



NBU-003-027401 Seat No. _____

M. Sc. (ECI) (Sem. IV) (CBCS) Examination

April / May - 2017

**Power Electronics : Paper - 13
(New Course)**

Faculty Code : 003

Subject Code : 027401

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instruction:**
- (1) All question carry equal marks
 - (2) Figures on right hand side indicate marks.

1 (a) Answer the following: (Any three) (14)

1. Define the term commutation.
2. Give the names of thyristor turn on methods.
3. What do you mean by Ac regulator and Cycloconverter?
4. Why BJT is called current controlled device?
5. What do you mean by inverter and chopper?
6. Class E-Commutation also known as Resonant Commutation.(T/F)
7. SCR has to turn off by a special commutation using extra circuit component called Forced commutation.(T/F)
8. Schottky diode has Aluminum-silicon junction.(T/F)
9. FET is a unipolar device, P-channel FET, its operation depends on the flow of electrons.(T/F)
10. To improve the wave shape of load current and power factor, a diode is known as freewheeling diode.(T/F)
11. A full converter is a one quadrant converter.(T/F)
12. A semi converter is a two quadrant converter.(T/F)
13. Draw symbol of Programmable unijunction transistor (PUT).
14. Give the full form of IGBT.

2 Answer the following: (Any Two)

1. What is a thyristor? Describe the holding current and latching current as applicable to an SCR with the help of its static V-I characteristic. (07)
2. Explain the two transistor analogy of an SCR with the help of a neat diagram. (07)
3. Explain the triggering of thyristors in series. (07)

- 3 Answer the following:
1. What are the different classes of forced commutation method? Draw circuits and explain class C commutation of thyristors. (05)
 2. Discuss the UJT as a relaxation oscillator with circuit diagram and wave forms. (05)
 3. Explain the difference between a Transistor and SCR. (04)

OR

- 3 Answer the following:
1. Draw the V-I characteristics of a TRIAC and explain its working principle. (05)
 2. Give names of triggering circuits for a thyristor. Draw and explain any one triggering circuits for a thyristor. (05)
 3. Give comparisons of Power MOSFET and IGBT. (04)

- 4 Answer the following: (Any Two)

1. Draw and explain the operation of cross-sectional structure of power MOSFET. (07)
2. What is a GTO? Discuss its operation. (07)
3. Why is it necessary to connect thyristors in series? Draw static and dynamic equalizing circuits for thyristors in series and explain their operation. (07)

- 5 Answer the following: (Any Two)

1. With the help of basic structural diagram and symbol explain the operation of static induction thyristors (SITH_S). (07)
2. Explain the working of a single phase fully controlled bridge converter supplying purely resistive load with wave shapes. (07)
3. What is semi-converter? Explain the single phase semi-converter with RL load with its circuit and voltage, current wave shapes. (07)
4. Explain configuration of IGBT with vertical cross-section. Draw and discuss symbol and i-v characteristics.(i.e. drain and transfer) (07)