Total number of printed pages: **04** **UG/1st /UEE101**

2022

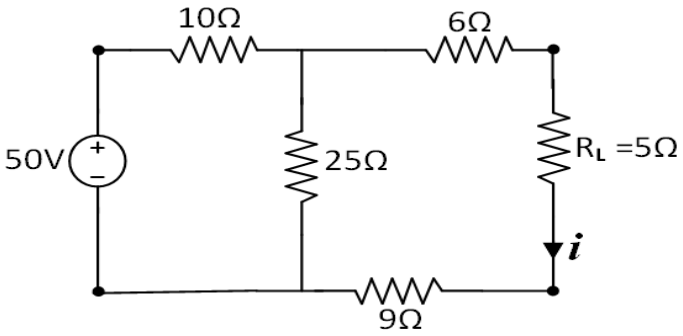
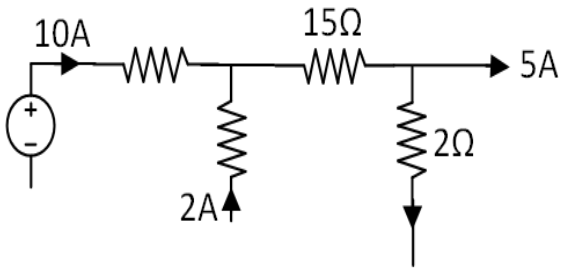
BASIC ELECTRICAL ENGINEERING

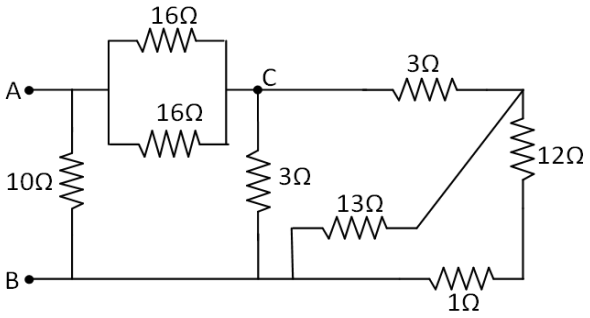
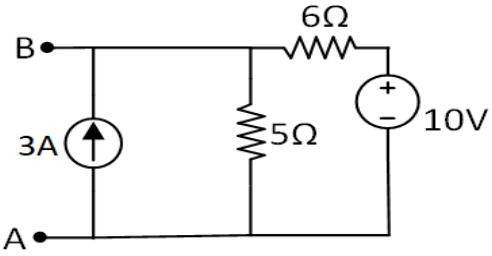
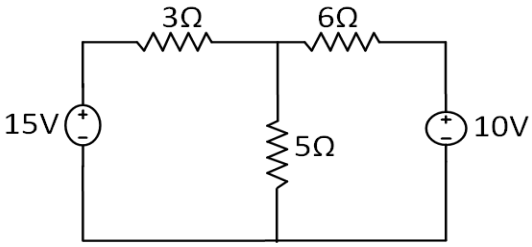
Full Marks : 100

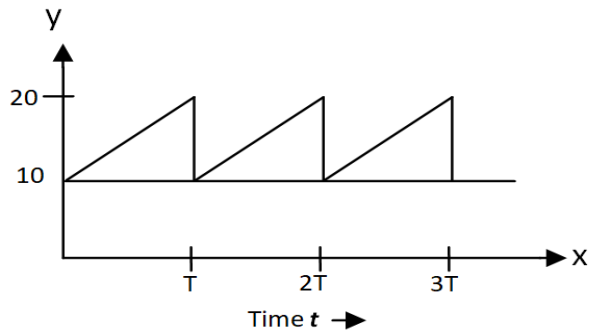
Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	In the given circuit, find Current ***i*** (in R_L) and power supplied by the source  	5
	b)	 In the above diagram, find the currents in 15Ω and 2Ω resistances.	5

	c)	 Find the equivalent resistance between A and B and between A and C.	10
2.	a)	 Find the Norton's equivalent resistance for the circuit shown above.	5
	b)	Three resistors 10Ω, 15Ω and 5Ω are connected in star. Find its equivalent delta. Draw necessary diagram.	5
	c)	In the given circuit, find the currents flowing through each resistor using KVL only. 	10
3.	a)	Two voltage phasors are given – $\mathbf{V_1}$= j ; $\mathbf{V_2}$ = - 4+j5 Evaluate $\mathbf{V_1} \times \mathbf{V_2}$ and $\mathbf{V_1}/\mathbf{V_2}$ Expressed your answers in polar form. Draw necessary diagrams.	5

	b)	Write the SI units of the following – Conductivity, admittance, conductance, magneto motive force (mmf), permeability	5
	c)	 Determine the RMS value of the waveform shown above	10
4.	a)	The maximum value of the sinusoidal alternating voltage in a circuit connected to 50Hz source is 350V. (i) find the time taken to reach 315V and write down the expression for voltage at time t. (time starts at t=0)	5
	b)	In an AC circuit, applied voltage is v (t) = 200Sin (314t +25°) V and circuit current is found as i(t) = 5Cos (314t -15°)A. Find the power factor of the circuit. Show the vector diagram.	5
	c)	In a circuit, the applied voltage is 100V and is found to lead the current of 10A by 30º. (i) Is the power factor lagging or leading? (ii) What is the value of p.f.? (iii) Is the circuit inductive or capacitive? (iv) What are the values of active and reactive powers in the circuit?	4×2.5=10
5.	a)	What are PMMC instruments? Find an expression of the deflecting torque of PMMC instruments. Draw neat diagram using pencil.	5
	b)	How will you use a PMMC instrument which gives full scale deflection at 50mV p.d. and 10mA currents as (i) ammeter 0-10A range (ii) voltmeter 0-250V range. Draw neat circuit for each case.	5
	c)	Find the expression of magnetic flux density B at a point X which is at a distance **r** from a long straight wire carrying steady current I.	10
6.	a)	Two circuits, the impedance of which are given by Z_1 = (10+j.15) Ohm and Z_2= (6-j.8) Ohm are connected in parallel. If the load current supplied is 35A,	10

		what is the power taken by each branch? Find also the p.f. of individual circuits and combination.	
	b)	A mild steel ring of 30cm mean circumference has a cross-sectional area of 6 cm^2 and has a winding of 500 turns on it. The ring is cut through at a point so as to provide an air-gap of 1mm in the magnetic circuit. It is found that a current of 4A in the winding produces a flux density of 1T in the air-gap. Find the relative permeability of the mild steel.	10

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