ELECTRICAL ENGINEERING

Q1. Write critical notes on any four:

a. Modulation and Demodulation
b. Importance of Energy Management
c. Frequency response of amplifiers
d. Methods for the measurement of low resistances
e. Superconductivity
f. Snubber circuits (4x7.5=30)

PART I

Q.2.a.) State Maxwell's equations in their general time varying form in

i. Differential form
ii. Integral form.
Specialize these equations for
A.Perfect dielectrics
B. Time harmonically varying fields. (15)

Q.2.b.) State and explain 'Complex Convolution theorem' for z transform.
Given functions $f_1(t)= t^2 u_s(t)$ and $f_2 = e^{-2t} U_s(t)$, find the Z transform of the product $f_1(t) f_2(t)$
Using complex convolution theorem of z transform. (15)

Q.3.a.) A sequential circuit has two flip flops (A and B), two inputs (x and y) and an output (z). The flip Flop input functions and the circuit output functions are as follows:

JA = xB+y'B', KA = xy'B'
JB = xA' KB = xy'+A
Z = xyA+x'y'B

Obtain the logic diagram, state table, state diagram and state equations. (15)

Q.3.b) What is an IGBT or IGT? Draw the schematic structure and equivalent circuit of it and hence discuss its electrical characteristics. How does it differs from that of a BJT and a MOSFET? (15)

Q.4.a) Explain with the help of phasor diagram, how the flux of the transformer core remains fairly constant from no load to full load.

A 10kVA, 200/400 V, 50 Hz, single phase transformer gave the following test results:

OC Test (HV winding open) : 200 V, 1.3 A, 120W
SC Test (LV winding short) : 22V, 30A, 200W

Find the parameters of the equivalent circuit as referred to the LV side. Also draw the equivalent circuit of the transformer. (15)

Q.4.b)) Draw the Bode plot for $G(s) = 512 (s+3) / s (s^2 + 16s + 256)$
From the plot determine gain margin and phase margin. (15)

PART II

Q.5.a). Explain and compare various methods to control the flow of reactive power over the transmission lines. (10)

Q.5.b) Explain what is meant by positive, negative and zero phase sequences. Illustrate with diagram, a system of protection making use of negative sequence currents for the operation of the relays. (10)

Q.5.c) What do you understand by the terms 'load factor' and 'diversity factor'? Explain their significance. (10)

Q.6.a) Describe the inputs, outputs and memory locations of Intel 8085 microprocessor. Also bring out the salient features of the instructional set of it. (15)

Q.6.b) Describe the principle of operation and working of an 'ultra sonic flowmeter'. Compare it with an electromagnetic type flowmeter. A gauge has a resistance of 120 ohm and a gauge factor of 2.1. It is shunted by a resistance of 100 kohm. What equivalent strain will be indicated when the gauge is shunted? (15)

Q.7.a) Find the transmission (ABCD) parameters of the network shown in fig. 1. Also find whether the network is
i. reciprocal ii. Symmetrical. (15)

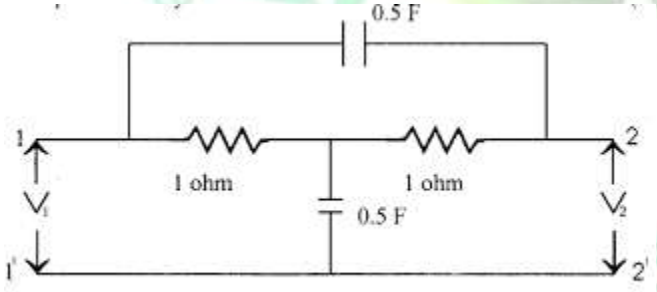

Fig-1

Q.7.b) Fig. 2 shows one form of the equivalent circuit for a transistor amplifier. Obtain the Thevenin's equivalent network across the output terminals A and B. (15)

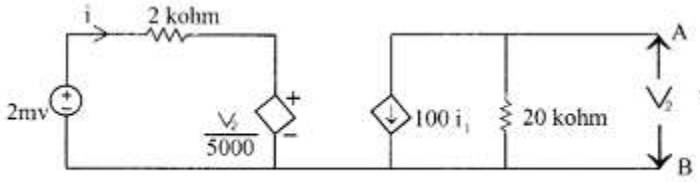

Fig-2