Total No. of Questions : 8]

SEAT No. :

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[6626]-100
T.E. (E&TC ENgineering)
POWER DEVICES & CIRCUITS
(2019 Pattern) (Semester - VI) (304194)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 and Q7 or Q8***
2) ***Neat diagrams and waveforms must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of nonprogrammable calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Explain working of single phase full bridge inverter for R-L load with input & output waveforms. **[8]**

b) What is meant by harmonics in inverters? Explain effects of harmonics. **[5]**

c) Single phase full bridge inverter is operated from 120V dc supply, it has a resistive load of R = 20 Ω Find: **[4]**

i) rms o/p voltage at fundamental frequency (V_{o1})

ii) rms o/p power

iii) rms o/p voltages at third & fourth harmonic (V_{o3} & V_{o4})

OR

Q2) a) Draw a three phase inverter for balanced star R load? Explain its operation of 180° mode with gate signals & output waveforms. **[12]**

b) What are PWM techniques in inverter? Explain Multiple PWM technique with waveforms. **[5]**

Q3) a) Explain various control strategies in DC chopper. **[6]**

b) Draw circuit diagram of step up chopper and derive an expression for its o/p voltage : $Vo = \frac{Vs}{(1-D)}$ where D is duty cycle. **[6]**

c) A DC chopper with R-L load is operated from 220V dc supply. The load parameters are R = 5Ω, L = 7.5 mH and chopping frequency Fc = 1KHz. If duty cycle is 50%, calculate: **[6]**

i) Maximum instantaneous load current

ii) Minimum instantaneous load current

P.T.O.

OR

Q4) a) A step up chopper is used to deliver load voltage is 660V from 220V DC source. If the blocking period of thyristor is 500μs, compute the turn on time. **[4]**

b) Explain with neat diagram the operation of 4 quadrant chopper with dc motor as a load. **[8]**

c) Explain with block schematic working of SMPS. **[6]**

Q5) a) What is EMI? Explain various sources & minimizing techniques of EMI. **[7]**

b) What is the need of resonant converter? Explain ZVS resonant converter with circuit & waveforms. **[8]**

c) Draw its thermal equivalent circuit of heat sink. **[3]**

OR

Q6) a) What are different over voltage protection techniques in power electronics? Explain any one in detail. **[6]**

b) Explain with neat diagram working of isolation transformer. **[6]**

c) What are various EMC standards? Explain any two. **[6]**

Q7) a) Explain operation of Off-line UPS with block schematic. **[6]**

b) Draw & explain single phase full wave ac voltage controller for resistive load with o/p voltage waveforms. **[6]**

c) Explain single phase semi converter drive for single phase separately excited dc motor. **[5]**

OR

Q8) a) Explain with suitable circuit diagram working of a LED driver. **[6]**

b) Explain various selection criteria of batteries in battery operated power systems. **[6]**

c) Explain with diagram architecture of EVs battery charger **[5]**

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