GURU NANAK INSTITUTE OF TECHNOLOGY

An Autonomous Institute under MAKAUT

2020-2021

CIRCUIT THEORY & NETWORKS(Backlog)

EI303

TIME ALLOTTED: 3 Hours **FULL MARKS: 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

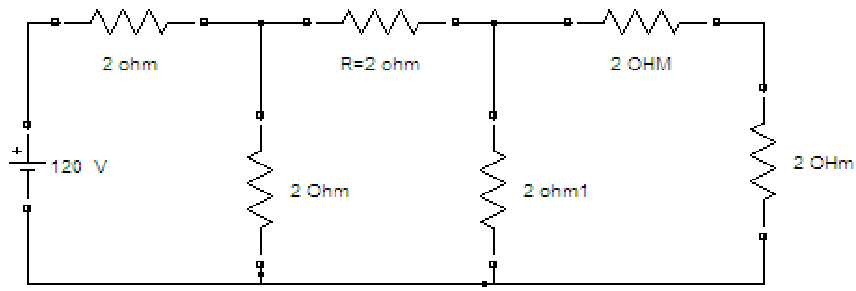
1. Answer any *ten* from the following, choosing the correct alternative of each question: 10×1=10

		Marks	CO No
1(i)	The relation between resonant frequency(ω0)& half power frequencies (ω1 & ω2) is a) ω0 = ω1 ω2 b) ω0 = ω1/ ω2 c) ω0 = √(ω1 ω2) d) ω0 = ω1+ ω2	1	CO3
1(ii)	A two port network will be reciprocal if a) $Y_{11} = Y_{22}$ b) $Y_{12} = Y_{21}$ c) $Y_{1221} = Y_{11}Y_{22}$ d) $Y^2_{11} = Y_{21}Y_{22}$	1	CO 4
1(iii)	In a R-L series circuit, the phase angle difference between voltage and current is a) 30° b) 90° c) 180° d) in between 0° & 90°	1	CO 1
1(iv)	In a network the Norton resistance is R_N& Thevenin's resistance is R_{TH} , then a) $R_N = R_{TH}$ b) $R_N \neq R_{TH}$ c) $R_N = R_{TH}/2$ d) $R_N = R_{TH}2$	1	CO 1
1(v)	The order of incidence matrix of the graph , consists of n nos. of nodes and b nos. of branches is a) n x b b) n + b c) n - b d) n/b	1	CO 5
1(vi)	Unit step function is first derivative of a) ramp function b) impulse function c) gate function d) parabolic function	1	CO 1
1(vii)	At resonance the nature of the R-L-C series circuit is a)resistive b) capacitive c) inductive d) all of these	1	CO 2
1(viii)	Superposition theorem is not valid for a) voltage responses b) current responses c) power responses d) either a) or b)	1	CO 2
1(ix)	In Superposition theorem, while considering a source, all other current sources are? a) short circuited b) change its position c) open circuited d) removed from the circuit	1	CO 1
1(x)	The value of impulse function K ∂ (t) at t = 0 is a) K b) 0 c) ∞ d) 1	1	CO 2

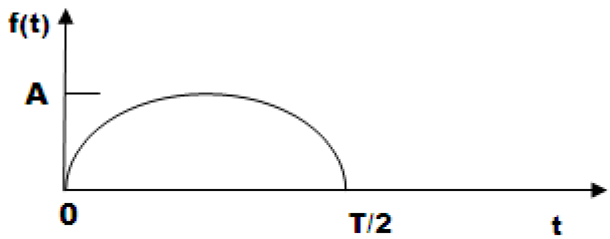
1(xi)	A low pass filter passes ________________ frequencies a)a band of b) lower c) higher d) All the frequencies	1	CO 1
1(xii)	Laplace transform of Impulse signal is a)1/S b)$1/S^2$ c)1 d)S	1	CO 3

GROUP – B
(Short Answer Type Questions)
(Answer any *three* of the following) 3 x 5 = 15

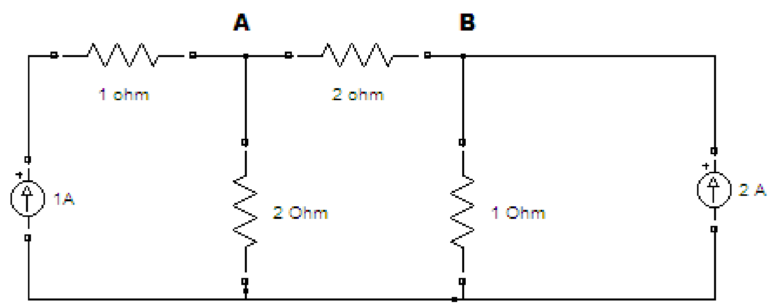
		Marks	**CO No**
2.	Calculate the power dissipated in the resistor R	5	CO 1



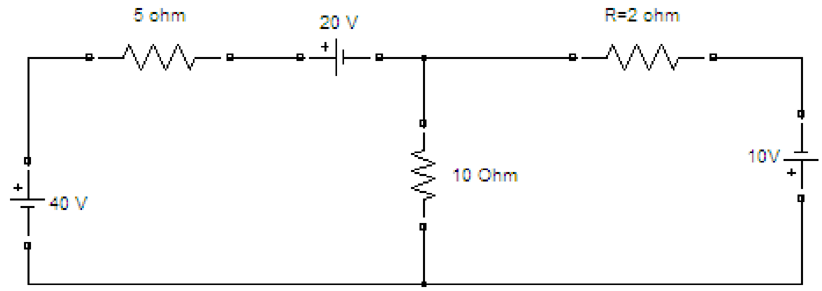
3.	a) State & prove the Maximum Power transfer theorem. b) Show the efficiency for maximum power transfer transfer theorem is 50%.	5	CO 1
4.	Determine the Laplace Transform of the given signal	5	CO 2



5.	Determine the voltage V_{AB} of figure by node analysis	5	CO 1

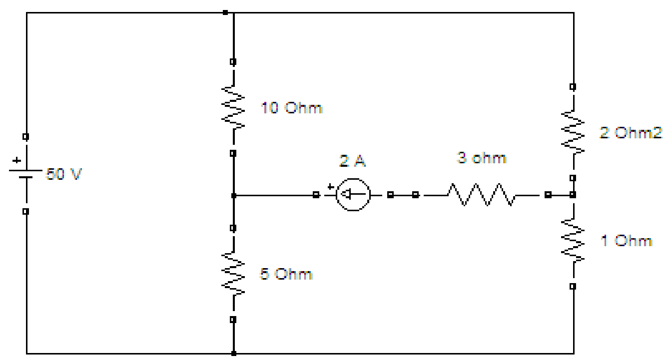


6.	State Superposition Theorem. Using this theorem calculate the current through the R of the circuit shown in the figure below.	5	CO 1

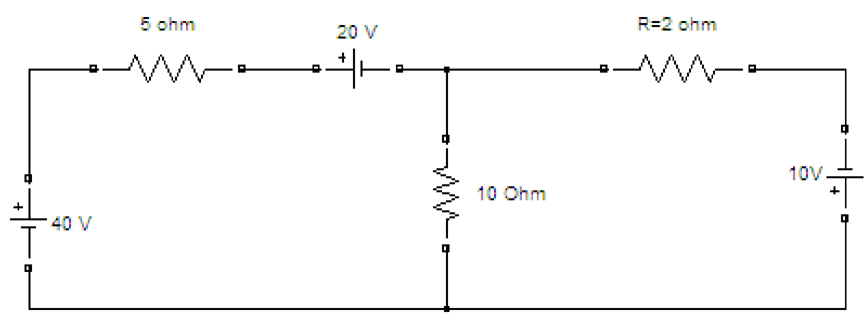


GROUP – C
(Long Answer Type Questions)
(Answer any *three* of the following) 3 x 15 = 45

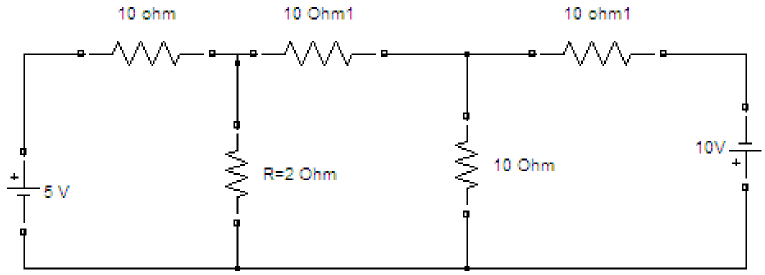
		Marks	**CO No**
7. a)	Find out the loop currents using super mesh analysis.	5	CO 1



7. b)	State Superposition Theorem. Using this theorem calculate the current through the R of the circuit shown in the figure below..	5	CO 1

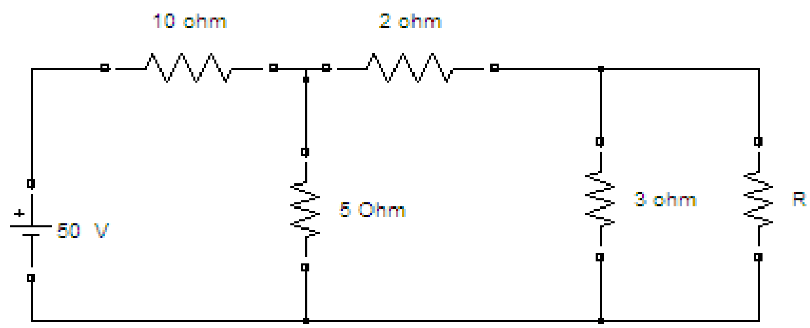


7. c) Find the voltage across the Resistance R. 5 CO 1

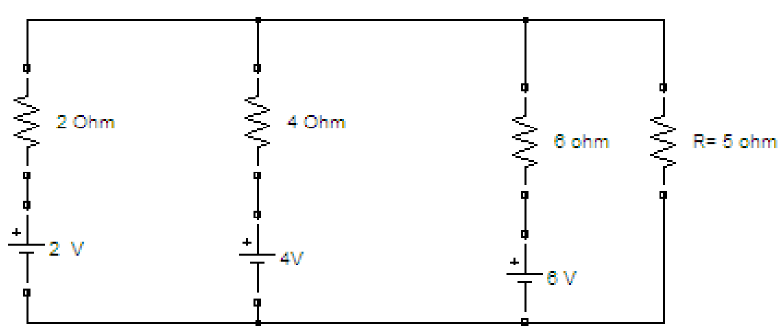


8.a) State & prove Final value theorem. 4 CO 1

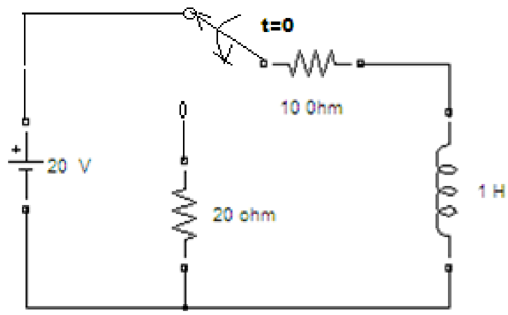
8.b) What should be the value of impedance R for maximum power to be transferred from the sources. Obtain the amount of maximum power. 6 CO 1



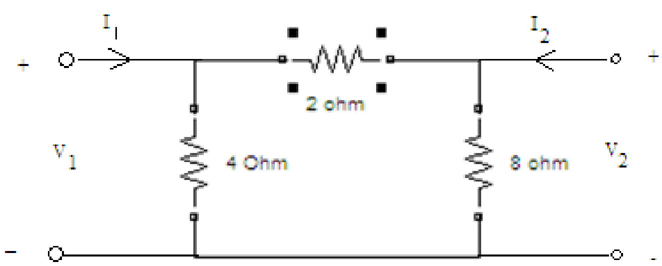
8.c) Determine current through the resistance R using Millman's theorem. 5 CO 1



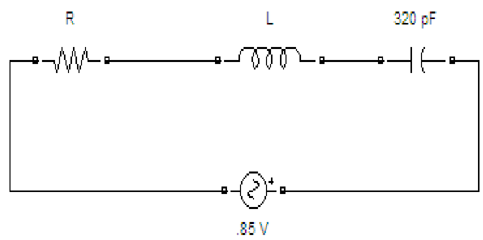
9.a)	The circuit given initially at steady state with switch at position ‘a’. If the switch position is changed from a to b at time t=0, find the current after switching.	5	CO 2



9.b)	Find the transient response of R-L series circuit due to step input signal.	5	CO 2
9.c)	Design a band pass filter with f_L=200 Hz &f_H= 1 KHz and a pass band gain=4. Also calculate Q of the filter.	5	CO 5
10. a)	Determine for a two port network the condition of reciprocity and condition of symmetry in terms of Z parameter.	5	CO 4
10. b)	Define ABCD parameters of a two port network. Where are they most efficiently used?	4+1	CO 4
10. c)	Find the Y parameters of the following circuit.	5	CO 4



11.a)	For the circuit shown in figure determine the value of inductance for resonance if Q =50 and f0 =175 kHz. Also find the circuit current and the band-width of the circuit.	6	CO 5



11.b)	What is selectivity of a resonant circuit? prove that the selectivity is the quality factor.	4	CO 3
11.c)	a) Prove that resonance frequency $f_0 = 1/2\pi\sqrt{LC}$ for a R-L-C series network. b) For a R-L-C network,prove bandwidth is the ratio of resonance frequency to the quality factor	2+3	CO 3