Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, APRIL 2018

Course Code: BE101-03

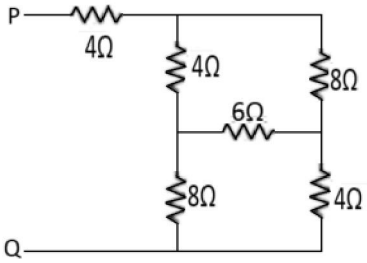
Course Name: INTRODUCTION TO ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks. Marks

1		State and Explain Lenz's Law.	(4)
2		Derive the expression for energy stored in inductance.	(4)
3		Using star delta transformation find the total resistance between points P and Q for the circuit shown below.	(4)

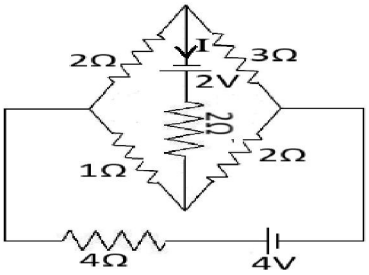


4		What are the dissimilarities of electric and magnetic circuits.	(4)
5		A flux of 0.04Wb is produced in a solenoid of axial length 25cm with 500 turns carrying a current of 4A. Find the magnetizing force and reluctance of the magnetic circuit.	(4)
6		Prove that power absorbed in a pure inductor is zero.	(4)
7		Define resonance in series RLC circuit and derive the expression for resonant frequency for the same.	(4)
8		A resistance of 10Ω connected in series with an inductive reactance of 30Ω is connected across a 230V, 50Hz supply. Determine the following: i) Active power ii) Reactive power iii) Power factor.	(4)
9		What are the advantages of star connected system?	(4)
10		Derive the relationship between line and phase values of voltages and current in a delta connected system.	(4)

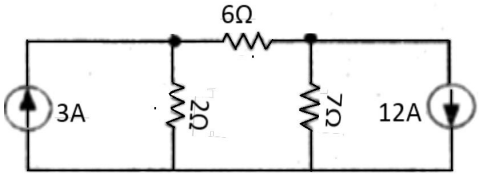
PART B

Answer any four full questions, each carries 10 marks.

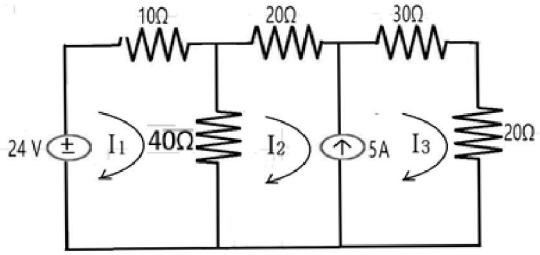
11	a)	The number of turns in a coil is 250. When a current of 2A flows in this coil the flux in the coilis 0. 3mWb.When this current is reduced to zero in 2ms, the voltage induced in the nearby coil is 63.75 volts. The coefficient of coupling between the two coils is 0.75. Find the self-inductances of the two coils, mutual inductance and number of turns in the second coil.	(6)
	b)	What is ideal voltage source and ideal current source? Explain.	(4)
12	a)	State and Explain Kirchhoff's Laws.	(4)
	b)	Find the current I in the circuit shown below using Kirchhoff's laws.	(6)



13 a) Find the current through the 6Ω resistor using Nodal Analysis. (4)



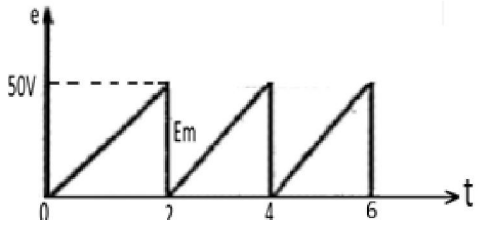
b) Using Mesh Analysis determine the currents I_1, I_2 and I_3 in the circuit shown in figure. (6)



14 a) A circular iron ring has a cross-sectional area of $0.01m^2$ and a mean circumference of 1.5m. A saw cut of 4mm wide is made in the ring. Calculate the magnetising current required to produce a flux of 0.8mWb in the air gap if the ring is wound with a coil of 175 turns. Assume relativepermeabilityof iron as 400 and leakage factor as 1.25. (5)

b) Define the terms flux, permeability and m.m.f with respect to magnetic circuits. (5)

15 a) Find the form factor of the waveform shown in figure. (5)



b) A coil of resistance 8Ω and inductance 0.03H is connected to an a.c supply of 240V, 50Hz. Calculate: (5)

i) The current, power and power factor of the circuit.

ii) The value of capacitance which when connected in series with the above coil causes no change in the value of current and power taken from the supply.

16 A non-inductive resistor of 10Ω is connected in series with a choke coil having internalresistance of 1.2Ω and is fed from a 200V, 50 Hz supply. Current flowing through the circuit is 8A. Calculate: (10)

i) Inductance of the choke coil ii) Voltage across the choke coil

iii) Power absorbed by the choke coil iv) Power absorbed by non-inductive resistor v) Total power absorbed. vi) Phasor diagram of the voltages in the

circuit.

PART C

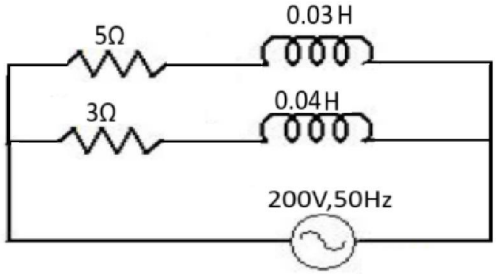
Answer any one full question from each module, each carries 10 marks.

Module V

17 a) What is active power and reactive power in an ac circuit? Explain. (4)

b) For the circuit shown in figure determine: (6)

i) The admittance in each branch ii) Total admittanceiii) Total current drawniv) Circuit power factor v) Power absorbed.



18 a) Draw the resonance curve of series RLC circuit (3)

b) A series RLC circuit has R= 5Ω, L=0.2H and C=50μF. The applied voltage is 200V. Find the: (7)

i) Resonant frequency ii) Q-factor iii) Band width

iv) Half power frequencies v) Current at resonance vi) Current at half power points vii) Voltage across inductance at resonance.

Module VI

19 a) What are the advantages of three-phase system over single-phase system? (4)

b) A balanced delta connected load consists of (5+j3) Ω in each branch. The line voltage is $300\sqrt{2}$ volts. Find: (6)

i) Line and phase currents ii) Real and apparent power.

20 a) Show that power consumed by three identical single-phase loads connected in delta is equal to three times the power consumed when the loads are connected in star. (6)

b) In the two-wattmeter method of 3 phase power measurement, the power input to load is 30kW at 0.397 lagging. Find the reading of each wattmeter. (4)

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