Code 08

ELECTRICAL ENGINEERING
Time: 3 Hours
Maximum Marks: 150

Note: Attempt five questions in all. All questions carry equal marks. Q.No.1 is compulsory. Answer any two questions from Part-I and two questions from Part–II. Parts of the same question must be answered together and must not be interposed between answers of other questions.

Q.1.Write critical notes on any four:
   a. UJT triggering circuit of thyristors
   b. Phase and frequency modulation
   c. Multiplexers and decoders
   d. Dielectric behavior of materials
   e. Data acquisition system
   f. Stepper motor   (7.5x4=30)

PART-I

Q.2.

   a).i) Following measurements are obtained on a two terminal network,

   A) when a voltage of $100\angle0^0$ volts applied at input port with output port open, $I_1=20\angle0^0$ amps and $V_2=25\angle0^0$ volts

   B) when a voltage of $100\angle0^0$ volts applied at output port with input port open, $I_2=10\angle0^0$ amps and $V_1=50\angle0^0$ volts.

Write loop equations for the network and determine the driving point and transfer impedance. (10)

ii) The driving point impedance of a network is given by $Z(S) = \frac{(s^3+4s)}{(s^2+2)}$, realize the network. (5)

b) Explain the construction, working principle and applications of brushless dc motors. (15)

Q.3.
a) A current sheet $K = 9\widehat{a_y}$ Amps/meter is located at Z=0, the interface between region1, Z<0 with μr_1=4 and region 2, Z>0 with μr_2=3. Find $\overline{H_1}$ given that $\overline{H_2}$ =14.5$\widehat{a_x}$+8$\widehat{a_z}$ (15)

b) Discuss the following
   i) Emitter-coupled logic (7)
   ii) 4-bit SISO registers (8)

Q.4
a) Explain the different working modes of differential amplifier. (15)

b). i) Explain the static characteristics of thyristor. (10)

ii) A single phase fully controlled bridge converter is supplied from 220V ac supply. Assuming the load current to be continuous, obtain the mean load voltage for firing angle of 45⁰. Assume that thyristor voltage drop is 1.5 volts. What is the PIV rating for each thyristor. (5)

PART-II

Q.5.

   a) Explain the basic concepts of memory interfacing for 8-bit microprocessor. (15)

   b) Explain the working principle of a ramp type digital voltmeter. (15)

Q.6.

   a) (i) Use Routh's criteria to investigate the stability of the open loop system given by transfer function,

   $$G(s) = \frac{k}{S(S+2)(S^3+3)}$$ (10)

   (ii) Determine the break- away point of the given transfer function,

   $$G(s)H(S) = \frac{k}{S(S+2)(S^2+2S+2)}$$ (5)

   b) Explain the wind energy conversion systems and their integration into electrical grid. (15)

Q.7.

   a) Explain the differential protection of a three phase transformer. Mention the impact of tap changing and inrush current on the operation of differential relay protection. (15)

   b) What is the concept of power system stability? Explain in brief, the various stability concern of power system. (15)

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