15970

BRAINWARE UNIVERSITY

Term End Examination 2025-2026
Programme – Dip.EE-2022/Dip.EE-2023
Course Name – Power Electronics and Drives
Course Code - DEEPC501
(Semester V)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Identify the behavior of the SCR like a switch.

a) an unidirectional
b) a bidirectional
c) a mechanical
d) none of these

(ii) Observe the static V-I curve for the SCR is plotted for

a) anode current vs gate current, anode-cathode voltage as a parameter
b) anode current vs anode-cathode voltage, gate current as a parameter
c) anode-cathode voltage vs gate current, anode current as a parameter
d) none of these

(iii) Choose the correct answer: if the cathode of an SCR is made positive with respect to the anode and no gate current is applied, then

a) all the junctions are reversed biased
b) all the junctions are forward biased
c) only the middle junction is forward biased
d) only the middle junction is reversed biased

(iv) Tell the number of notches per cycle is __________ in a three-phase converter.

a) one
b) three
c) six
d) nine

(v) Identify a freewheeling diode is placed across the DC load

a) to prevent reversal of load voltage
b) to permit the transfer of load current away from the source
c) both to prevent reversal of load voltage and to permit transfer of load current away from the source
d) none of these

(vi) Apply a freewheeling diode in a phase-controlled rectifier

a) stops rectifier operations
b) improves line power factor
c) is the reason for additional harmonics
d) is the reason for the sudden breakdown

(vii) Tell a fully controlled converter uses

a) diodes only
b) thyristors only

c) both diodes and thyristors
d) none of these

(viii) Tell a chopper converts

a) AC to DC
b) AC to AC
c) DC to AC
d) DC to DC

(ix) Write the output of SMPS is

a) pulsating DC
b) voltage sweep
c) AC
d) DC

(x) Identify the duty cycle of a chopper is

a) $\frac{T_{ON}}{T_{OFF}}$
b) $\frac{T_{ON}}{T}$
c) $\frac{T}{T_{ON}}$
d) $T_{OFF} \times T_{ON}$

(xi) Identify the condition to be satisfied for controllable power transfer for a step-up operation

a) $0 < Vs < E$
b) $0 < Vs > E$
c) $Vs > E$
d) $Vs < E$

(xii) Write another name of step-down chopper.

a) First-quadrant chopper
b) Second-quadrant chopper
c) Third-quadrant chopper
d) Fourth-quadrant chopper

(xiii) Identify the condition if a step-up chopper's switch is always kept off then (ideally)

a) $V_0 = 0$
b) $V_0 = \infty$
c) $V_0 = V_S$
d) $V_0 > V_S$

(xiv) Choose the condition of the load current (continues or discontinuous) the nature of controlled rectifiers

a) type of load and firing angle
b) only on the type of load
c) only on the firing angle
d) it is independent of all the parameters

(xv) Examine chopper control for the DC motor provides variation in

a) input voltage
b) frequency
c) both input voltage and frequency
d) none of these

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Define the commutation process of SCR. State the types of commutation. (3)
3. Discuss the advantages of Single-Phase Bridge Converter Over Single-Phase Mid-Point Converter. (3)

4. Define an inverter. List a few industrial applications of inverters. (3)
5. Define firing angle and extinction angle. (3)
6. Write advantage of GTO over BJT. (3)

OR

Write down the working principle of DIAC. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain VI charecteristics of SCR. (5)

8. Explain about step down chopper with proper circuit diagram and wave form. (5)

9. Explain the operation of Multiple Pulse Width Modulation. (5)

10. A DC chopper operates on 23 volt DC and frequency of 400 Hz, feeds an R-L load. Calculate the ON time of the chopper for output of 150 volt. (5)

11. Write the salient features, advantage, disadvantage and application of cycloconverter. (5)

12. Explain the single phase full-wave bridge convereter resistive load and draw the circuit diagram with waveform. (5)

OR

Explain with circuit diagram and waveform single phase mid-point converter with R-L load. (5)

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