

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech. (Automation & Robotics)(Sem.-6)

POWER ELECTRONIC & DRIVES

Subject Code : BTAR-601-18

M.Code : 79276

Date of Examination : 02-07-22

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Write briefly :

- a) What are the different methods to turn on the thyristor?
- b) Define latching and holding current.
- c) Why does SCR require gate protection?
- d) What is commutation angle or overlap angle?
- e) What are the applications of ac voltage controllers?
- f) What are the disadvantages of load commutated chopper?
- g) What is meant by inversion mode?
- h) Write down the expression for average output voltage for step down chopper.
- i) Why diodes should be connected in antiparallel with the thyristors in inverter circuits?
- j) What are the advantages of PWM control?

SECTION-B

2. Explain the operation of resonant pulse commutation.
3. “*R- triggering of SCR is not possible for inversion operation of a single phase AC to DC converter feeding a RLE load*”. Explain. How an R triggering circuit is designed depending on the gate voltage and gate current specification of a SCR.
4. From the two transistor analogy of thyristor, find the expression of anode current.
5. Explain the operation of a single phase step down cyclo-converter.
6. Deduce the expression of *r.m.s* value of output phase voltage and output line voltage of a 3-ph inverter supplied from a DC voltage V_s and operating at 120° conduction mode feeding a star connected balanced 3-ph load.

SECTION-C

7. For a 3-ph full-wave bridge controlled converter fed from a 3-ph 415V 50Hz ac source supplying a smooth ripple-free continuous dc current to a load ($R=10\Omega$, $L=\text{very high}$ to maintain smooth ripple free continuous dc load current, $E=110V$), calculate the average output voltage, dc load current, output dc power, r.m.s value of source current, r.m.s value of fundamental component in source current, displacement factor, harmonic content in source current, distortion factor, THD, input power factor. (Consider the converters as lossless and triggering angle is 60°).
8. Briefly explain the working principle of a boost converter supplying a constant load current along with the waveforms of inductor current, diode current, capacitor current and output voltage. Derive the expression for output voltage, voltage ripple and current ripple.
9. Write short note on :
 - a. Dual converter
 - b. Harmonic reduction techniques in single phase inverter.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.