

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
B.Tech Degree S1,S2(S,FE) Examination May 2021 (2015 Scheme)

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

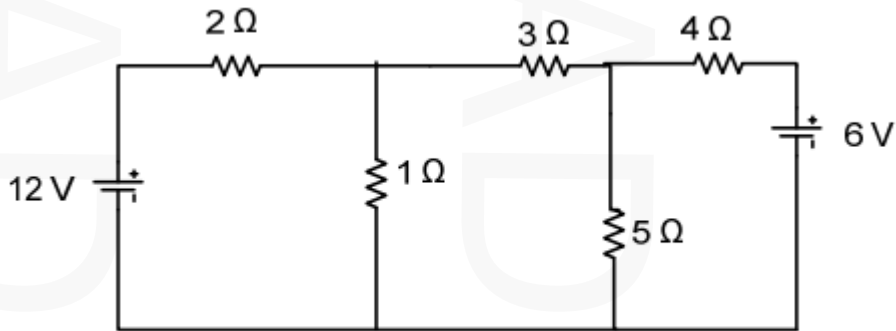
		Marks
1	State and explain Faradays laws of Electromagnetic induction.	(4)
2	Distinguish between self and mutual inductances. Derive an expression for the Self-inductance of a coil.	(4)
3	Explain Kirchhoff's law.	(4)
4	Compare Electric and magnetic circuits.	(4)
5	Derive an expression for energy stored in a magnetic circuit.	(4)
6	Derive the form factor of a pure sinusoidal wave form.	(4)
7	Define bandwidth of a resonant circuit. Give the relationship of quality factor in terms of bandwidth and resonant frequency.	(4)
8	A resistance of 10Ω and an inductive reactance of 10Ω are connected in series. Calculate the value of impedance and draw the impedance triangle.	(4)
9	The input power to a three phase motor was measured using two watt meters. The readings were 5.2 KW and -1.7 KW, and the line voltage was 415V. Calculate a) the total power b) the power factor c) the line current	(4)
10	What are the advantages of three phase system.	(4)

PART B

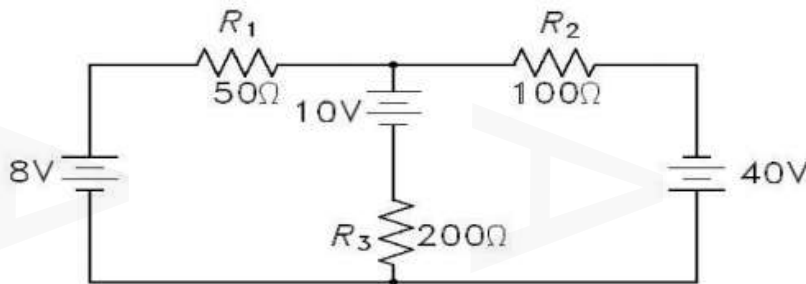
Answer any four full questions each carries 10 marks

- 11 a) An iron cored reactor is wound with 250 turns and has an air gap of 0.8 cm. The flux path in iron is 1.2 m and the cross sectional area is 0.15 m^2 . Determine the inductance of the reactor when carrying a current of 10 A. Take relative permeability of iron as 1100. (6)
- b) Explain ideal and non-ideal voltage sources. (4)

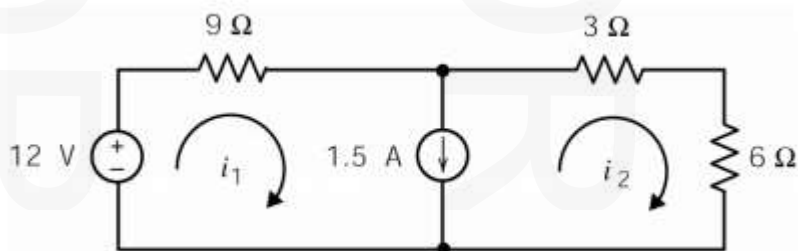
- 12 a) Three resistors, $20\ \Omega$, $90\ \Omega$ and $10\ \Omega$ are connected in star. Obtain the equivalent delta circuit. (4)
- b) Use nodal analysis to find currents in the different branches of the circuit shown below. (6)



- 13 a) Determine the power dissipated in all the three resistors shown in figure using mesh analysis. (6)



- b) Determine the values of mesh currents i_1 and i_2 for the circuit shown in figure. (4)



- 14 a) An iron ring 15 cm mean diameter and 10 cm in cross-section is wound with 200 turns of wire. For a flux density of $1\ \text{Wb/m}^2$ and a relative permeability of 500, calculate the exciting current, inductance and energy stored when there is 2mm air gap. (6)
- b) Write a short note on i) Magneto motive force ii) Reluctance iii) Magnetic flux iv) Permeability (4)

- 15 a) Two impedances Z_1 and Z_2 when connected separately across a 200 V 50 Hz supply consume powers of 100 W and 60 W at power factors of 0.5 lagging and 0.6 leading respectively. If the impedances are now connected together in series across the same supply, determine the power absorbed and resulting power factor. (5)
- b) Prove the instantaneous power consumed by a pure inductor is zero. (5)
- 16 A current of 5A flows through a non inductive resistance in series with a choke coil when supplied at 250V, 50Hz. If the voltage across the resistance is 125V and that across the coil is 200V, calculate (i) Impedance, reactance and resistance of the coil (ii) Power absorbed by the coil and (iii) Total power absorbed by the circuit. (10)

PART C

Answer any one full question from each module, each carries 10 Marks

Module V

- 17 a) What is resonance? Explain the characteristics of resonance in RLC series circuit (4)
- b) Explain parallel resonance and draw graphs of Z , X_L and X_C against frequency (6)
- 18 a) Explain active power, Reactive power and apparent power? (3)
- b) An inductive coil of resistance 10Ω and an inductance of 20mH are connected in series with a capacitor of $10 \mu\text{F}$. 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. (7)

Module VI

- 19 Explain the measurement of power in a three phase system by using two wattmeters with relevant phasor diagrams. (10)
- 20 a) A balanced star connected load of $(8+j6) \Omega$ per phase is connected to a three-phase 230V supply. Find the line current, power factor and power consumed by the load. (6)
- b) Derive the relation between line and phase values of voltage and current for delta connected system. (4)
