CENTRAL INSTITUTE OF TECHNOLOGY, KOKRAJHAR
(Deemed to be University)
KOKRAJHAR :: B.T.A.D. :: ASSAM :: 783370

END – SEMESTER EXAMINATION
PG

Session: Jan-June, 2025 Semester: 2nd Time: 3Hrs. Full Marks: 100

Course Code: MGE213 Course Title: Advanced Power Electronics

ANSWER ANY FIVE QUESTIONS:

1. a. What is equalization circuits. Derive the expression for equalization resistance of a series equalization circuit. 10

b. A resistive load of 10ohm is connected through a half wave SCR circuit through 220, 50Hz single phase source. Calculate the power delivered to the load for firing angle of 60°. Also find the input power factor. 6

c. A dc battery is charged through a resistor R as shownin fig.1. Derive an expression for the average valueof charging current in terms of V_m, E, R etc. on the assumption that the SCR is fired continuously. For anAC source voltage of 230V, 50Hz find the value of average charging current for R=8Ω and E=150V. 4

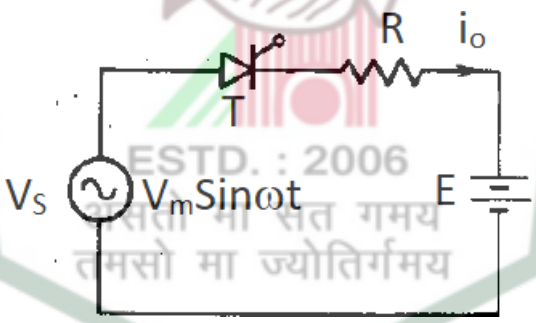

Fig. 1

2. a. What is UPS? Explain the working of short and no break UPS. 10

b. What is a chopper? Derive the input output relation of buck and boost chopper. 10

3. a. A step up chopper has an input voltage of 150V. The voltage output needed is 450V. Given, that the thyristor has a conducting time of 150μseconds. Calculate the chopping frequency. 6

b. A separately excited DC motor is supplied from a 230V,50 Hz source through a single phase half wave controlled converter. Its field is fed through a 1-phase semi converter with zero degree firing angle delay. Motor resistance r_a=0.7Ω and motor

constant is 0.5 V-sec/rad. For rated load torque of 15nm at 1000rpm and for continuous ripple free currents, determine-

i. firing angle delay of the armature converter

ii. rms values of thyristor and freewheeling diode currents

iii. input power factor of the armature converter 14

4. a. For a type A chopper dc source voltage is 230V, loadresistance is 10Ω. Voltage drop across the chopper is 2V when it is on. For a duty cycle of 0.4 calculate - 8

i. average and rms values of output voltage

ii. chopper efficiency

b. A single phase half bridge inverter has a resistance of 2.5Ω and input DC voltage of 50V. Calculate the following – 12

i. The RMS voltage occurring at the fundamental frequency
ii. The power output
iii. Peak current and average current
iv. Harmonic RMS voltage
v. Total harmonic distortion

5. a. What is SMPS? Explain the working of anyone configuration of SMPS. 10

b. What is resonant converter? Explain load resonant converter. 10

6. Write short notes on- 10x2=20

a. Sepic converter

b. Multilevel inverter