

H.T No:

--	--	--	--	--	--	--	--	--	--

R22



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : M.Tech II Semester Regular & Supplementary Examinations August-2025
Course Name : Advanced Power Electronic Converters-II
Course Code : B443303
Branch : Power Electronics
Date & Session : 25-08-2025 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. Name three types of non-isolated DC-DC converters. 1 M
2. What is the function of a Buck-Boost converter? 1 M
3. What is the primary function of a Flyback converter? 1 M
4. Which converter is suitable for low-power, isolated applications? 1 M
5. What are the key components of a resonant pulse inverter? 1 M
6. Why are resonant inverters preferred at high frequencies? 1 M
7. What is Zero Current Switching (ZCS)? 1 M
8. What is the main advantage of ZVS resonant inverters? 1 M
9. What are the main functions of a power conditioner? 1 M
10. How many inductors are used in a SEPIC converter? 1 M

PART-B

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

- 11.A). Explain the working principle, operation modes, and waveforms of a Buck Regulator. 10M
Derive the expression for output voltage in terms of duty cycle.
- OR**
- 11.B). With a neat diagram, explain the operation of a Buck-Boost regulator. Derive the relationship between input and output voltages. 10M
- 12.A). Explain the working principle of a Switched Mode Power Supply (SMPS). How is it different from a linear power supply in terms of efficiency and operation? 10M
- OR**
- 12.B). Derive the expression for the output voltage of a Flyback converter operating in Continuous Conduction Mode (CCM) 10M
- 13.A). Explain the construction and working principle of a Half-Bridge Resonant Inverter with a neat circuit diagram. 10M
- OR**
- 13.B). Explain Half Bridge resonant inverter with bidirectional switches with a neat circuit diagram. 10M

(P.T.O.)

14. A). Explain the procedure for selecting the inductor (L) and capacitor (C) values in a Zero Current switching inverter. 10M

OR

14. B). Explain the working of L-Type ZCS resonant Converter with relevant waveforms. 10M

15. A). Explain the working principle of a UPS system. Describe its main components and the power flow during normal operation and during a power outage. 10M

OR

15. B). Explain the working of a SEPIC converter with a circuit diagram. Derive the expression for output voltage in terms of duty cycle. 10M

H.T No:

--	--	--	--	--	--	--	--	--	--

R22



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : M.Tech II Semester Regular & Supplementary Examinations Aug/Sept-2025
Course Name : Distributed Generation
Course Code : B443414
Branch : Power Electronics
Date & Session : 02-09-2025 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 Distributed Generation. 1 M
2. Distinguish between renewable and non-renewable energy sources. 1 M
3. List the different types of DG interfaces. 1 M
4. What is significance of optimal placement of distributed generation? 1 M
5. What are the protective relays used in distribution system? 1 M
6. List out the limitations of DGs. 1 M
7. Mention any two power quality problems. 1 M
8. What is significance of IEEE 1547 standards? 1 M
9. What is Autonomous grid? 1 M
10. What are types of micro grid? 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). i) Discuss the need for Distributed Generation. 5M
ii) Enumerate the advantages of distributed generation technology. What are the main concerns of existing centralized power system? 5M
- OR**
11. B). Analyze the current scenario of Distributed Generation in India. 10M
12. A). Discuss the factors to be considered for planning of DGs. 10M
- OR**
12. B). Describe the different aggregation approaches that can be applied for integration of DGs in power system. 10M
13. A). Discuss the impact of DG on Transmission and Distribution systems. 10M
- OR**
13. B). What is De-regulation? Illustrate the advantages and disadvantages of De-regulation. 10M
14. A). What are the problems that are noticed when the DG is interfaced to the utility system? Discuss the impact of DG interface to utility system. 10M

(P.T.O.)

OR

14. B). i) Explain the following harmonic indices in detail: 5M
(a) Total Harmonic Distortion (b) Total Demand Distortion.
- ii) There are different reactive power control functions like Constant reactive power mode, voltage-reactive power mode etc. Discuss any one mode with example. 5M
15. A). Explain briefly about the integration of renewable energy sources in micro grid. 10M

OR

15. B). Explain the concept of micro grid, and its need and applications. 10M

H.T No:

--	--	--	--	--	--	--	--	--	--

R22



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : M.Tech II Semester Regular & Supplementary Examinations Aug/Sept-2025
Course Name : Power Electronics Applications to Power Systems
Course Code : B443304
Branch : Power Electronics
Date & Session : 04-09-2025 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 basic algorithm for forming the bus impedance matrix? 1 M
2. What is the function of a phase-shifting transformer? 1 M
3. What are Line Outage Distribution Factors (LODF), and how are they used in contingency analysis? 1 M
4. Why is contingency evaluation important in power system operation? 1 M
5. Define the PV curve and explain its significance in voltage stability assessment. 1 M
6. List two practical applications of modal analysis in voltage stability studies. 1 M
7. What is the basic operating principle of a Static Var Compensator (SVC)? 1 M
8. Why is reactive power control important in power systems? 1 M
9. What are the different modes of operation of TCSC? 1 M
10. List the main advantages of using TCSC in power systems. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). How does a phase-shifting transformer work? Explain its role in controlling power flow in a transmission network. 10M

OR

11. B). For Given power system with three buses having the following line impedances: 10M

- Bus 1 to Bus 2: $Z_{12}=j0.2$
- Bus 1 to Bus 3: $Z_{13}=j0.25$
- Bus 2 to Bus 3: $Z_{23}=j0.1$

Form the bus admittance matrix.

12. A). Explain the Generation Shift Distribution Factors (GSDF) and analyze their role in contingency analysis. 10M

OR

12. B). Describe different power system security levels and explain how contingency analysis helps in maintaining system reliability. 10M

13. A). Derive the PV curve and explain how its slope acts as a proximity indicator for voltage stability. 10M

OR

13. B). Discuss the significance of the minimum eigenvalue of the reduced load flow Jacobian in voltage stability analysis. 10M

(P.T.O..)

14. A). Analyze the role of reactive power control in improving voltage stability and reducing transmission losses. 10M

OR

14. B). Compare the operating characteristics of Thyristor-Switched Capacitor (TSC) and Fixed Capacitor-TCR in terms of response time, control flexibility, and power handling capability. 10M

15. A). Describe the working principle of TCSC with a neat schematic and explain its modes of operation. 10M

OR

15. B). Discuss the different control strategies used in TCSC for improving system performance. 10M

H.T No:

--	--	--	--	--	--	--	--	--	--

R22



CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)

Examination : M.Tech II Semester Regular & Supplementary Examinations August-2025
Course Name : Power Quality Improvement Techniques
Course Code : B443411
Branch : Power Electronics
Date & Session : 08-09-2025 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 power quality in electrical systems 1 M
2. What are the different types of power quality problems? 1 M
3. What is the major power quality issue caused by non-linear loads? 1 M
4. Define non-linear loads in power systems. 1 M
5. What is the purpose of series compensation in power systems? 1 M
6. Name one application of passive series compensation. 1 M
7. What is the primary function of a DVR (Dynamic Voltage Restorer)? 1 M
8. Name one application of DSTATCOM in power systems. 1 M
9. What are the two main components of a UPQC? 1 M
10. Name one power quality issue that a UPQC can mitigate. 1 M

PART-B

Answer the following. Each question carries TEN Marks.

5x10=50M

- 11.A). Analyze the classification of power quality problems with appropriate diagrams. 10M
- OR**
11. B). Explain various power quality standards. 10M
12. A). Compare non-linear and linear loads, highlighting their differences and providing relevant examples. 10M
- OR**
12. B). Analyze the impact of non-linear loads on the neutral conductor in a three-phase four-wire system. Why does the neutral current increase in such systems? 10M
13. A). Analyze the design and operation of a passive shunt compensator for a single-phase system. Include diagrams and mathematical expressions. 10M
- OR**
13. B). Analyze the role of passive shunt compensators in mitigating voltage sags and swells in distribution systems. 10M
14. A). Examine the principle of operation of DSTATCOM, its role in power quality improvement, classification, and applications. 10M
- OR**
14. B). Assess the working principle of DVR and its effectiveness in mitigating voltage sags and swells in power systems. 10M

(P.T.O.)

15. A). Investigate the principle of operation of a Unified Power Quality Compensator (UPQC), 10M
including its classification and applications in power systems.

OR

15. B). Design a Synchronous Reference Frame Theory-based control algorithm for UPQC, 10M
including a block diagram and mathematical analysis.
