automation in modern power distribution systems.
- (c) List and explain the primary objectives of energy accounting in the context of electricity distribution.
- (d) What is Need-Based Energy Management (NBEM)?

23743-P-3-Q-9 (24)

[P.T.O.]

Section-A

2. Discuss the purpose of overhead lines and underground cables in a distribution system in detail. 20
3. Explain the effect of voltage fluctuations and unbalanced loading on the failure rate of distribution transformers. 20

Section-B

4. (a) Discuss the impact of aging infrastructure on the reliability of existing distribution networks. 10
- (b) How does load imbalance affect the performance of existing electrical distribution systems? 10
5. (a) How can Distribution Automation help in accommodating renewable energy sources in the distribution network? 10
- (b) What are the environmental advantages of implementing Distribution Automation? 10

(3)

23743

Section-C

6. Discuss the tools and technologies used in energy accounting. 20
7. What challenges might arise in the energy accounting process and how can they be mitigated? 20

Section-D

8. How does NBEM help in reducing energy wastage and improving overall energy efficiency? 20
9. How does DSM contribute to reducing peak demand and enhancing the reliability of the power grid? 20