Code No: 123BR **R15**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech II Year I Semester Examinations, March - 2017

BASIC ELECTRICAL ENGINEERING

(Common to CSE, IT)

Time: 3 Hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) State Super position Theorem? [2]

b) What are Ideal and Practical sources? [3]

c) A 3μF capacitor is connected to a supply frequency of 1KHz and a current of $2.83\angle 90^0$ flows. Determine the supply voltage. [2]

d) The impedance of an electrical circuit is (30 -j50) ohms. Determine (i) the resistance, (ii) the capacitance, and (iii) the magnitude of the impedance, when the circuit is connected to a 240 V, 50 Hz supply. [3]

e) Define regulation of a transformer? [2]

f) Give the constructional details of a 1-ϕ transformer. [3]

g) What are different types of DC generators? [2]

h) What is slip and slip speed? [3]

i) State the materials used for:
i) Pointer and ii) Springs. [2]

j) Compare different damping torques required in measuring instruments? [3]

PART - B

(50 Marks)

2.a) Using Thevenin equivalent circuit for the circuit shown in figure 1 across x-y terminals, calculate the current flowing through the 5 Ω resistor.

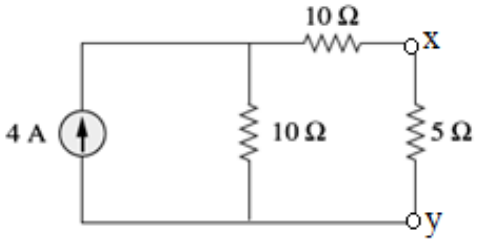

Figure: 1

b) Find the equivalent resistance R_{ab} in the circuit shown in figure 2. [7+3]

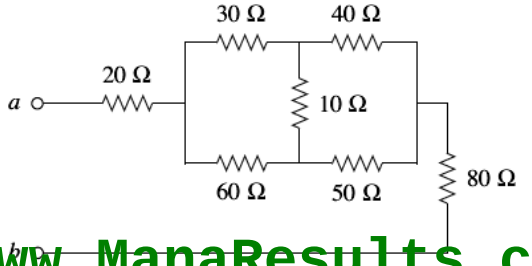

Figure: 2

OR

3.a) State and explain Kirchoff's laws.

b) Determine v_x for the circuit shown in figure 3.

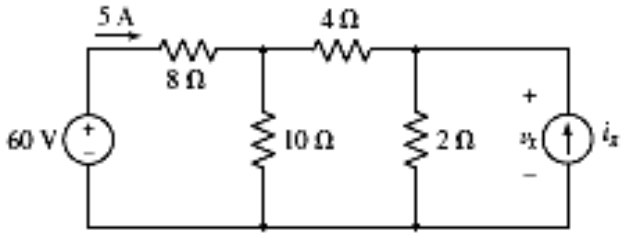

Figure: 3

c) Using Δ-Y or Y-Δ conversion, find the current I in the circuit shown in figure 4? [3+3+4]

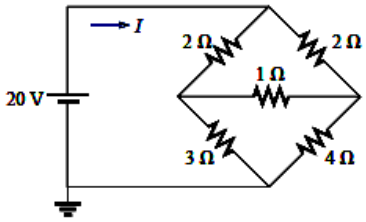

Figure: 4

4.a) Define the following with respect to sinusoidal quantity:
i) RMS Value ii) Average Value iii) Form factor iv) Peak factor.

b) A coil has a resistance of 4 Ω and an inductance of 9.55 mH. Calculate (i) the reactance, (ii) the impedance, and (iii) the current taken from a 240V, 50 Hz supply. Determine also the phase angle between the supply voltage and current. [4+6]

OR

5. Determine the average value, rms value and form factor of the current waveform in Figure 5. [10]

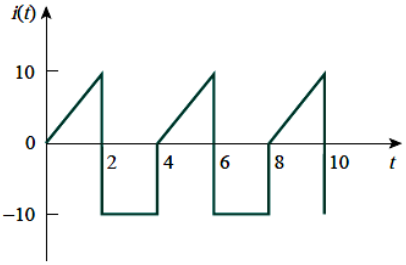

Figure: 5

6.a) A single – phase, 50 Hz transformer has 40 primary turns and 520 secondary turns. The cross- sectional area of the core is 270 cm^2. When the primary winding is connected to a 300 volts supply, determine (i) the maximum value of flux density in the core, and (ii) the voltage induced in the secondary winding.

b) Explain about various losses of Single phase transformer? How to minimize them? [5+5]

OR

7.a) Briefly explain different tests performed on transformer with suitable circuit diagrams.

b) A single-phase transformer is rated at 40 kVA. The transformer has full-load copper losses of 800W and iron losses of 500W. Determine the transformer efficiency at full load, 75 % of load and 0.8 power factor. [6+4]

8.a) Derive the torque equation of dc motor.

b) The stator of a 3-phase, 4-pole induction motor is connected to a 50 Hz supply. The rotor runs at 1455 rev/min at full load. Determine (i) the synchronous speed and (ii) the slip at full load. [6+4]

OR

9.a) Explain the operating principle of Three phase Induction motor.

b) A 10kW d.c shunt generator having an armature circuit resistance of 0.75Ω and a field resistance of 125 Ω, generates a terminal voltage of 250V at full load. Determine the efficiency of the generator at full load, assuming the iron, friction and wind age losses amount to 600W. [5+5]

10.a) How are measuring instruments classified?

b) Explain the construction and working of PMMC instrument. Derive the equation for deflection if the instrument is spring controlled. [4+6]

OR

11. Explain the construction and working of MI instrument with the help of a neat sketch. [10]