Register Number: ……..

B.E DEGREE EXAMINATIONS: MAY/JUNE 2013

Fourth Semester

MECHATRONICS ENGINEERING

MCT106- Industrial Electronics

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. When a Thyristor has been fired by an appropriate gate pulse, when will it to turn off?

   a) When the current through the device falls below the holding current Drain, source and base.
   b) After a fixed period of time determined by circuit components.
   c) When a gate pulse of the opposite polarity is applied.
   d) When the applied voltage changes polarity.

2. Which of the following statements is incorrect?

   a) Both bipolar transistors and FETs have very good switching characteristics. Off- state loss in the device.
   b) A great advantage of switching regulators is that their power consumption is very low.
   c) The output voltage of a switching regulator is controlled by altering the switching frequency.
   d) Switching regulators use switching speeds of 20 kHz or more.

3. Compared to Power MOSFET, the Power BJT has

   a) Lower switching losses but higher conduction loss.
   b) Higher switching losses and higher conduction loss.
   c) Higher switching losses but lower conduction loss.
   d) Lower switching losses and lower conduction loss.

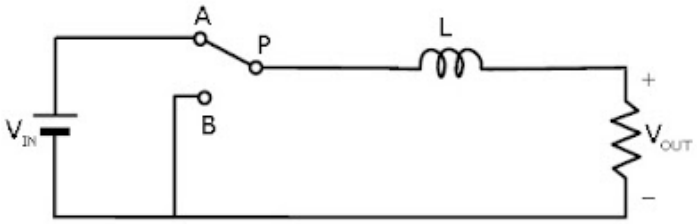
4. The SCR is turned-off when the anode current falls below

   a) Forward current rating
   b) Break over voltage
   c) Holding current
   d) Latching current

5. “Six MOSFETs connected in a bridge configuration (having no other power device) MUST be operated as a Voltage Source Inverter (VSI) ". This statement is

   a) True, because being majority carrier devices, MOSFETs are voltage drive
   b) True, because MOSFETs have inherently anti parallel diodes
   c) False, because it can be operated both as current source Inverter (CSI) or a VSI
   d) False, because MOSFETs can be operated as excellent constant current sources in the saturation region

6. The power electronic converter shown in the figure has a single pole double throw switch. The pole P of the switch is connected alternately to throws A and B. The converter shown in a fiqure.



a) Step down chopper(buck converter) b) Half- wave rectifier

c) Step Up chopper (boost converter) d) Full wave converter

7. A single-phase full bridge inverter can operate in load-commutation mode in case load consists of

a) RL load b) RLC underdamped

c) RLC damped d) RLC critically damped

8. In a circulating-current type of dual converter, the nature of the voltage across the reactor is

a) Alternating b) Pulsating

c) Direct d) Triangular

9. Which of the following finds application in speed control of a dc motor?

a) FET b) NPN transistor.

c) SCR. d) JFET

10. A Thyristor can be termed as:

a) DC switch b) AC switch

c) both AC and DC switch d) Relay

PART B (10 x 2 = 20 Marks)

11. What are the different methods to turn on the Thyristor?
12. What is a reverse recovery time?
13. Mention some of the applications of controlled rectifier?
14. What are the advantages of freewheeling diodes in a controlled rectifier?
15. What is meant by duty-cycle?
16. How is the inverter circuit classified based on commutation circuitry?
17. Differentiate ON-OFF control and phase control of Thyristor.
18. What is meant by Cyclo-converter?
19. List out various typical industrial applications.
20. Brief about some of the specialty equipment used in industrial electronics.

PART C (5 x 14 = 70 Marks)

21. a) Draw the transient characteristics of IGBT and explain it.

(OR)

b) Discuss the different modes of operation of TRIAC with the help of VI characteristics.

22. a) Explain the working of 1Φ full converter with RL load and derive the expression for the average and rms value.

(OR)

b) Explain the working of 3Φ full converter for highly inductive load with the help of waveforms.

23. a) Describe the working of three phase inverter with suitable waveform.

(OR)

b) Explain in detail about step up and step down choppers?

24. a) Explain the operation of sequence control of AC voltage controller?

(OR)

b) Explain the operation of three-phase Cyclo-converter with neat diagram?

25. a) Write short notes about the following

(i) Power electronics application to industrial process (8)

(ii) Industrial motor drives. (6)

(OR)

b) Explain the following

(i) Sawtooth Generator. (5)

(ii) Electronic Regulators. (5)

(iii) Induction Heating. (4)

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