H.T No: | | | | | | | | | | | R22

CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : **M.Tech II Semester Supplementary Examinations March-2025**
Course Name : **Advanced Power Electronic Converters-II**
Course Code : **B443303**
Branch : **Power Electronics**
Date & Session : **18-03-2025 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 functions of dc-dc converters? 1 M
2. List the applications of dc-dc converters. 1 M
3. What are different types of Switched mode converters? 1 M
4. What are the advantages of fly back converter? 1 M
5. Discuss advantages of series resonant inverters? 1 M
6. What are the advantages of soft-switching in these types of inverters? 1 M
7. Write two comparisons between ZCS and ZVS. 1 M
8. What are the main advantages of using ZCS in power converters? 1 M
9. What are the advantages and disadvantages of matrix converters compared to conventional AC-DC-AC converters. 1 M
10. What are the advantages of uninterrupted power supplies? 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Explain operation of the Buck converter with neat circuit. 10M

OR

11. B). Derive the expression for the output voltage of a boost converter in terms of the input voltage and the duty cycle. 10M

12. A). Explain operation of half bridge Push pull converter and derive the expression for the output voltage of a push-pull converter in terms of the input voltage and the turns ratio of the transformer. 10M

OR

12. B). Explain the basic operation of a flyback converter and derive the expression for the output voltage of a flyback converter. 10M

13. A). Explain in detail about series Resonant Inverter with neat diagram and output waveforms 10M

OR

13. B). Explain in detail about Class E Resonant rectifier with neat diagram and output waveforms. 10M

(P.T.O..)

14. A). Explain in detail about L type ZCS resonant converter with different types of operation modes. 10M

OR

14. B). The ZCS Resonant Converter delivers a maximum power of PL = 400MW at Vo=4V.The supply voltage is Vs =12V. The maximum operating frequency is fmax =50kHz. Find the value of L and C. Assume that the intervals t1 and t3 are very small and x=1.5(I m/Io). 10M

15. A). Explain the basic operation of a SEPIC converter. How does it achieve both step-up and step-down voltage conversion? 10M

OR

15. B). What is a Interleaved converter. Explain the structure and operation with neat sketches. 10M

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Examination : **M.Tech II Semester Supplementary Examinations March-2025**
Course Name : **Power Electronics Application to Power Systems**
Course Code : **B443304**
Branch : **Power Electronics**
Date & Session : **20-03-2025 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 primary components of a power system? 1 M
2. What factors affect the loadability of a transmission line? 1 M
3. Define Generation Shift Distribution Factor (GSDF). 1 M
4. List and briefly describe different power system security levels. 1 M
5. What is voltage stability, and why is it important in power systems? 1 M
6. What is the slope of the PV curve? 1 M
7. What are Flexible AC Transmission Systems (FACTS)? 1 M
8. What are the advantages of shunt compensation in power systems? 1 M
9. What is a Thyristor-Controlled Series Capacitor (TCSC)? 1 M
10. What is the role of TCSC in damping power oscillations? 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Explain the transmission line model and factors affecting its loadability. 10M

OR

11. B). A 500 kV transmission line delivers 1000 MW over 300 km. If the line reactance is 0.3 p.u. and power factor is 0.9, calculate the reactive power loss and suggest methods to reduce it. 10M

12. A). Discuss the role of Compensated Shift Factors (CSF) in improving power system security. Provide a case where they can be used effectively. 10M

OR

12. B). Explain how Line Outage Distribution Factors (LODF) are used to predict power flow changes during a line outage. Provide a numerical example. 10M

13. A). Explain the concept of voltage stability and classify different types of voltage instability in power systems. 10M

(P.T.O..)

OR

13. B). Given the following eigenvalues and their corresponding right eigenvectors for a power system: Determine the most vulnerable bus in terms of voltage stability using participation factors. 10M

$$\lambda_1 = 0.12, \quad \lambda_2 = 0.03, \quad \lambda_3 = 0.002$$

Eigenvectors:

$$V_1 = \begin{bmatrix} 0.8 \\ 0.5 \\ 0.3 \end{bmatrix}, V_2 = \begin{bmatrix} 0.6 \\ 0.7 \\ 0.4 \end{bmatrix}, V_3 = \begin{bmatrix} 0.2 \\ 0.1 \\ 0.9 \end{bmatrix}$$

14. A). With a neat diagram, explain the working of Thyristor-Controlled Reactor (TCR) and its effect on reactive power compensation. 10M

OR

14. B). Explain the differences between Static Var Compensator (SVC) and Static Synchronous Compensator (STATCOM) and justify which is more efficient under dynamic load conditions. 10M

15. A). Explain how TCSC enhances transient stability in a power system, including its effect on power flow and oscillation damping. 10M

OR

15. B). Compare the steady-state and transient stability models of TCSC, explaining their applications in power system analysis. 10M

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H.T No: | | | | | | | | | | | R22

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Examination : **M.Tech II Semester Supplementary Examinations March-2025**
Course Name : **Power Quality Improvement Techniques**
Course Code : **B443411**
Branch : **Power Electronics**
Date & Session : **22-03-2025 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. List any two effects of poor power quality on industrial equipment. 1 M
2. State the causes for Voltage Fluctuations. 1 M
3. Define power quality issues caused by non-linear loads. 1 M
4. Name any two power electronic devices that introduce non-linearity in power systems. 1 M
5. What is the role of capacitors in passive shunt compensation? 1 M
6. What is the significance of load balancing in three-phase systems? 1 M
7. What is the purpose of the I-Cosφ control algorithm in DSTATCOM? 1 M
8. What is the main difference between DSTATCOM and DVR? 1 M
9. Define the role of the shunt compensator in a UPQC. 1 M
10. Name one control algorithm used for UPQC operation. 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Analyze various power quality issues, their causes, and their effects on the power system. 10M

OR

11. B). Discuss the role of power electronic devices in mitigating power quality problems. 10M

12. A). Discuss in detail the types of non-linear loads and their effects on power quality. 10M

OR

12. B). Analyze the effects of non-linear loads on power quality in a distribution system. Discuss the impact of harmonics on transformers, capacitors, and motors. 10M

13. A). Analyze the impact of passive series compensation on the stability and efficiency of a transmission line. 10M

OR

13. B). Design a passive shunt compensator for a three-phase four-wire system to achieve load balancing and power factor correction. 10M

14. A). Develop a Synchronous Reference Frame Theory-based control algorithm for DSTATCOM, incorporating a block diagram and mathematical analysis. 10M

OR

14. B). Analyze the Synchronous Reference Frame Theory-based control algorithm for DVR. Include a block diagram and mathematical analysis. 10M

(P.T.O..)

15. A). Analyze the role of UPQC in mitigating voltage sags, swells, and harmonics in a distribution network. 10M

OR

15. B). Design a control strategy for a UPQC to mitigate both voltage and current-related power quality issues in a three-phase system. 10M

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Examination : **M.Tech II Semester Supplementary Examinations March-2025**
Course Name : **Distributed Generation**
Course Code : **B443414**
Branch : **Power Electronics**
Date & Session : **25-03-2025 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 is the need for Distributed generation? 1 M
2. What is distributed generation? 1 M
3. What are the different types of interfaces in distributed generation? 1 M
4. What is the Aggregation of multiple DG units? 1 M
5. What do you mean by Deregulation? 1 M
6. What are the technical impacts of DG on transmission systems? 1 M
7. What are the power quality issues due to DG? 1 M
8. What are the limitations of DG's? 1 M
9. What is Autonomous grids? 1 M
10. What is protection of Micro grids? 1 M

PART-B

Answer the following. Each question carries TEN Marks. **5x10=50M**

11.A). Explain current Scenario in Distribution generation. 10M

OR

11. B). Discuss the Renewable sources in Distributed generation. 10M

12. A). Briefly explain the Sitting and Sizing of DG's optimal placement of DG sources in distribution systems. 10M

OR

12. B). Discuss the Grid integration of DG's. 10M

13. A). Explain the impact of DG's upon transient and dynamic stability of existing distribution systems. 10M

OR

13. B). Discuss the steady state and dynamic analysis of DG's. 10M

14. A). Explain the Economic and control aspects of DG's market facts. 10M

OR

14. B). Explain the Reliability of DG based systems. 10M

15. A). Briefly discuss the modelling and analysis of Micro grids with multiple DG's. 10M

OR

15. B). Discuss the Micro grids with power electronic interfacing units. 10M

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