‘I’ 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       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) A1φ half controlled rectifier supplied with voltage $V=150 \sin 314t$, $\alpha = 45^0$ and load resistance is $10\Omega$. 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.
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(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.
‘I’ 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       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.         12 Marks
   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) A1φ fully controlled rectifier with supplied with voltage V=150 sin314t find the average output dc voltage if α = 45° and load resistance is 100Ω.