Total No. of Questions : 8]

SEAT No. : [ ]

PA-1493

[Total No. of Pages : 2

[5926]-113
T.E. (E&TC)
POWER DEVICES & CIRCUITS
(2019 Pattern) (Semester - II) (304194)

Time : 2½ Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figurers to the right 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 load with input & output waveforms. Derive an expression for rms o/p voltage. **[7]**

b) Compare freewheeling diode with feedback diode. **[4]**

c) Single phase full bridge inverter is operated from 50V dc supply, it has a resistive load of R = 5 Ω. Find: **[6]**

i) rms o/p voltage at fundamental frequency (V_{O1})

ii) rms o/p power

iii) rms o/p voltages at second & third harmonic (V_{O2} & V_{O3})

OR

Q2) a) What is mean by harmonics in inverters? Explain how harmonics can be reduced. **[7]**

b) Compare 120° mode with 180° mode in three phase bridge inverter. **[5]**

c) Give the classification of inverters? Draw Three Phase voltage source inverter for balanced star R load? **[5]**

Q3) a) Explain operation of step down chopper and derive an expression for its average o/p voltage& rms o/p voltage. **[10]**

b) A DC step down chopper is operating on 220V dc input voltage at 2KHz chopping frequency with TRC principle. If output voltage is 170V, calculate conduction & blocking period of chopper. **[4]**

c) Compare step up & step down choppers. **[4]**

OR

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Q4) a) Give classification of choppers? Explain operation of two quadrant chopper with circuit diagram. **[8]**

b) A step up chopper is used to deliver load voltage is 500V from 220V DC source. If the blocking period of thyristor is 80μs, compute the turn on time. **[4]**

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

Q5) a) Explain the role of heat sink? Draw its thermal equivalent circuit. **[5]**

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

c) For a thyristor, Maximum junction temperature is 110°C. The thermal resistances are $\varnothing_{JC} = 0.16$, $\varnothing_{CS} = 0.08$°C/W. for heat sink temperature of 60°C, calculate total average power loss in thryistor - sink combination. If heat sink temperature is reduced to 50°C, find new total average power loss in thryistor - sink combination. **[4]**

OR

Q6) a) What is EMI? Explain various sources & minimizing techniques of EMI. **[7]**

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

c) What is snubber circuit? Explain its role in power devices protection circuits. **[4]**

Q7) a) Explain operation of On-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 full converter drive for single phase separately excited dc motor. **[6]**

OR

Q8) a) Explain working of electronic ballast with block schematic. **[6]**

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

c) Explain various battery charging models for EVs. **[6]**

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