

'T' Scheme

Sample Question Paper

Program Name : **Electrical Engineering Program Group & Diploma in Industrial Electronics**

Program Code : **EE/EP/EU/IE**

Semester : **Third**

Course Title : **Fundamentals of Power Electronics**

Marks : **70**

22326

Time: 3 Hrs.

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1) Attempt any FIVE of the following.

10 Marks

- a) Give the merits of Power transistor (any two).
- b) State the applications of IGBT (any two).
- c) Draw the symbol of PUT and DIAC.
- d) Give the types of gate triggering.
- e) Give the difference between R and RC triggering of SCR in terms of firing angle.
- f) Define transfer time and back up time of UPS.
- g) State the requirements of SMPS.

Q.2) Attempt any THREE of the following.

12 Marks

- a) Describe with sketch the construction of IGBT.
- b) Describe SCR mounting and cooling with sketch.
- c) Explain the operation of R triggering circuit with a diagram.
- d) Explain with circuit diagram the operation of single phase full bridge controlled rectifier with R load.

Q.3) Attempt any THREE of the following.

12 Marks

- a) Explain the operation of crowbar protection circuit with diagram.

- b) Explain the operation of UJT relaxation oscillator circuit with diagram .
- c) Explain with sketch the operation of single phase fully controlled midpoint configuration with RL load.
- d) Explain the operation of Burglar alarm system with diagram.

Q.4) Attempt any THREE of the following.

12 Marks

- a) Give the types of protection circuit for overvoltage .
- b) Explain the operation of class D commutation circuit with diagram .
- c) A 1ϕ half controlled rectifier supplied with voltage $V=150 \sin 314t$, $\alpha = 45^\circ$ and load resistance is 10Ω . Find i) Average output dc voltage, ii) Load current.
- d) Explain the operation of AC circuit breaker with circuit diagram.
- e) Explain speed control of the motor by using TRIAC with the help of circuit diagram.

Q.5) Attempt any TWO of the following.

12 Marks

- a) For the Snubber circuit, answer the following-
 - i) Give the importance in SCR.
 - ii) Justify with circuit diagram.
- b) For a Class B commutation, answer the following -
 - i) Explain the operation with a circuit diagram.
 - ii) Interpret with waveforms.
- c) Explain the modes of operations in TRIAC with quadrant diagram.

Q.6) Attempt any TWO of the following.

12 Marks

- a) State the effect of source inductance in controlled rectifiers with waveforms.
- b) Justify with sketches the procedure to eliminate reverse power in a fully controlled rectifier with RL load.
- c) If a person use one ceiling fan (80W), one tube light (40W), 2 CFL (7 Watt per one CFL) simultaneously with UPS having 12V, 150 AH battery. Calculate back up time of UPS battery.

'T' Scheme

Sample Test Paper - I

Program Name : **Electrical Engineering Program Group & Diploma in Industrial Electronics**

Program Code : **EE/EP/EU/IE**

Semester : **Third**

Course Title : **Fundamentals of Power Electronics**

Marks : **20**

22326

Time: 1 Hour.

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.

08 Marks

- a) Draw the symbol of power transistor and IGBT.
- b) Give the merits of GTO over SCR (any two).
- c) Sketch labeled VI characteristics of DIAC.
- d) Sketch two transistor equivalent circuit of SCR.
- e) Give the turn ON methods of SCR (any four).
- f) For a DC source, name any four turn off methods of SCR.

Q.2 Attempt any THREE.

12 Marks

- a) Explain the operation of IGBT with sketch.
- b) Show the effect of gate current on break over voltage of TRIAC with labelled characteristics.
- c) Interpret the VI characteristics of UJT with sketch.
- d) Describe with sketch the operation of SCR.
- e) Justify the use of pulse transformer in SCR triggering with circuit diagram.
- f) Explain with sketch the operation of Class C commutation.

'T' Scheme

Sample Test Paper - II

Program Name : Electrical Engineering Program Group & Diploma in Industrial Electronics

Program Code : EE/EP/EU/IE

Semester : Third

Course Title : Fundamentals of Power Electronics

Marks : 20

22326

Time: 1 Hour.

Instructions:

- (1) All questions are compulsory.
- (2) Illustrate your answers with neat sketches wherever necessary.
- (3) Figures to the right indicate full marks.
- (4) Assume suitable data if necessary.
- (5) Preferably, write the answers in sequential order.

Q.1 Attempt any FOUR.

08 Marks

- a) Give the merits of freewheeling diode in controlled rectifier circuit (any two).
- b) Give the relation between firing angle and conduction angle with waveform.
- c) Sketch 1ϕ half controlled rectifier with R load.
- d) Draw labeled basic block diagram of UPS.
- e) Draw labeled basic block diagram of SMPS.
- f) Sketch light dimmer circuit using DIAC and TRIAC.

Q.2 Attempt any THREE.

12Marks

- a) Explain with sketch the working of battery charger using SCR.
- b) Describe emergency light system with sketch.
- c) Explain temperature controller using SCR with sketch.
- d) Give the operation of 1ϕ fully controlled midpoint configuration with R load with output voltage and output current waveform.
- e) Explain the operation of 1ϕ Half controlled rectifier with RL load using output voltage and output current waveform.
- f) A 1ϕ fully controlled rectifier with supplied with voltage $V=150 \sin 314t$ find the average output dc voltage if $\alpha = 45^\circ$ and load resistance is 100Ω .