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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

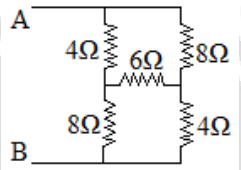
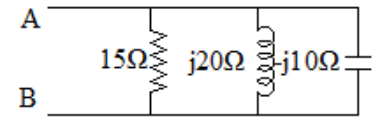
Course Code: BE101-03

Course Name: INTRODUCTION TO ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks.

1		Differentiate between self-inductance and mutual inductance. What is meant by Coupling coefficient?	(4)
2		State and explain Kirchhoff's current and voltage laws with the help of neat diagram.	(4)
3		Find the equivalent resistance R_{AB} 	(4)
4		Compare electric and magnetic circuits in terms of any two similarities and two differences.	(4)
5		Find equivalent impedance of the circuit shown in figure 	(4)
6		Draw the phasor diagram showing the following voltages v_1= 100sin(500t), v_2= 200sin(500t+45^o), v_3= -50cos(500t). Also find the expression of resultant voltage of the three.	(4)
7		What is meant by resonance in electric circuit? Write the expression for resonance frequency of a series RLC circuit.	(4)
8		With the help of an RLC circuit explain the concept of complex power and power factor.	(4)
9		Calculate the phase and line values of voltage and current in a 3-phase star connected balanced network with phase impedance (6+j10) Ω and supply voltage 100 V, 50 Hz.	(4)
10		Derive the relation between phase values of current and voltage of a delta connected 3 phase circuit to the line values with the help of phasor diagram.	(4)

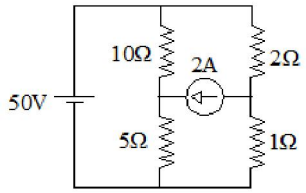
PART B

Answer any four full questions, each carries 10 marks.

11	a)	State Faraday's laws of electromagnetic induction and differentiate between statically and dynamically induced emfs.	(4)
	b)	Two coils A and B 600 and 100 turns respectively are wound uniformly around a wooden ring of mean circumference 80 cm. The cross-sectional area of the ring is 4cm^2. Calculate self-inductance of each coil, mutual inductance between coils, emf induced in the coil B when a current of 2A in coil A is reversed in 0.01 second.	(6)

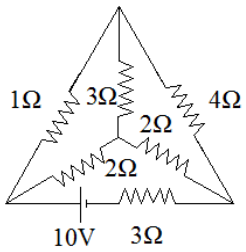
12 a) Derive the expression for energy stored in an inductor. (4)

b) Find the values of branch currents in the circuit shown below using mesh analysis. (6)



13 a) Differentiate between ideal and real current sources with the help of terminal V-I characteristics and circuit representations. (4)

b) Find the branch currents in the circuit shown below using node analysis. (6)

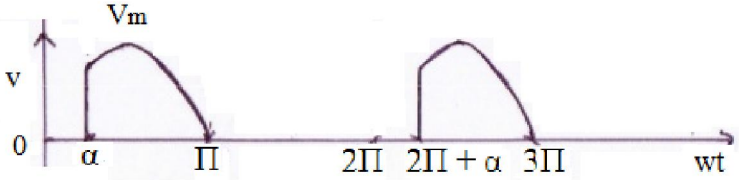


14 a) Define the terms - mmf, flux, reluctance and permeability. (4)

b) A steel ring, 30 cm mean diameter, has an air gap of 1mm long. It is wound uniformly with 600 turns of wire carrying a current of 2.5 A. Neglect magnetic leakages. The iron path has about 40% of the total mmf. Estimate the values of mmf in air gap, magnetic flux in iron path, reluctance of iron path and flux density in air gap. (6)

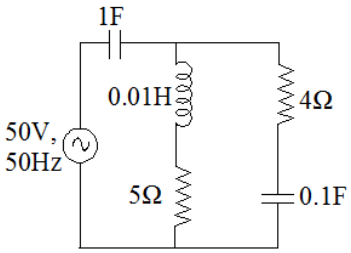
15 a) What is meant by the terms rms value, average value, peak factor and form factor in connection with periodic waveforms. (4)

b) Find the average value rms value and form factor of the sinusoidal voltage shown in figure, where Vm =100V, $\alpha = \pi/4$ (6)



16 a) Prove that the current through a pure inductor lags 90^o the sinusoidal voltage applied across it. (4)

b) Calculate the branch currents in the circuit shown below. (6)



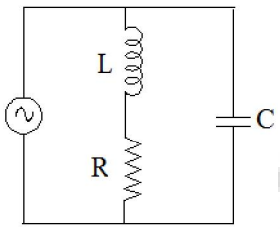
PART C

Answer any one full question from each module, each carries 10 marks.

Module V

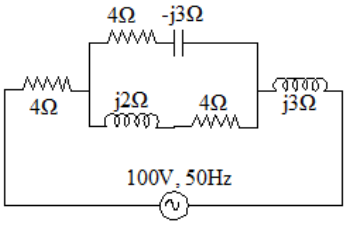
17 a) Define the terms band width and quality factor. Explain the significance of both. (4)

b) Derive the resonance frequency of the circuit shown below. (6)



18 a) Point out any four differences of series and parallel resonance. (4)

b) Calculate the real power, reactive power, apparent power and power factor of the circuit. (6)



Module VI

19 a) List the advantages of 3 phase ac over single phase ac. (4)

b) A 3 phase 4 wire star connected load of phase impedances $Z_1 = (16 + j12)\ \Omega$, $Z_2 = (14 - j21)\ \Omega$ and $Z_3 = 25\ \Omega$ is connected across a 254 V, 50 Hz ac supply. Calculate the current in each phase of the load and power consumed by the load. (6)

20 a) Describe how the two watt meter method is used for real and reactive power measurement in a 3phase 3 wire circuit. (6)

b) A 3 phase balanced load connected across a 3 phase 400V ac supply draws a line current of 10 A. Two wattmeters are used to measure input power. The ratio of two wattmeter readings is 2:1. Find the readings of the two wattmeters. (4)

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