Total No. of Questions : 8]

SEAT No. :

P1727

[Total No. of Pages : 3

[5460] - 556
T.E. (E & TC)
POWER ELECTRONICS
(2015 Pattern)

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

Instructions to the candidates:

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
3) ***Assume suitable data, if necessary.***

Q1) a) Explain the gate drive circuit requirements for MOSFET & draw the sample drive circuit. **[6]**

b) Explain effect of source impedance on the performance of 1Φ full converter. Derive the expression for average output voltage? **[6]**

c) In a single phase full converter with highly inductive load is feed from 120 V RMS ac mains & fired at $\alpha = 45$ deg., Calculate **[8]**

i) Average Load voltage.

ii) RMS Load Voltage.

iii) Power factor.

OR

Q2) a) In a full AC to DC converter, explain the rectification mode & line commutated inverter mode of operation with relevant waveforms. **[7]**

b) Explain single pulse PWM & Sinusoidal PWM control technique for 1 ϕ inverter. **[7]**

c) Explain the following parameters in relation to ac to dc converters, **[6]**

i) Displacement factor

ii) Harmonic factor.

iii) Power factor

P.T.O.

Q3) a) Explain the principle of step up chopper feeding R - L load, with neat diagrams and waveforms of load voltage, load current, voltage across switch & current through switch. Derive the expression of output voltage. **[8]**

b) Explain the operation of Flyback type SMPS and discuss advantages & limitations. **[8]**

OR

Q4) a) Explain 4 quadrant operation of chopper for DC motor as a load. **[8]**

b) Draw & explain the operation of single phase AC voltage controller using SCR or IGBT with necessary waveforms. Derive the expression of RMS voltage at output. **[8]**

Q5) a) Draw the neat diagram of ZCS resonant converter. Explain the operation through waveforms? **[8]**

b) In a MOSFET operating in a circuit with V_{DS} = 25V & I_D = 1A, the thermal resistance θ_{jc} = 1°C/W, Maximum junction temperature is 125°C, and ambient temperature is 25°C, the thermal grease is used between heat sink and device case reduces the θ_{cs} = 0.3°C/W, find the appropriate heat sink. **[8]**

OR

Q6) a) Draw the neat diagram of ZVS resonant converter. Explain the operation through waveforms? **[8]**

b) Explain dv/dt, di/dt and snubber circuit protection. **[8]**

Q7) a) A UPS is driving a load of 200 W with lagging pf of 0.82. The efficiency of the inverter is 85% & the battery voltage is 12 V, Find **[6]**

i) KVA Rating of inverter

ii) AH rating of battery

b) Draw and explain the fan regulator using Triac & Diac with waveforms at various circuit points? **[6]**

c) What are the methods of speed control of DC motor? Explain the how the speed of the separately excited dc motor can be controlled by DC drive system? **[6]**

OR

Q8) a) What is stepper motor drive? Explain with necessary sequence generation, how it works? **[8]**

b) Draw & explain torque speed characteristics of DC drive and explain the constant power & constant speed operation of DC motor? **[10]**

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