

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

M.Tech I Year II Semester Regular Examinations August-2026

ADVANCED POWER ELECTRONICS
(Power Electronics)

Time: 3 Hours

(Answer all Five Units 5 x 12 = 60 Marks)

Max. Marks: 60

UNIT-I

- 1 a Explain the characteristics of Insulated Gate Bipolar Transistor (IGBT). CO1 L2 6M
b Explain the two-transistor model of Silicon-Controlled Rectifier. CO1 L2 6M

OR

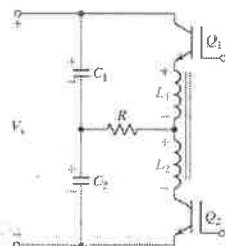
- 2 a Explain the characteristics of Gate Turn Off (GTO) Thyristor. CO1 L2 6M
b Compare Silicon-Controlled Rectifier (SCR) and Gate Commutated Thyristor (GCT). CO1 L2 6M

UNIT-II

- 3 Explain in detail various modes of operation of Series resonant Inverters with unidirectional Switches. CO2 L3 12M

OR

- 4 The half-bridge resonant inverter in Figure below, is operated at an output frequency, $f_o = 7$ kHz. If $C_1 = C_2 = C = 3 \mu\text{F}$, $L_1 = L_2 = L = 50 \mu\text{H}$, $R = 2 \Omega$, and $V_s = 220$ V, determine (i) the peak supply current I_{ps} , (ii) the average transistor current I_A , (iii) the rms transistor current I_R .

**UNIT-III**

- 5 a Explain the comparison between Zero current switching and Zero voltage switching resonant converters. CO3 L3 6M
b What is the principle of zero-current-switching (ZCS) resonant converters? CO3 L2 6M

OR

- 6 a Explain the various modes of operation of Two quadrant ZVS resonant converters. CO3 L3 6M
b What are the advantages and limitations of Zero voltage switching converters? CO3 L2 6M

UNIT-IV

- 7 a Explain sinusoidal pulse width modulation scheme with necessary wave forms. CO4 L3 6M
b Discuss the concepts of harmonic content in two level inverter waveform and over modulation. CO4 L3 6M

OR

- 8 a Explain the concept of modulation index in space vector modulation. CO4 L2 6M
b Explain Bipolar Pulse-Width Modulation in Single-phase H-bridge inverter. CO4 L3 6M

UNIT-V

- 9 Discuss Cascaded H-Bridge multilevel inverter with unequal DC voltage sources. CO5 L3 12M

OR

- 10 Explain space vector modulation (SVM) scheme for the three-level NPC inverter with dwell time calculations. CO5 L4 12M

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