Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIRST SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: BE101-03

Course Name: INTRODUCTION TO ELECTRICAL ENGINEERING

Max. Marks: 100 Duration: 3 Hours

PART A

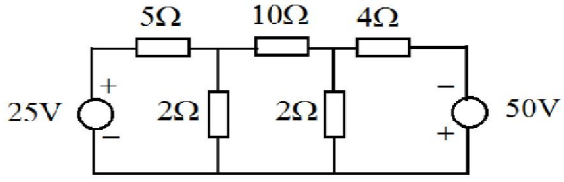
Answer all questions, each carries 4 marks. Marks

1	Define self inductance of a coil. Derive an expression for the self inductance.	(4)
2	State and explain Kirchhoff's voltage and current laws.	(4)
3	Draw series and parallel magnetic circuits and show their electrical equivalents.	(4)
4	A magnet of square cross-section with a side of 5 cm has a magnetic flux of 0.5 mWb. Calculate magnetic flux density.	(4)
5	An alternating current is given by i=62.35 sin(323t) A. Find its frequency and form factor.	(4)
6	Find the peak factor of a sinusoidal wave.	(4)
7	What is resonant frequency? Why parallel resonance is called current resonance?	(4)
8	Explain the terms real, reactive and apparent powers.	(4)
9	Compare star and delta connection of three phase circuits.	(4)
10	Two watt meters are connected to measure power in a 3 phase circuit. One of the wattmeters reads 500 W and the other points in the reverse direction. After reversing the voltage coil terminals, the reading of this wattmeter is found to be 200 W. Determine the power factor of the load and total power of the circuit.	(4)

PART B

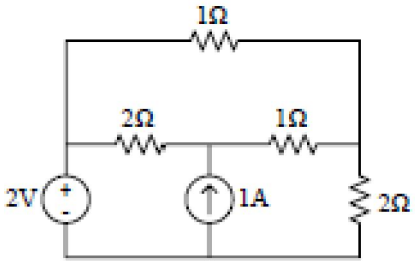
Answer any four full questions, each carries 10 marks.

11	a)	List the factors on which the reluctance of a magnetic material depends.	(2)
	b)	A coil consists of 1000 turns of wire uniformly wound on a non-magnetic ring of mean diameter 25 cm and cross sectional area 10cm^2. Calculate (i) The inductance of the coil (ii) Energy stored in the magnetic field when the coil is carrying 12A current, and (iii) Emf induced in the coil if this current is completely interrupted in 0.01s.	(8)
12		For the circuit shown, find voltage across the 10 Ω resistor using i) Nodal analysis and ii) Mesh analysis	(10)

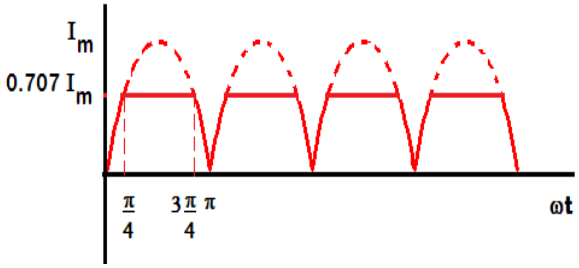


13 A magnetic core in the form of a closed ring has a mean length of 20 cm and cross sectional area of 1 cm^2 .The relative permeability of iron is 2400. What direct current will be needed in a coil of 2000 turns uniformly wound around the ring to create a flux of 0.2 mWb? If an air gap of 1mm is cut through the core, what current will now be needed to maintain the same flux in the air gap? What fraction of the ampere turns is required to maintain the flux in the air gap? (10)

14 Evaluate the power delivered by the 2V source in the circuit below using mesh current method. (10)



15 Determine rms and average values of the given waveform: (10)



16 Find the total current taken by a parallel circuit connected across a 200 V 50 Hz supply. The parallel circuit is made up of three branches having impedances of$(6 + j8)\Omega, (4 - j3)\Omega$ *and* $(20 - j10)\Omega$. Also find the power factor of the whole circuit. Use admittance method. (10)

PART C

Answer any one full question from each module, each carries10 marks.

Module V

17 An inductive coil of resistance 10 Ω, and an inductance of 20 mH are connected in series with a capacitor of 10 μF. Calculate the frequency at which the circuit resonate. If a voltage of 50 V at resonant frequency is applied across the circuit, calculate the voltage across the circuit components and the Q factor. (10)

18 When a 230 V, 50 Hz supply is applied across a resistor of 10 Ω in parallel with a pure inductor, the total current drawn from the supply is 25 A. When the supply frequency is changed, the total current drawn is 36 A. Calculate the new frequency. (10)

Module VI

19 a) A 3 phase four wire 400V, RYB system supplies a star connected load with (5)

$Z_R=10<0^o$, $Z_Y=15<30^o$ and $Z_B=10< -30^o$. Find the line currents and neutral current.

b) The two wattmeters connected to a three phase three wire balanced delta connected load reads 1154 W and 557 W. Obtain the load impedance if the line voltage is 141.4V. (5)

20 a) Two wattmeters W_1 and W_2 are used for measuring power in a three phase circuit. Prove that the sum of wattmeter readings gives the total power consumed by the load and the difference of wattmeter readings gives the total reactive power. Also derive the power factor of the circuit. (10)

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