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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Power System Operation & Control
Course Code : A402311
Branch : Electrical & Electronics Engineering
Date & Session : 26-11-2025 AN **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. Define incremental fuel cost. 1 M
2. What is a penalty factor? 1 M
3. What are the important methods of hydrothermal coordination? 1 M
4. What are the constraints in unit commitment? 1 M
5. What are the different components of speed governor mechanism? 1 M
6. What is the need of integral control in single area LFC System? 1 M
7. What is meant by load compensation? 1 M
8. What is the need of excitation system? 1 M
9. What are the functions of SCADA? 1 M
10. List the basic functions of EMS. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Derive general transmission line loss formula and state assumptions made for calculating B- coefficients. 10M

OR

11. B). The fuel inputs per hour of plants 1 and 2 are given as 10M
 $F_1 = 0.2P_1^2 + 40P_1 + 120$ Rs/hr
 $F_2 = 0.25P_2^2 + 30P_2 + 150$ Rs/hr
Calculate the economic operating schedule and the corresponding cost of generation. The maximum and the minimum loading on each unit are 100MW and 25MW. Assume the transmission losses are ignored and the total demand is 180MW. Also determine the saving obtained if the load is equally shared by both the units.

12. A). Obtain the condition for economic generation of steam and hydro plants for short term scheduling. State the any assumptions are considered. 10M

OR

12. B). What is meant by unit commitment and explain briefly the constrains on unit commitment. 10M

13. A). Explain the load frequency control of single area system with neat block diagram. 10M

OR

13. B). Explain the integration of economic dispatch with load frequency control with neat block diagram. 10M

(P.T.O..)

14. A). What is an excitation system? What are its characteristics? Derive its transfer function and represent block diagram. 10M

OR

14. B). Describe in detail various reactive power compensation used in transmission systems and mention its advantages. 10M

15. A). Explain the hardware components and functional aspects of SCADA system using a fundamental block diagram. 10M

OR

15. B). Explain the various operating states of power system. Also discuss the state transitions and control strategies using state transition diagram. 10M

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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : High Voltage DC Transmission
Course Code : A402407
Branch : Electrical & Electronics Engineering
Date & Session : 28-11-2025 AN **Duration: 3 hours** **Max. Marks: 60**

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. What are the five modes of region of rectifier operation of a 12-pulse converter? 1 M
2. What are the demerits of HVDC transmission? 1 M
3. What is the importance of reactive power? 1 M
4. What is the effect the source inductance on the system. 1 M
5. Mention the different methods for power flow analysis. 1 M
6. What is meant by DC Network. 1 M
7. How corona affects the DC line? 1 M
8. What is radio interference? 1 M
9. What is the role of the AC filter in HVDC transmission? 1 M
10. What is meant by non characteristic harmonics? 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Discuss about the various new trends used to reduce cost of the converter station and improving the performance of the HVDC transmission. 5M
ii) Elaborate the factors to be considered for the choice of the converter configuration. 5M

OR

11. B). i) Explain in detail about the application of DC transmission systems. 4M
ii) Draw the diagrams and explain the types of HVDC links. 6M

12. A). i) Explain Starting and Stopping of DC-link. 5M
ii) Discuss the concept of reactive power requirement in HVDC converters. 5M

OR

12. B). i) Explain how to control the power in the HVDC link. What is a drawback in power control. 5M
ii) Explain in detail the significance of constant extinction angle control. 5M

13. A). Discuss in detail about the sequential method of power flow solution with necessary equations. 10M

OR

13. B). i) Explain load flow in DC quantities for HVDC System. 5M
ii) Write the mathematical model of a dc converter. 5M

(P.T.O.)

14. A). Explain about over voltage and over current protection in the converter station. 10M

OR

14. B). i) Explain the use of surge arrestors for HVDC systems. 5M

ii) Explain the development of DC circuit breaker. 5M

15. A). Explain in detail about the design aspects of high pass filter with necessary equations. 10M

OR

15. B). i) Discuss the effect of non-characteristic harmonics on HVDC transmission. 5M

ii) Derive the expression for the inductance of a single tuned filter. 5M

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R22



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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Flexible AC Transmission Systems
Course Code : A402411
Branch : Electrical & Electronics Engineering
Date & Session : 01-12-2025 AN **Duration:** 3 hours **Max. Marks:** 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. Why electrical transmission systems are interconnected? 1 M
2. List out the voltage and current ratings of high power devices. 1 M
3. Mention the importance of self-commutating converters. 1 M
4. What are the effects of harmonics in a three phase bridge converter. 1 M
5. Write the three important objectives of shunt compensation. 1 M
6. What is the significance of reactive power? 1 M
7. What are static VAR compensators? 1 M
8. Why shunt compensation is less effective than series compensation? 1 M
9. What is meant by switched transients in thyristor switched capacitor? 1 M
10. Write the functional requirements of series compensation. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Explain various FACTS controllers and state their benefits. 5M
ii) Discuss various limitations on the loading of a transmission line. 5M

OR

11. B). i) Explain the power flow in AC systems. 5M
ii) Describe relative importance of different types of controllers. 5M

12. A). i) Explain the three phase full-wave bridge converter with necessary waveforms. 5M
ii) Enumerate the relative merits and demerits of current source converters over voltage source converters. 5M

OR

12. B). Discuss 3- Phase 24 pulse full wave bridge converter operation with necessary diagrams. 10M

13. A). i) Enumerate variable impedance type static VAR generators and switching converter type VAR generators. 5M
ii) Discuss in detail the operation of thyristor-controlled reactor. 5M

OR

13. B). Explain the mid-point voltage regulation for line segmentation with shunt compensation. 10M

14. A). i) Enumerate the operating features of STATCOM. 5M
ii) Describe the power oscillation damping using shunt compensation. 5M

OR

14. B). Describe the transfer function and dynamic performance of SVC and STATCOM with necessary diagrams. 10M

(P.T.O.)

15. A). i) Explain the operation of GTO thyristor-controlled series capacitors. 5M
ii) Explain the functional block diagram of GTO thyristor-controlled series capacitors 5M

OR

15. B). Explain in detail the operation and characteristics of thyristor controlled series capacitor. 10M

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Examination : B.Tech VII Semester Regular Examinations Nov/Dec-2025
Course Name : Electrical Energy Conservation & Audit
Course Code : A402414
Branch : Electrical & Electronics Engineering
Date & Session : 03-12-2025 AN **Duration:** 3 hours **Max. Marks:** 60

(Note: Assume suitable data if necessary)

PART-A

Answer all TEN questions

Each question carries ONE mark.

10x1=10M

1. Mention any two factors influencing energy pricing. 1 M
2. What is meant by energy security? 1 M
3. State the formula for heat transfer. 1 M
4. What are the main units of energy? 1 M
5. State any two instruments used in energy auditing. 1 M
6. Define energy substitution. 1 M
7. Define distribution losses. 1 M
8. What is meant by maximum demand control? 1 M
9. List two advantages of energy-efficient motors. 1 M
10. What are occupancy sensors? 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Formulate a long-term national energy strategy considering economic and environmental balance. 10M

OR

11. B). Summarize the importance of energy conservation in national growth. 10M

12. A). Evaluate the effect of load management on system efficiency. 10M

OR

12. B). Explain the methods of power factor improvement in power system. 10M

13. A). Identify methods used for preparing process flow diagrams. 10M

OR

13. B). Analyze how benchmarking improves industrial energy performance. 10M

14. A). Apply methods for distribution and transformer loss minimization in electrical distribution networks. 10M

OR

14. B). Analyze the losses and factors effecting Induction motor performance. 10M

15. A). Evaluate the performance of energy-efficient lighting systems for energy saving 10M

OR

15. B). Apply power factor controllers to optimize system energy consumption 10M
