(3 Hours)   [Total Marks : 100

N.B. : (1) Questions No.1 is compulsory.
       (2) **Solve** any **four** questions out of remaining **six** questions.
       (3) **Each** question is for **20 marks.**
       (4) Assume **suitable** data if **necessary.**

1. Solve the following questions :   20
    (a) Write short note on thyristors family.
    (b) Explain the principle of operation- of power MOSFET.
    (c) Draw the circuit diagram of any one application using Triac & Diac and
         compare their V-1 characteristics.
    (d) Why there is a restriction on the firing angle in case of ac voltage controllers
         feeding highly inductive load.

2. (a) Explain steady state characteristics of common emitter configuration of BJT in   10
         details.
    (b) Explain protection circuit of SCR.   10

3. (a) Explain in detail the different methods of turning on SCR.   10
    (b) A 1 phase full wave controlled rectifier has a RL load having L= 6.5mH, R = 0.5   10
         Ω. The input voltage is V_s =120 V(rms), 60Hz. Determine a) the load current I_{L0}
         at wt = α = 60°, b) the average thyristors current, c) the rms thyristors current, d)
         the rms output current, e) the average output current.

4. (a) Explain with circuit diagram and waveforms, a 1 phase dual converter.   10
    (b) A 3 phase half wave converter is operated from a 3 phase star connected 208 V   10
         (line to line), 60 Hz supply and load resistance is R = 10Ω. If it is required to
         obtain an average output voltage 50% of the maximum possible output voltage,
         calculate a) the delay angle α, b) the rms and average output currents, c) the
         average and rms thyristor currents, d) the rectification efficiency, e) the TUF, and
         f) the input power factor.

5. (a) Explain with circuit diagram and waveforms, 3 phase bridge inverter for 120°   10
         conduction mode.
    (b) Explain in detail with circuit diagram and waveforms, three phase cyclo-converter.   10

                                                                  TURN OVER

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6. (a) Explain with circuit diagram and waveforms the step-up converter with L load. 10
   (b) Buck regulator has an input voltage of 12V and the required average output voltage 10
   is 5V. The peak to peak output ripple voltage is 20mV, load resistance is 100 ohms
   and the switching frequency is 25kHz. Find a) Duty cycle b) Value of L & C and
   c) Average input current, if the peak to peak ripple current in inductor is limited to
   be 0.8A.

7.   Write short note on any **two** : 20
     (a) Four Quadrant operation of Triac.
     (b) Turn on & Turn off characteristics of SCR.
     (c) Single phase Dual converter.
     (d) R & R-C firing circuit of SCR.