

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 $100\angle 0^\circ$ volts applied at input port with output port open, $I_1=20\angle 0^\circ$ amps and $V_2=25\angle 0^\circ$ volts

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

$$Z(S) = \frac{(S^3+4S)}{(S^2+2)}, \text{ realize the network.} \quad (5)$$

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

Q.3.

a) A current sheet $K = 9\hat{a}_y$ Amps/meter is located at $Z=0$, the interface between region 1, $Z<0$ with $\mu r_1=4$ and region 2, $Z>0$ with $\mu r_2=3$. Find \overline{H}_1 given that $\overline{H}_2 = 14.5\hat{a}_x + 8\hat{a}_z$ (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 45° . 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,

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

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

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

- 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)