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Reg. No.:_____   Name:

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIRST SEMESTER B.TECH DEGREE SPECIAL EXAMINATION, SEPTEMBER 2016
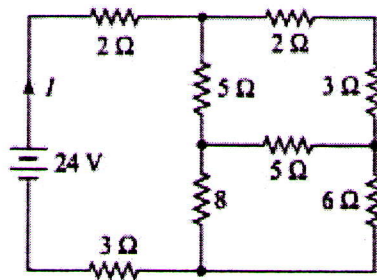**BE101-03 INTRODUCTION TO ELECTRICAL ENGINEERING**
Max. Marks: 100   Duration: 3 Hours

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

PART- A (Answer all Questions. 10x4 = 40 marks)

1   Determine the current supplied by the battery in the circuit shown in fig. using star delta transformation   (4)


2   Draw and explain the characteristics of ideal and practical voltage and current sources.   (4)

3   Distinguish between self inductance and mutual inductance and derive the expression for the self inductance of a coil.   (4)

4   A Capacitor and resistor are connected in series across a 120 V, 50 Hz supply. The circuit draws a current of 1.144 A. If power loss in the circuit is 130.8 W, find the values of resistance and capacitance.   (4)

5   For an ac circuit, if v(t) = 160 sin (ωt+ 10°) and   i(t) = 5sin(ωt - 20 °); find the power factor and active power absorbed by the circuit. Draw the phasor diagram.   (4)

6   What is resonant frequency? A series LC circuit is resonate at 150 kHz and has a Q of 50. Find the upper and lower cutoff frequencies.   (4)

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

8   In the two wattmeter method of three phase power measurement the load connected was 50kW at 0.80 pf lagging. Find the reading of each wattmeter.   (4)

9   Differentiate between fuse and   MCB used in domestic installations.   (4)

10 Explain the necessity of earthing in electrical appliances   (4)

PART- B

## Answer any four full Questions

11 a.   How is energy stored in capacitor? On what factors does it depend?   (3)

    b.   Formulate the Kirchhoff's voltage law equations using mesh analysis and
        determine the currents I_1 , I_2 , and I_3 in the circuit shown in figure.   (7)
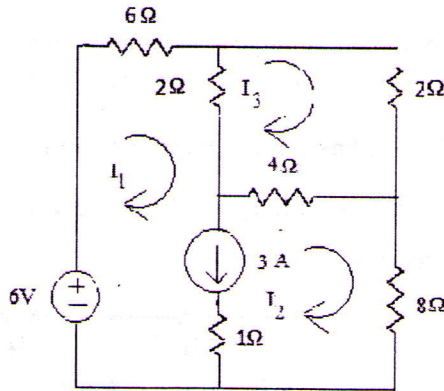

12 a.   Find V_0 for the circuit shown in figure below using nodal analysis.   (6)
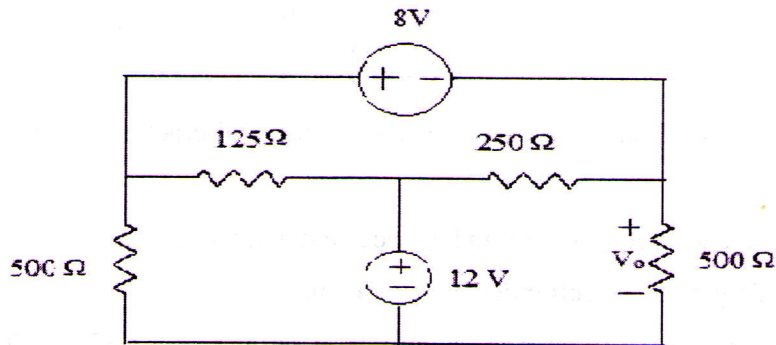
    b.   Give a few seminaries and dissimilarities of electric circuits and magnetic
        Circuit.   (4)

13   An iron ring has a diameter of 21 cm and a cross sectional area of 10 cm^2 .The
        ring is made up of semicircular sections of cast iron and cast steel, with joint
        having a reluctance producing an air gap of 0.2 mm. Find the ampere-turns
        required to produce a flux of 8 mWb. The relative permeability of cast steel
        and cast iron are 800 and 166 respectively.   (10)

14   Find the RMS value , Average value and form factor of the waveform
        shown   (10)
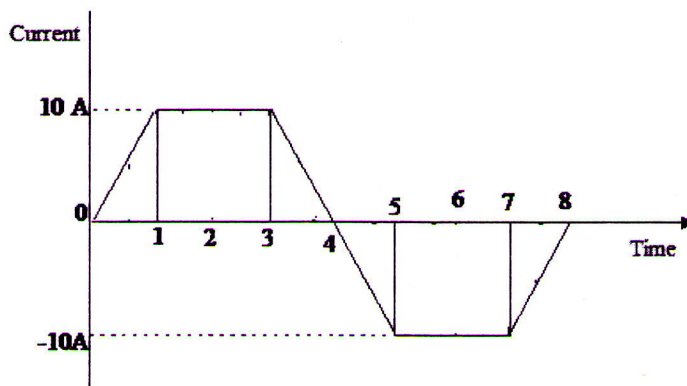
15   A non- inductive resistance is connected in series with a practical inductive coil. The circuit is supplied with 250 V, 50 Hz supply. When a current of 5A flows through the circuit, the magnitude of voltage drop across the resistance and coil are 125 V and 200 V respectively. Calculate (i) the impedance, resistance and reactance of the coil (ii) Power absorbed by the coil and (iii) Total power. Also draw the phasor diagram   (10)

16   a.   Calculate the value of R in the circuit shown in figure such that the circuit will resonate   (4)
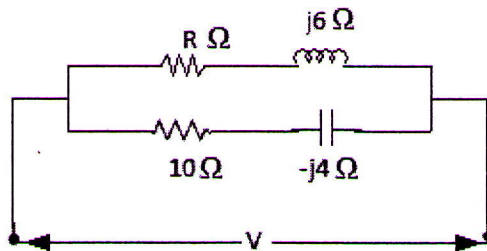
   b.   Two coils A and B are connected in series across a 240 V, 50 Hz ac supply. The resistance of A is 5 Ω and the inductance of B is 0.015 H. If the input from the supply is 3 kW and 2 kVAR, find the inductance of coil A and resistance of coil B. Calculate the voltage across each coil.   (6)

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 star connected system.   (5)

   b.   A three phase star connected load consumes a total of 12 kW at a power factor of 0.8 lagging when connected to a 3 phase, 400 V, 50 Hz power supply. Calculate the resistance and inductance of load per phase.   (5)

OR

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

3

b. Two single phase wattmeter are used to measure three phase power. The readings of the two Watt meters are 2500 W and 450 W respectively. Calculate the Power factor of the circuit. What would be the power factor if the reading of the second wattmeter is negative? (7)

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

b. What is the role of an ELCB in domestic wiring circuit? Also explain the working of ELCB (5)

OR

20 With a neat sketch, explain pipe earthing indicating required dimensions. (10)