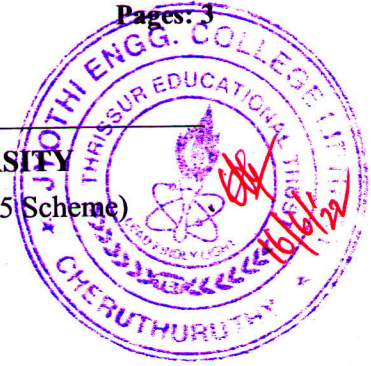D

Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (S,FE) S2 (S) Examination May 2022 (2015 Scheme)

Course Code: BE101-03

Course Name: INTRODUCTION TO ELECTRICAL ENGINEERING

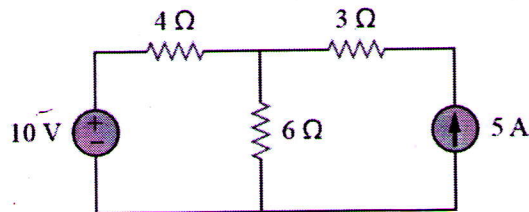Max. Marks: 100   Duration: 3 Hours

PART A

Answer all questions, each carries 4 marks   Marks

1   Explain Faraday's law of electromagnetic induction and what are the factors   (4)
    affecting magnitude of induced emf?

2   Find the current through 6Ω resistor in the following circuit   (4)


3   Explain kirchhoff's voltage and current law with example.   (4)

4   Define reluctance. What is the effective reluctance for a series magnetic circuit of   (4)
    two different materials?

5   What is the significance of rms value and how it is calculated?   (4)

6   Two impedances $(10 - j12)\Omega$ and $(6 + j10)\Omega$ are connected in parallel. Calculate   (4)
    the effective impedance.

7   What is power factor? Explain its significance.   (4)

8   Explain the variation of impedance with frequency in a series RLC circuit.   (4)

9   What is star connected network? Derive the relation between line and phase   (4)
    voltages in a star connected network.

10 Show that the neutral current of a three phase balanced star connected load is   (4)
   zero.

PART B

Answer any four full questions each carries 10marks

11 a) Two coils A and B are kept in parallel planes, such that 70% of flux produced by coil A links with coil B. Coil A has 10,000 turns and coil B has 12,000 turns. A current of 4A in coil A produces a flux of 0.04 mWb while a current of 4A in coil B produces a flux of 0.08 mWb. Calculate i) self inductance of coil A and B   ii) mutual inductance iii) coefficient of coupling   (7)

b) Explain an ideal voltage source with v-i characteristics.   (3)

12 Find the loop currents using mesh analysis   (10)
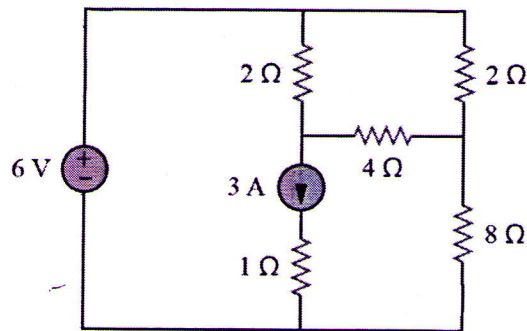
13 a) Distinguish between statically and dynamically induced emf.   (4)

b) Calculate the equivalent resistance between the points A and B   (6)
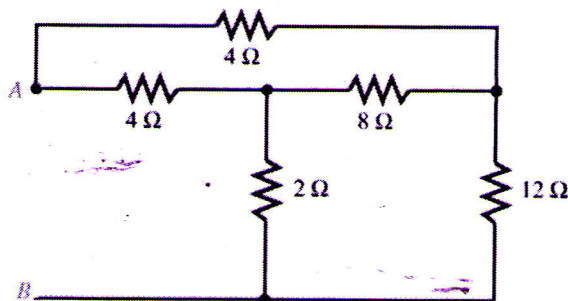
14 A ring has a diameter of 21cm and a cross sectional area of 10 cm^2. The ring is made up of semi conductor sections of cast iron and cast steel, with each joints having a reluctance equal to an air gap of 0.2 mm. Find the ampere turns required to produce a flux of 0.8mWb. The relative permeabilities of cast steel and cast iron are 800 and 166 respectively. Neglect fringing and leakage effects.   (10)

15 a) Find the rms value, average value and form factor of the following waveform.   (6)
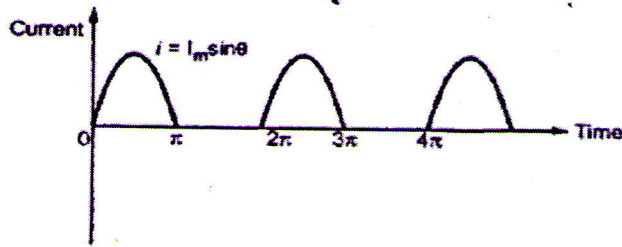
  b) Define form factor and peak factor.   (4)

16 A coil of resistance 2Ω and inductance 500mH is connected across a capacitor of   (10)
500μF. The parallel combination is connected across a 230V, 50Hz ac supply.
Find the current drawn from the supply and current through each parallel path.
Also draw the phasor diagram.

PART C

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

Module V

17 a) A series circuit consists of a resistor of 12Ω, an inductor of 0.3H and a variable   (7)
capacitor. The circuit is connected across a 100V, 50Hz ac supply. Calculate the
value of capacitance required for resonance. Also find the power drawn by the
circuit under this condition.

  b) Define Q-factor of an ac circuit.   (3)

18 a) Derive the resonant frequency for an RLC series circuit.   (4)

  b) An alternating voltage v = (160 + j120)V is applied to a circuit and the current   (6)
flowing is (-6 + j15)A. Find the impedance, powerfactor, active power and
reactive power.

Module VI

19 Three identical loads are connected as a delta load to a three phase supply. The   (10)
line current drawn from the supply is 15A and the total power consumed is
7.5kW. The kVA input to the load is 10kVA. Find i) Line and phase voltages
ii) phase current iii) Power factor iv) Resistance and reactance per phase

20 Explain with necessary diagrams how active and reactive power can measure in a   (10)
three phase circuit using two wattmeter method.

****