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10116

Reg. No. _____ Name _____

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JANUARY 2016

Course Code: BE101-03

Course Name: INTRODUCTION TO ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

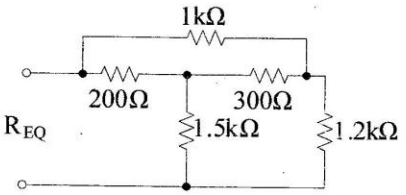
Instructions: Make suitable assumptions if any data is missing
Write units in all numerical answers

PART- A

Answer all Questions. 10x4 = 40 marks

1 Draw and explain the characteristics of ideal and practical voltage and current sources.

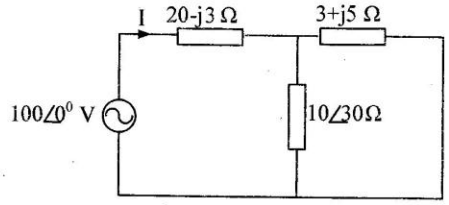
2 Using star-delta transformations, find the total resistance R_{EQ} for the circuit shown below.



3 What is fringing effect and leakage flux in magnetic circuit? What are its disadvantages?

4 An alternating current is represented by $i(t) = 200\sin(314t)$. Find (i) RMS value (ii) frequency (iii) time period and (iv) instantaneous value of voltage when $t = 3$msec.

5 From the figure shown below, (i) evaluate current '*I*' flowing through the circuit and (ii) draw the phasor diagram of current and voltage (take source voltage as reference quantity).



6 A choke coil takes 3A which is lagging 60^0 with respect to applied voltage of 230 V, 50 Hz AC supply. Determine impedance, resistance and inductance of coil.

7 List a few advantages of three phase system over single phase system.

8 Three impedances $(10+j15)$ Ω are connected in delta across three phase 400 V supply. Find the line current, power factor and active power.

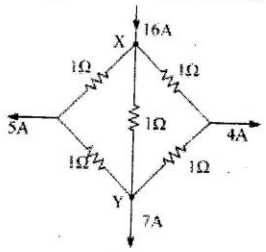
9 Explain the necessity of earthlings in electrical installations

10 Draw a schematic layout of LT switch board.

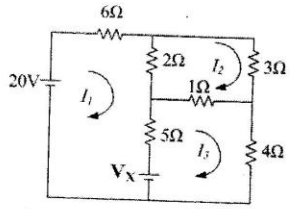
PART- B

Answer any four full Questions 4x10 =40 marks

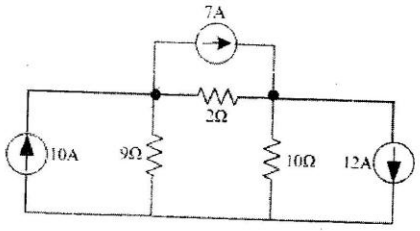
11 a. Compute current through the segment *X* and *Y* shown in the figure below. (4)



b. Determine unknown voltage V_X given in the figure, so that the current supplied by the 20V source is zero (6)

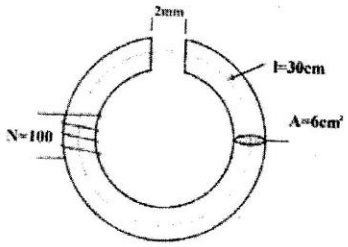


12 a. Using nodal analysis, find power consumption of 10 Ω resistor in the circuit given below (7)



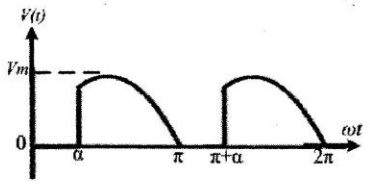
b. What are the dissimilarities of electric and magnetic circuits? (3)

13 a. An iron ring of cross sectional area 6 cm^2 is wound with a wire of 100 turns and the ring has a saw cut of 2 mm shown below. Calculate the magnetizing current required to produce a flux of 0.1 mWb if mean length of magnetic path is 30 cm and relative permeability of iron is 470.Neglect magnetic leakages and fringing. (6)



b. Derive the expression of coefficient of coupling in terms of mutual inductance and self-inductance. (4)

14 a. The output voltage appearing across an electronic power converter is shown in figure. Find RMS and average value of $v(t)$ if $Vm = 100$ V and $\alpha = 60^{\circ}$ (6)



b. Explain how sinusoidal voltages and current are represented in phasor form (4)

15 a. Express the phasor in time domain '$i(t)$' after carrying required computation in phasor form $I = \frac{(4e^{-j\pi/12} - 3e^{j\pi/8})}{(2\angle -25)(2-j2)}(15+j1.2)$ (5)

b. Sketch how the parameters of a series RLC circuit vary with frequency. Define 'Q' Factor and bandwidth of a series resonant circuit? (5)

16 a. Prove the instantaneous power consumed by a pure inductor is zero. (3)

b. A series RLC circuit with L= 25 mH and C = 70 μF has a lagging phase angle 30^0 at f =320 Hz. At what frequency will the phase angle be 40^0 leading (7)

PART- C

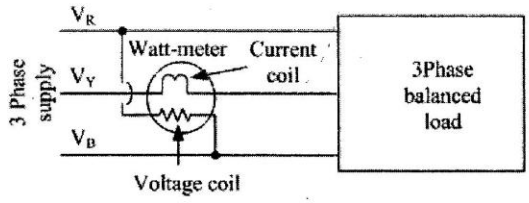
Answer two full Questions (17 or18 and 19 or 20)

17 a. The Power input and line current of three phase induction motor is 15 kW and 25A respectively. Find the readings of two watt meters connected to measure the motor input power. Assume three phase supply voltage is 400V (6)

b. Explain phase sequence of three phase system. (4)

OR

18 a. Figure below shows a watt meter connection in a three phase balanced load is connected to balanced three phase supply. Prove that wattmeter reading is proportional to reactive power consumed by the load. (6)



b. Derive the line and phase voltage relationship in a star connected three phase circuit with the help of phasor diagram. (4)

19 With neat sketch, explain the method of standard pipe earthing. (10)

OR

20 Explain briefly, various protective devices used in LT installations (10)