UPES
End Semester Examination, May 2023

Course: Aircraft Electrical System   Semester: VI
Program: B.Tech Aerospace Engineering (Avionics)   Time   : 03 hrs.
Course Code: AVEG 3002P   Max. Marks: 100

Instructions: Attempt all the questions. Assume any missing data. Use of calculator is allowed.

SECTION A (5Qx4M=20Marks)			
S. No.		**Marks**	**CO**
Q 1	How do we achieve voltage and frequency stability in the grid?	4	CO1
Q 2	Briefly explain the working of a dc-dc buck converter along with the output voltage and current waveforms.	4	CO2
Q 3	What is holding and latching current of SCR?	4	CO3
Q 4	What are the limitations of PWM inverters?	4	CO4
Q 5	What are the conditions that must be met to synchronize a generator to the grid?	4	CO1
SECTION B (4Qx10M= 40 Marks)			
Q 6	Explain the performance parameters of a rectifier along with their mathematical expressions.	10	CO5
Q 7	For the single-phase, full-wave, uncontrolled rectifier, the supply voltage is 110V, 50Hz, the load resistor is 25Ω. Calculate: (a) The average value of the output voltage and current. (b) The rms value of the output voltage and current. (c) The dc power consumed by the load (P_{dc}) and the average value of the power delivered to the load (P_{ac}). Sketch the appropriate voltage and current waveforms	10	CO4
Q 8	Explain the working of single-phase full wave-controlled rectifier connected to a resistive load along with the input and output voltage and current waveforms.	10	CO3
Q 9	Draw and explain the static I-V characteristics of SCR. **OR** Explain the various triggering methods of thyristor.	10	CO2
SECTION-C (2Qx20M=40 Marks)			

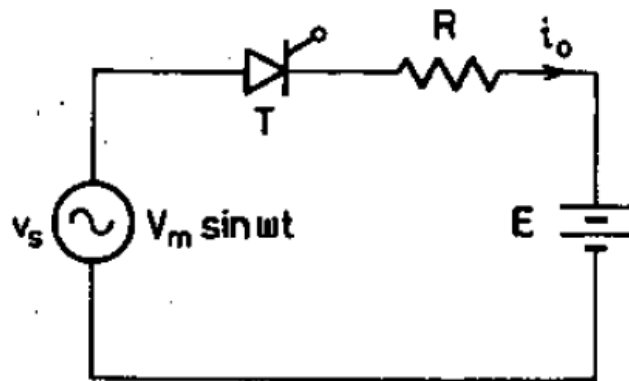| Q 10	A single-phase 230V, 1 kW heater is connected across 1-phase, 230V, 50Hz supply through an SCR. For firing angle delays of 45^0 and 90^0, calculate the power absorbed in the heater element. **OR** A 230V, 50Hz, single-phase half-wave controlled rectifier is triggered at a firing angle of 40^0 and the load current extinguishes at an angle of 210^0. Find the circuit turn off time, average output voltage and the average load current for (a) $R = 5\Omega$, $L = 2mH$ (b) $R = 5\ \Omega$, $L = 2mH$ and $E = 110V$.	20	CO5
Q 11	A dc battery is charged through a resistor R as shown in Fig. 1. Derive an expression for the average value of charging current in terms of V_m, E, R etc. on the assumption that SCR is fired continuously (a) For an ac source of 230V, 50Hz, find the value of average charging current for $R = 8\Omega$ and $E = 150V$. (b) Find the power supplied to battery and that dissipated in the resistor. (c) Calculate the supply power factor. Fig. 1	20	CO4