



**M.E. DEGREE EXAMINATIONS: JAN 2015**

(Regulation 2014)

First Semester

**POWER ELECTRONICS AND DRIVES**

P14PET102: Advanced Power Semiconductor Devices

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Power devices as switches are operated in [K<sub>2</sub>]
  - a) Cutoff and Saturated regions
  - b) Cutoff and Active regions
  - c) Breakdown and saturated regions
  - d) Breakdown and active regions
  
2. Power diodes are used as [K<sub>1</sub>]
  - A) Rectifiers B) Inverters C) Choppers D) Feedback elements
  - a) A&B
  - b) B&C
  - c) C&D
  - d) A&D
  
3. The turn ON process of Power BJT has the following steps [K<sub>2</sub>]
  - A) Increasing base current B) Reducing  $V_{CE}$  C) Applying  $V_{BE}$  D) Increasing  $I_C$

The correct sequence is

  - a) A-B-C-D
  - b) D-C-B-A
  - c) C-A-D-B
  - d) B-A-C-D
  
4. Match the following [K<sub>2</sub>]

A. Thyristor	1. Induction motor drive
B. IGBT	2. HVDC
C. Power MOSFET	3. SMPS

  - a) A-3 B-1 C-2
  - b) A-1 B-2 C-3
  - c) A-2 B-3 C-1
  - d) A-2 B-1 C-3
  
5. MOSFET is a [K<sub>1</sub>]



18. What is the need for snubber? [K<sub>2</sub>]  
19. Define convection? [K<sub>1</sub>]  
20. What is meant by thermal resistance? [K<sub>2</sub>]

**PART C (6 x 5 = 30 Marks)**

21. State and explain the attributes of ideal power devices. [K<sub>1</sub>]  
22. Draw and explain the reverse recovery characteristics of power diode. [K<sub>2</sub>]  
23. Draw and explain the V-I characteristics of power BJT. [K<sub>2</sub>]  
24. Draw the structure and explain the physics of power MOSFET operation. [K<sub>2</sub>]  
25. How is the over voltage protection is provided for thyristors? [K<sub>3</sub>]  
26. Draw and explain the mounting types of power devices. [K<sub>2</sub>]

**PART D (4 x 10 = 40 Marks)**

27. Compare the power devices with respect to power, switching speed and applications. [K<sub>3</sub>]  
28. Draw and explain transistor analogy of SCR and derive the anode current expression. [K<sub>3</sub>]  
29. Construct the gate drive circuit for thyristors of single phase fully controlled bridge converter and explain the components and operation. [K<sub>3</sub>]  
30. With equivalent circuit explain the electrical analogy of thermal components. Describe the guidance for heat sink selection. [K<sub>3</sub>]

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