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Sub Code: EEE602
Roll No. [redacted]

B.TECH
(SEM VI) THEORY EXAMINATION 2017-18
POWER ELECTRONICS

Time: 3 Hours **Total Marks: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. **2 x10 = 20**

a) Draw the static characteristics of power diode.
b) What is commutation?
c) Explain the need for protection of power devices.
d) Explain which device is easy to parallel and why?
e) State types of commutation.
f) Explain the effect of source inductance on the operation of 3-phase full converter.
g) What does AC voltage controller mean?
h) State the types of control techniques used for the AC voltage controller.
i) Define Inverter.
j) Give the classification of inverters based on the nature of source.

SECTION B

2. Attempt any three of the following: **10 x 3 = 30**

a) With the help of the waveforms, explain the DC to AC converter. State its applications.

b) Explain the crowbar circuit. What are supply and load transient?

c) With the help of neat circuit diagram and relevant waveforms, explain the working of type-D chopper.

d) Derive the expression for the circulating current of a 3-phase dual converter in the circulating current mode.

e) Explain the operation of a 1-phase current source inverter.

SECTION C

3. Attempt any one part of the following: **10 x 1 = 10**

a) Explain the working of SCR and explain its drawbacks, advantages and applications of SCR.

b) With the help of neat diagram explain the static characteristics of an IGBT.

4. Attempt any one part of the following: 10 x 1 = 10

a) Explain the need of multiple connections of SCRs. Derive the formula for the static equalizing resistance. State the assumptions made.

b) Derive the expressions for commutating components used in auxiliary voltage commutation.

5. Attempt any one part of the following: 10 x 1 = 10

a) Explain the inverting mode of a 1-phase fully controlled bridge and draw all the waveforms.

b) Explain the modes in which the 3-phase full converter operates when: (i) $\alpha<90^0$ (ii) $\alpha>90^0$.

6. Attempt any one part of the following: 10 x 1 = 10

a) Derive the expression for the RMS value of load voltage for an AC controller with ON-OFF control.

b) With the help of neat circuit diagram and relevant waveforms explain the operation of a bridge type cycloconverter, with resistive load.

7. Attempt any one part of the following: 10 x 1 = 10

a) Explain the operation of the 3-phase transistorized inverter in 180^0 mode with resistive star connected load.

b) Explain the operation of single phase modified Mc-Murray half bridge inverter.