# MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

**Paper Code : PC-EE501/PC-EE504/PC-EEE504 Power Electronics**

**UPID : 005526**

*Time Allotted : 3 Hours* *Full Marks :70*

*The Figures in the margin indicate full marks.*
*Candidate are required to give their answers in their own words as far as practicable*

## Group-A (Very Short Answer Type Question)

1. Answer *any ten* of the following : [ 1 x 10 = 10 ]

(I) A single phase diode bridge rectifier supplies a highly inductive load. The load current can be assumed to be ripple free. What will be the ac supply side current waveform?

(II) The fundamental component of output voltage for a half wave bridge inverter (with a DC voltage source of magnitude is Vs), is given by.....

(III) What is series resonant inverter?

(IV) HVDC power transmission system is economical for.....as compared to AC transmission

(V) What are holding and latching currents in SCR?

(VI) For high frequency applications of over 10 kW power rating, ..... type of diodes are used

(VII) How to protect an SCR against di/dt?

(VIII) What is dual converter?

(IX) A 3 phase VSI (Voltage source inverter) is supplied from a 600V DC source, and is connected to a star connected load of 20 Ω per phase. The load power in (kW) for 120 degree mode of conduction is .....

(X) What is ZVS resonant converter?

(XI) The range of firing angle used in a thyristor controlled reactor (TCR) is.....

(XII) The two six pulse converters are connected in series on the dc side to meet the .....requirements in HVDC systems

## Group-B (Short Answer Type Question)

Answer *any three* of the following : [ 5 x 3 = 15 ]

2. Write a short note on HVDC links. [5]
3. What are the different types of power diodes? [5]
4. Explain the two transistor analogy of an SCR. [5]
5. Explain the operation of a single phase half wave controlled rectifier. [5]
6. Explain the effect of source inductance in a single phase fully controlled rectifier. [5]

## Group-C (Long Answer Type Question)

Answer *any three* of the following : [ 15 x 3 = 45 ]

7. (a) Explain the working principle of three phase fully controlled bridge rectifier with highly inductive load. [ 5 ]

   (b) A single-phase full-bridge inverter, fed from 230 V dc, is connected to load R=10 Ω and L=0.03 H. For the square wave output of 50Hz frequency, find the following: [ 8 ]
   i)The RMS value of fundamental voltage
   ii)Load impedance (Ω) at fundamental frequency
   iii)The RMS value of fundamental component of load current
   iv)The maximum voltage to be blocked by each device when it is in OFF condition

   (c) What is displacement power factor? [ 2 ]

8. (a) Explain the working principle of single phase half bridge inverter. [ 5 ]

   (b) A single-phase half bridge inverter has a load resistance R=2Ω, and a DC voltage source Vs = 230 V. What is the RMS value of the fundamental component of output voltage and the load current? [ 7 ]

   (c) What is feedback diode? [ 3 ]

9. (a) Discuss how resonant converters are classified.. [ 12 ]

   (b) What are the applications of series resonant inverters? [ 3 ]

10. (a) Explain the speed control technique of a thyristor fed ac motor. [ 8 ]

(b) Explain the types of power converter topologies used in HVDC transmission system. [ 7 ]

11. (a) What are the different turn on process of an SCR? [ 6 ]

(b) Explain a suitable snubber circuit for an SCR with a neat sketch and necessary equations. [ 5 ]

(c) Define reverse recovery time of an SCR with necessary equations. [ 4 ]

*** END OF PAPER ***