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Ref. No. EX/EE/5/T/111A/2019 (Old)

BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING) FIRST YEAR FIRST SEMMESTER EXAMINATION, 2019 (Old)

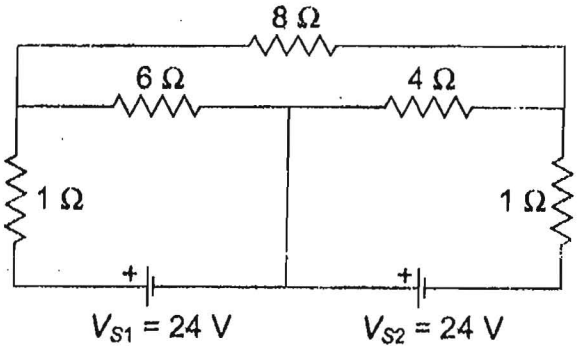
SUBJECT : PRINCIPLES OF ELECRICAL ENGINEERING

Full Marks -100

Time : Three hours

Use a separate Answer-Script for each part

No. of question		Marks
	Answer any FIVE questions.	
1. a)	State and explain Superposition Theorem.	6
b)	With reference to Fig.1 using "Superposition Theorem", determine the component of the current through the 8Ω resistor that is due to V_{S2}. The battery voltage $V_{S1} = V_{S2} = 24V$.	10



c)	State and explain maximum power transfer theorem for dc circuit.	4
2. a)	What do you mean by 'effective value' of a sinusoidal waveform? Derive the expression for form factor and peak factor for 50 Hz pure sinusoidal wave represented as $V=V_{max}$ Sinwt.	10
b)	How an unbalanced system of three phase vectors can be resolved into three balanced systems of vectors? Explain with suitable example	10

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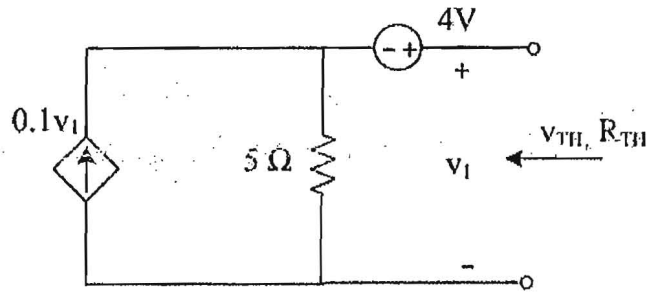
3.a) State and explain Thevenin's and Norton's Theorem. In the circuit shown in following figure find the value V_{TH} and R_{TH} 10



b) Derive the condition of resonance for RLC series circuit. Compare series and parallel RLC resonance in ac circuit. 10

4. a) What do you mean by self-inductance of a coil? Find the expression of energy stored in any conductor. 8

b) Define intensity of magnetisation and magnetic flux density. Find the relationship between them. 4

c) Explain Star-Delta and Delta-Star transformation in any electrical circuit. 8

5.a) Write a note on : hysteresis loss and eddy current loss. 4

b) Determine magnetic field strength and flux density (i) around a long straight conductor, (ii) within a solenoid using Ampere's Law. 8

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c)	Define Coulomb's Law for force between two point charges and hence give the definition of unit of charge. Define electric field intensity and potential.	8
6.a)	The magnetic field due to a current carrying circular loop of radius 10 cm at its centre is 0.6×10^{-4}T. Find the magnetic field due to this loop at a point on the axis at a distance of 4 cm from the centre.	10
b)	Determine capacitance per unit length between two coaxial cylinders with the assumption that +q charge is on the outer surface of the inner cylinder and the outer cylinder is earthed.	10
7.a)	Explain the significance of hysteresis curve (B-H) for a magnetic material?	8
b)	A steel magnetic circuit has a uniform cross-sectional area of 4 cm2 and a length of 50 cm. A coil of 250 turns is wound uniformly over the magnetic circuit. When the current in the coil is 1.5 A, the total flux is 0.25 mWb; when the current is 5A, the total flux is 0.6 mWb. For each value of current, calculate the (a)magnetic field strength , (b) relative permeability of the steel.	8
c)	State and explain Ampere's Law with suitable example.	4
8.a)	State Gauss's Law.	2
b)	What do you mean by magnetic circuit? Compare electric and magnetic circuit.	10
c)	The hysteresis loop of a sample of sheet steel subjected to a maximum flux density of 2 Wb/m^2 has an area of 100 cm^2, the scale being 1cm=0.1 Wb/m^2 and 1 cm=50 AT/m. Frequency is 50 Hz. Calculate the hysteresis loss when 2000 cm^3 of the same material is subjected to an alternating flux of 2 Wb/m^2. .	8