Reg No.:_____ Name:_____

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

Sixth Semester B.Tech Degree Supplementary Examination May 2023 (2019 Scheme)

**Course Code: ECT322**

**Course Name: POWER ELECTRONICS**

Max. Marks: 100 Duration: 3 Hours

**PART A**

***Answer all questions, each carries 3 marks.*** Marks

| | | | |
|---|---|---|---|
| 1 | | Compare power BJT, MOSFET and IGBT for switching applications. | (3) |
| 2 | | Draw the switching characteristics of power BJT. | (3) |
| 3 | | List the advantages of 3 phase rectifier over single phase. | (3) |
| 4 | | What is a snubber circuit? | (3) |
| 5 | | For a Buck Converter, R= 1Ω, $V_i$ = 40V, $V_o$ = 5V. Find the duty ratio. | (3) |
| 6 | | Draw the circuit of half bridge converter. | (3) |
| 7 | | What is space vector modulation? | (3) |
| 8 | | Define inverter. Also list its classification based on the strategy used for driving power semiconductor switches. | (3) |
| 9 | | What is four quadrant operation of dc drive? | (3) |
| 10 | | List the advantages of induction motor. | (3) |

**PART B**

***Answer one full question from each module, each carries 14 marks.***

**Module I**

| | | | |
|---|---|---|---|
| 11 | a) | With neat waveforms, explain the static and dynamic characteristics of the power diode. | (7) |
| | b) | Draw the structure of the power transistor and explain its operation with its transfer characteristics. | (7) |

**OR**

| | | | |
|---|---|---|---|
| 12 | a) | With structure, describe the working of IGBT. | (8) |
| | b) | Illustrate the methods used to turn on and turn off GTO. | (6) |

**Module II**

| | | | |
|---|---|---|---|
| 13 | a) | Illustrate any two MOSFET drive circuits. | (6) |

b) Explain the working of shunt snubber with relevant circuit diagram, waveform. Also deduce the equation for resistor and capacitor value. . (8)

**OR**

14 a) Derive the expression of average output voltage of single-phase full wave-controlled rectifier with R load along with neat diagram and waveform. (6)

b) Explain the working of three-phase diode bridge rectifier. (8)

**Module III**

15 a) Draw and explain the circuit diagram of the Boost converter with switching waveform. (10)

b) Define buck-boost converter. When it will act as a buck converter and boost converter? (4)

**OR**

16 a) Discuss full-bridge converter with circuit diagram and waveforms. (7)

b) Explain the working of push-pull converters with circuit diagram. (7)

**Module IV**

17 Illustrate the different modes of operation of full bridge inverter with RL Load. (14)

**OR**

18 Enumerate the working principle of three phase inverter. (14)

**Module V**

19 a) Explain the working principle of induction motor. (10)

b) Why rotor never runs at synchronous speed? (4)

**OR**

20 a) Mention two industrial applications of power electronics. (7)

b) Mention two residential applications of power electronics. (7)

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