D

10118

Reg. No............................ Name................................

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, JUNE 2016

BE101-03 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 Identify and explain the source given in the figure below within the dotted line.   (4)
   Given V=1.5V and R=1Ω, find the value of current I_0 and voltage V_0 across R_L
   for the following values of R_L = 0.1, 0.5 and 1.0 Ω.
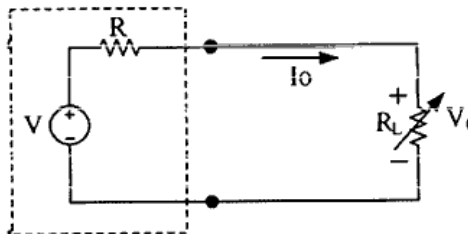
2 List a few similarities and dissimilarities of magnetic and electric circuits.   (4)

3 A 50 cm long conductor moves with a velocity of 2 m/s at right angles to itself   (4)
   and a uniform magnetic field of $1Wb/m^2$ flux density. Calculate the voltage
   induced between the ends of the conductor. What will be the voltage if the
   conductor is moving at $30°$ from the direction of the flux?

4 A capacitor of capacitance 79.5 µF is connected in series with a non-inductive   (4)
   resistance of 30 Ω across 100 V, 50 Hz supply. Find (i) impedance (ii) current
   (iii) phase angle and (iv) equation for instantaneous value of current.

5 The voltage across 150 Ω resistor is $150 \sin(2\pi \times 10^3 t)$ V. At what value of 't'   (4)
   does the current through the resistor equal to -0.26 A and what is instantaneous
   power at this time t ?

6 What is resonant frequency? Give a graphical explanation of series resonance in   (4)
   series RLC circuits.

7 What are the advantages of three phase system over single phase system?   (4)

8 How do you measure 3phase reactive power in a balanced 3 phase system using   (4)
   one Wattmeter?

9 What is the role of a MCB in domestic wiring circuit? Also explain the working   (4)
   of MCB

1

10   Explain the necessity of earthing in electrical appliances   (4)
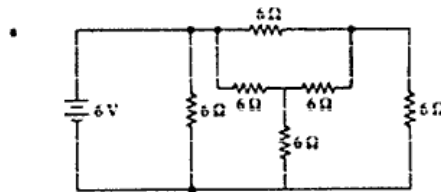
### PART- B

Answer any four full Questions

11 a. Using Nodal Analysis find the currents flowing through the various branches in   (6)
        the circuit shown in figure below.
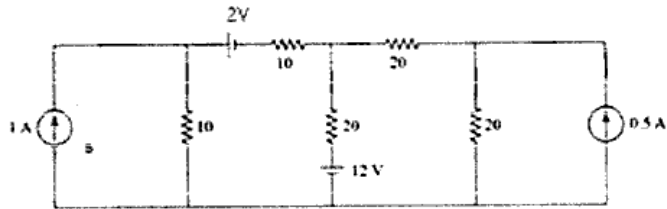

   b. Calculate the current supplied by the battery in the circuit shown in figure below   (4)

12 a. Using mesh analysis, determine the current supplied by each battery in the circuit   (6)
        shown in figure. http://www.ktuonline.com
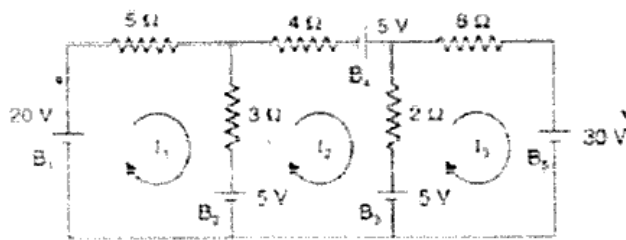
    b. Drive the expression for coefficient of coupling (K) between two magnetically   (4)
        coupled circuits.

13   Calculate the current required to be passed through the central limb winding so as   (10)
     to produce a flux of 1.6 mWb in this limb. Length of iron in the central limb is
     15 cm. Cross sectional area of the central limb is 8 cm^2 and that of outer limbs
     4 cm^2. The mean length of iron of the outer limb is 32 cm each. Given that for
     iron, for a flux density of 2.0 Wb/m^2, the value of H is 800 AT/m.
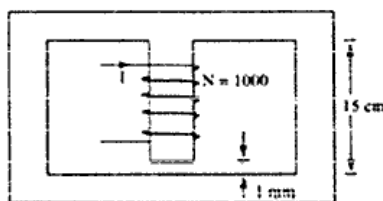
14   Find the average value and r.m.s value of the waveform given below.   (10)
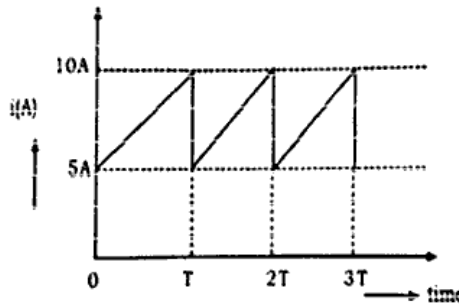
15 a. Explain how sinusoidal voltages and currents are represented as phasor? (4)

   b. A Coil of resistance 50 Ω and inductance 100 mH is connected in series with a (6)
       capacitor of 500 µF is connected across a 230 V, 50 Hz ac supply. Find (i)
       Current through the coil (ii) Power consumed (iii) Reactive power and (iv)
       Voltage across the coil. Also draw the phasor diagram with voltage as the
       reference vector.

16 a. Prove the instantaneous power consumed by a pure capacitor is zero. (4)

   b. A series LCR circuit which resonates at frequency 500 kHz has L=100 µH, (6)
       R=25Ω and C=1000 pF. Determine (i) the Q-factor of the circuit (ii) the new
       value of C required to resonate at 500 kHz when the value of L is doubled and
       the new Q factor.

PART- C

Answer two full Questions (17 or 18 and 19 or 20)

17 a. Derive the relation between Line and Phase Values of Voltage and Current for a (4)
       delta connected system.

   b. The load to a three phase power supply consists of three similar coils connected (6)
       in star. The line currents are 25A and the kVA and kW inputs are 20 and 11
       respectively. Find (i) the phase and line voltages (ii) the reactive power input (iii)
       the resistance and reactance of each coil.

OR

18 a. What is meant by phase sequence of a 3 phase system? (3)

   b. Three identical coil having resistance of 10 Ω and an inductance 38.2 mH are (7)
       connected in delta across 400 V, 3 phase 50 Hz supply. Find wattmeter reading if
       two Wattmeter method is used to measure total power.

19 With a neat sketch explain plate earthing indicating standard dimensions. (10)

OR

20 a. If an earth leakage is occurred in a domestic installation, which protective device (5)
       will act? Explain the working of that device.

   b. Give the schematic Layout of an LT Switch Board. (5)