Hall Ticket Number:

Code No. : 12413

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

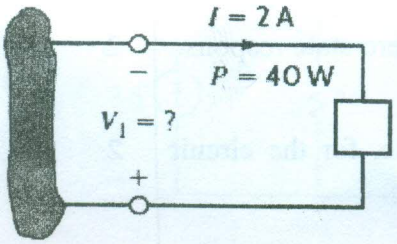
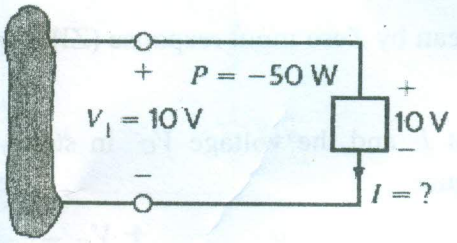
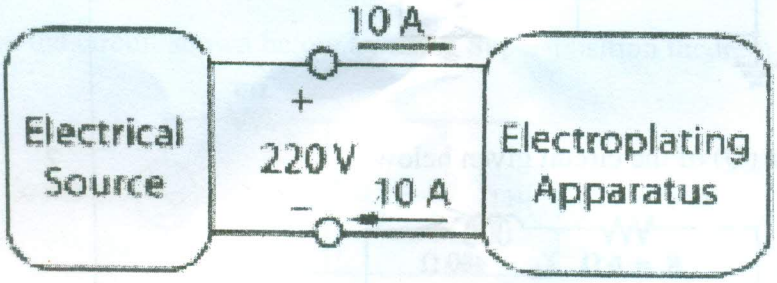
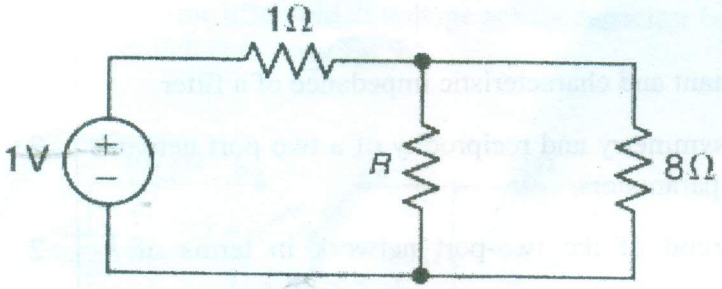
B.E. (E.C.E) II-Semester Main & Backlog Examinations, September-2022

Basic Circuit Analysis

Time: **3 hours** Max. Marks: **60**

*Note: Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Determine the unknown voltage or current in the following figures (a) and (b)  	2	2	1	1
2.	An electroplating apparatus uses electrical current to coat material with metals such as copper or silver. In the figure below, a 220 V electrical DC source supplies 10 A DC to the electroplating apparatus. Then find the cost to operate the apparatus for a single 12 hour day if electric energy costs 10 paisa per kilowatt-hour (kWh) 	2	2	1	1
3.	Find the compensation voltage that is required when R is changed from 4 Ω to 2 Ω 	2	2	2	1

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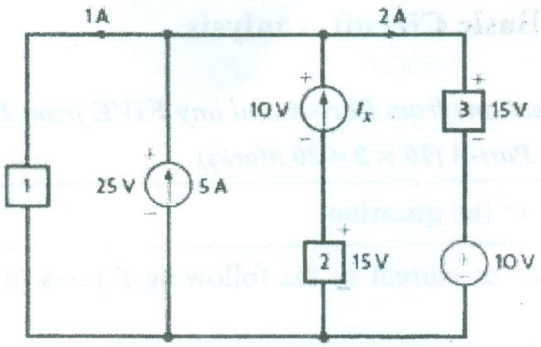
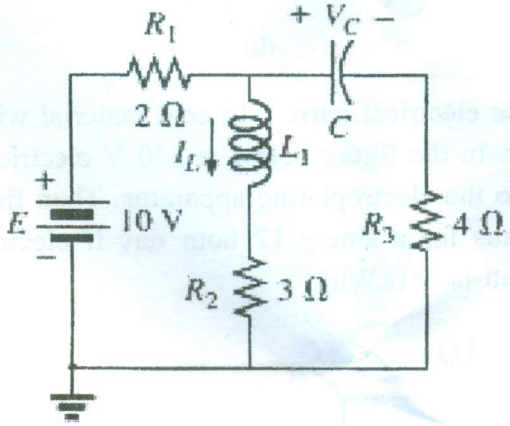
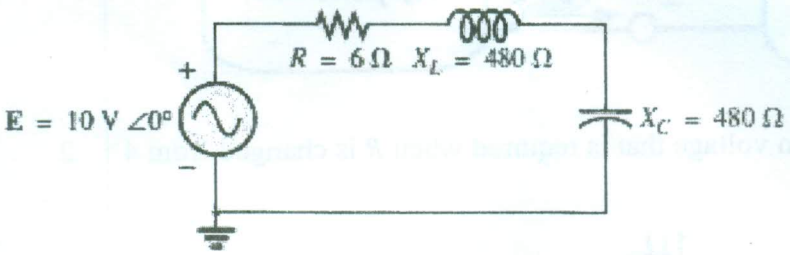
4.	Find I_x using Tellegen's theorem.Assume boxes numbered are circuit elements. 	2	3	2	1
5.	What do you mean by Zero input response (ZIR) and Zero state response (ZSR).	2	1	4	1
6.	Find the current I_L and the voltage V_C in steady state, for the circuit shown in the figure 	2	3	4	2
7.	Find the quality factor (Q) of the circuit given below. 	2	2	3	1
8.	Define propagation constant and characteristic impedance of a filter	2	1	5	1
9.	Write the condition for symmetry and reciprocity of a two port network in terms of transmission parameters.	2	1	6	1
10.	Draw the equivalent circuit of the two-port network in terms of *h*-parameters.	2	1	6	1

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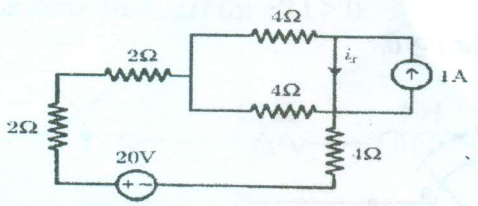
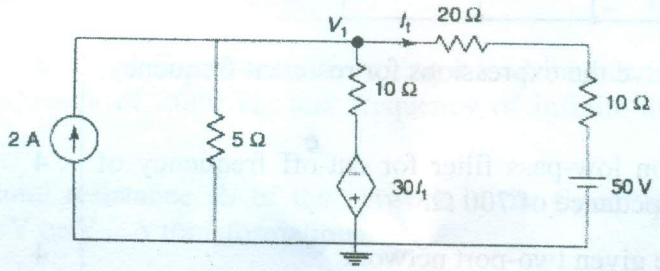
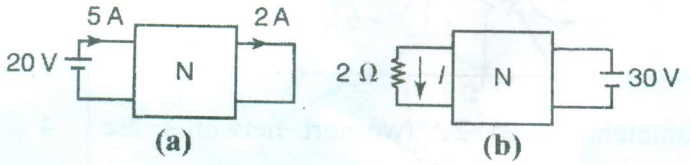
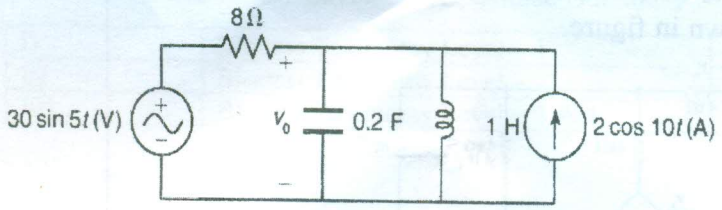
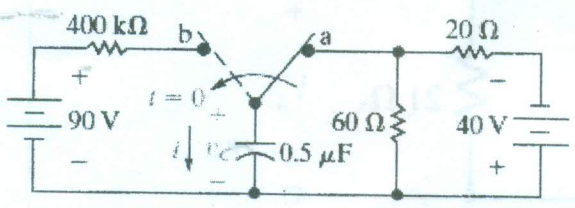
Part-B (5 × 8Marks = 40 Marks)

11. a)	Find i_x from the circuit using the mesh analysis 	4	2	1	2
b)	Find the voltage across the 5 Ω resistor in the network shown in below figure using the Nodal Analysis. 	4	2	1	2
12. a)	Two sets of measurements are made on a linear passive resistive network in Fig.(a) and Fig.(b). Find the current through the 2- Ω resistor by using Reciprocity theorem. 	4	3	2	3
b)	Find V_o in the circuit shown below by using Super-position theorem 	4	2	2	2
13. a)	The switch in the circuit shown in figure below has been in position 'a' for a long time. At $t = 0$, the switch is moved to position 'b'. Then i) Find the expression for $v_C(t)$ when $t \geq 0$ ii) Determine the time after which voltage across capacitor becomes zero, when switch is in position 'b' . 	4	3	4	2

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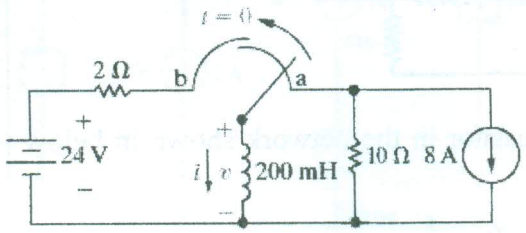
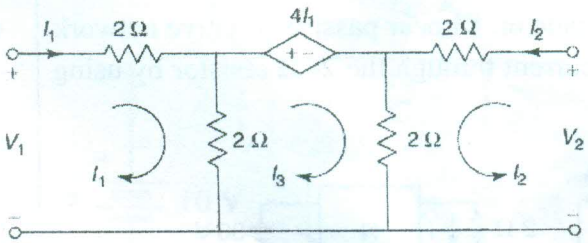
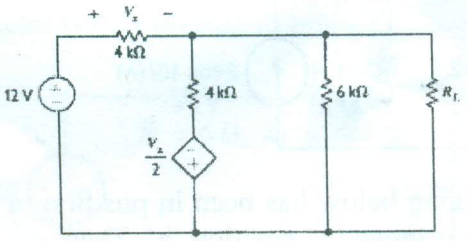
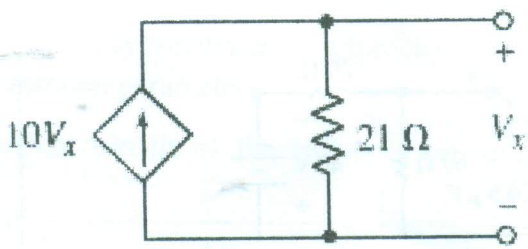
b)	The switch in the circuit shown in figure below has been in position 'a' for a long time. At $t = 0$, the switch moves from position 'a' to position 'b'. i) Find the expression for $i(t)$ for $t \geq 0$. ii) Determine $i(t)$ at t=0.2 s. 	4	3	4	2
14. a)	For a parallel RLC circuit, derive the expressions for resonant frequency, quality factor and bandwidth.	4	1	3	2
b)	Design a constant-k, T section low-pass filter for cut-off frequency of 2.5 kHz and nominal load impedance of 700 Ω.	4	4	5	3
15. a)	Find the Z – parameters of the given two-port network 	4	3	6	2
b)	Obtain the over-all Y-parameters, when 2 two-port networks are connected parallel.	4	1	6	1
16. a)	Determine the value of R_L to deliver maximum power to load and power delivered in the circuit shown in figure. 	4	3	2	2
b)	Determine the Thévenin and Norton equivalents of the circuit represented in the figure below from the perspective of the open terminals. 	4	2	2	2

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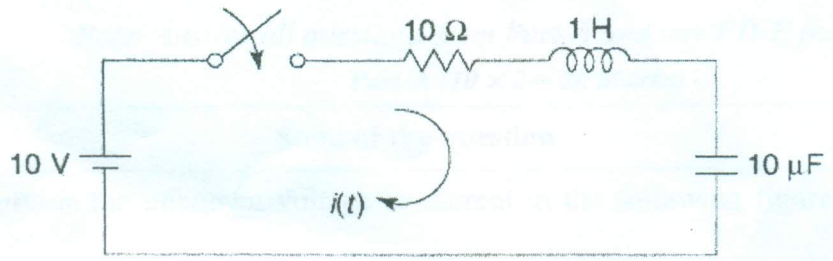
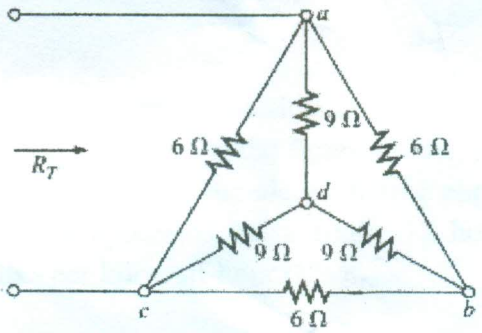
17.	Answer any ***two*** of the following:				
a)	The switch is closed at $t = 0$, in the network shown below. Assuming all initial conditions as zero, find i(t) for all t > 0	4	2	4	2
b)	Design a *m*-derived T-section HPF having a load impedance of 300 Ω, cut-off frequency of 2000 Hz and frequency of infinite attenuation is 1700 Hz.	4	4	5	2
c)	Find the total resistance R_T of the network in the figure shown below ,using Δ – Y or Y – Δ transformations.	4	2	1	2





M : Marks; L: Bloom's Taxonomy Level; CO; Course Outcome; PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	40%
iii)	Blooms Taxonomy Level – 3 & 4	40%

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