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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## June 2025 Semester End Main Examinations

**Programme: B.E.** **Semester: V**
**Branch: Electrical and Electronics Engineering** **Duration: 3 hrs.**
**Course Code: 22EE5PCPE1** **Max Marks: 100**
**Course: Power Electronics - I**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | | UNIT - I | *CO* | *PO* | Marks |
|---|---|---|---|---|---|---|
| 1 | a) | | What are the ideal characteristics of switches? | *CO3* | *PO2* | **06** |
| | b) | | Explain the control characteristics of any two power devices. | *CO3* | *PO2* | **07** |
| | c) | | Discuss about peripheral effects of power electronics devices and its remedies. | *CO3* | *PO2* | **07** |
| | | | **OR** | | | |
| 2 | a) | | List explain Ideal and Practical characteristics of power devices | *CO1* | *PO1* | **10** |
| | b) | | With the help of circuit diagram and waveforms explain any two types of power electronic converters | *CO3* | *PO2* | **10** |
| | | | **UNIT - II** | | | |
| 3 | a) | | Explain the reverse recovery characteristics of a diode and derive the expression for reverse recovery current. | *CO2* | *PO3* | **10** |
| | b) | | Evaluate the performance parameters of a single-phase full bridge diode rectifier. | *CO2* | *PO3* | **10** |
| | | | **OR** | | | |
| 4 | a) | | What are the different types of diodes? Explain their constructional features and mention their applications. | *CO1* | *PO1* | **10** |
| | b) | | A single-phase full bridge diode rectifier is connected to a 220V, 50Hz supply. The load resistance is 12.4 Ohms. Calculate i)DC voltage across the load ii) DC load current iii) Ripple factor iv) Power factor v) Peak reverse voltage of each diode | *CO2* | *PO3* | **10** |
| | | | **UNIT - III** | | | |
| 5 | a) | | Explain the structure and working of a BJT | *CO1* | *PO1* | **08** |
| | b) | | Explain the switching characteristics of a BJT. | *CO3* | *PO2* | **08** |

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| | | c) | Explain the steady state characteristics of a BJT with relevant graph. | *CO1* | *PO1* | **04** |
| | | | **OR** | | | |
| | 6 | a) | Explain the construction and switching characteristics of a MOSFET | *CO1* | *PO1* | **08** |
| | | b) | Compare depletion type and enhancement type MOSFET | *CO1* | *PO1* | **06** |
| | | c) | Describe on SiC MOSFET and comment on its ON-state resistance | *CO1* | *PO1* | **06** |
| | | | **UNIT - IV** | | | |
| | 7 | a) | Explain the construction and switching characteristics of an IGBT | *CO3* | *PO2* | **10** |
| | | b) | Explain the steady state characteristics of an IGBT | *CO1* | *PO1* | **04** |
| | | c) | Describe Silicon Carbide IGBT, structure and working. | *CO1* | *PO1* | **06** |
| | | | **OR** | | | |
| | 8 | a) | With a neat circuit, explain the turn ON and turn OFF control of a BJT base drive control. | *CO4* | *PO2* | **07** |
| | | b) | Explain the different gate Drive circuits of MOSFET | *CO4* | *PO2* | **07** |
| | | c) | Explain the different gate Drive circuits of IGBT | *CO4* | *PO2* | **06** |
| | | | **UNIT - V** | | | |
| | 9 | a) | Explain the V-I characteristics of a thyristor and also define holding current and latching current. | *CO1* | *PO1* | **08** |
| | | b) | Mention different methods of turning ON of a thyristor | *CO4* | *PO2* | **04** |
| | | c) | With the help of a two-transistor model, derive an expression for anode current of a thyristor | *CO1* | *PO1* | **08** |
| | | | **OR** | | | |
| | 10 | a) | Describe the structural features of a thyristor? Explain its operation using a suitable model. | *CO1* | *PO1* | **10** |
| | | b) | With the help of circuit diagram and waveforms explain in detail UJT triggering circuit for thyristors. | *CO4* | *PO2* | **10** |

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