EC32(O)

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RAMAIAH
Institute of Technology

(Autonomous Institute, Affiliated to VTU)
(Approved by AICTE, New Delhi & Govt. of Karnataka)
Accredited by NBA & NAAC with 'A+' Grade

SEMESTER END EXAMINATIONS – APRIL 2023

Program	:	**B.E. – Electronics and Communication Engineering**	**Semester**	:	**III**
Course Name	:	**Analog Circuits**	**Max. Marks**	:	**100**
Course Code	:	**EC32(O)**	**Duration**	:	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT - I

1. a) With example explain linear element, bilateral, loop, mesh, super mesh and Super node. CO1 (10)

   b) Using source transformation and source shifting techniques replace the network shown in Fig.1(b) across AB by a single voltage source in series with a resistance. CO1 (10)

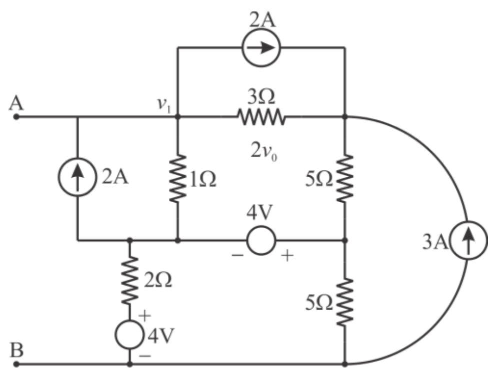

Fig.1(b)

2. a) Using mesh analysis, find V_{AB} in the circuit shown in Fig.2(a). CO1 (10)

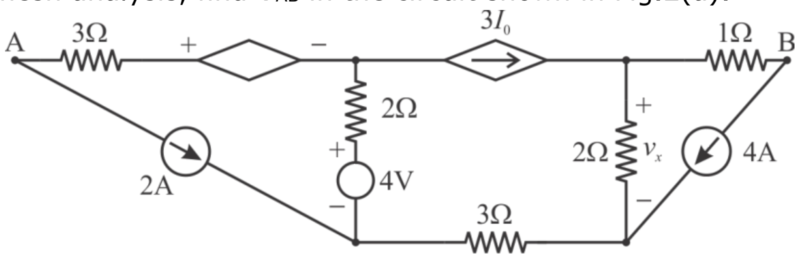

Fig.2(a)

   b) The network shown in Fig.2(b), below consists of two star connected circuits in parallel. Obtain a single delta connected equivalent. CO1 (10)

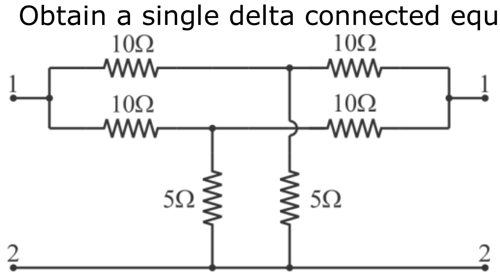

Fig.2(b)

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UNIT - II

3. a) Obtain the Norton's equivalent across the terminals A – B, in the circuit shown in Fig.3(a). CO2 (10)

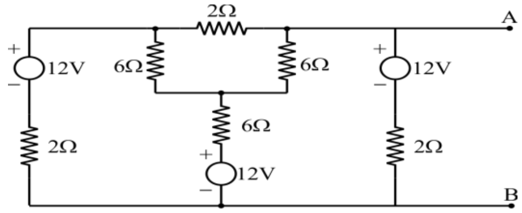

Fig.3(a)

b) State and prove Thevenin's theorem with an example. CO2 (10)

4. a) Using superposition theorem, find Vx, in the circuit shown in Fig.4(a) CO2 (10)

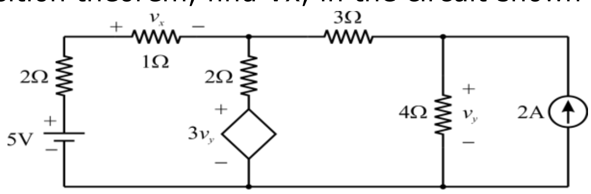

Fig.4(a)

b) Find the value of R in the circuit shown in Fig.4(b), so that maximum power is delivered to the load. Also find the maximum power delivered to the load. CO2 (10)

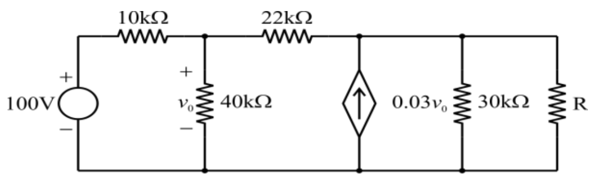

Fig.4(b)

UNIT - III

5. a) Explain the concept of feedback amplifier. An amplifier with an open loop voltage gain Av=1000±100 is available. It is necessary to have an amplifier whose voltage gain varies by no more than ±0.1 percent. Find: CO3 (07)

i) The reverse transmission factor β of the feedback network.

ii) The gain with feedback.

b) For the given circuit below, determine Zi, AI, Av and Zo. The h parameters are RE= 1.2KΩ ,R1=82KΩ, R2= 10KΩ, Rc= 4.7KΩ, Rs= 1KΩ ,RL=1.2KΩ, h_{fe}=90 ,h_{ie}=1kΩ, h_{oe}=20 μA/V and $h_{re}=2\times10^{-4}$ CO3 (09)

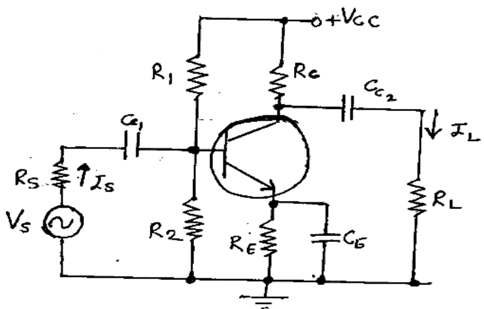

Fig.5(b)

c) State and prove Miller's theorem. CO3 (04)

6.	a)	Define h-parameters. Draw the h-parameter model of a transistor.	CO3	(04)
	b)	Draw the block diagram of a feedback amplifier. Discuss the function of each block.	CO3	(08)
	c)	A voltage amplifier has the following parameter values without feedback. Open circuit voltage gain Av= -500 Input resistance Ri=2 kΩ Output resistance Ro=402 kΩ Bandwidth BW= 300KHz Load resistance RL= 10KHz If 10% negative voltage series feedback is given. Calculate Avf, Rif and BWf.	CO3	(08)

UNIT- IV

7.	a)	Derive an expression for output power and maximum conversion efficiency of class B push pull amplifier.	CO4	(07)
	b)	A power amplifier has harmonic distortions D2= 0.1, D3=0.02, D4=0.01, the fundamental current I1=4A and RL= 8Ω.Calculate the total harmonic distortion, fundamental power and total power.	CO4	(07)
	c)	Illustrate the process of heat flow from power transistor with an equivalent analogous circuit.	CO4	(06)
8.	a)	An ideal class B push pull power amplifier with input and output transformers, has Vcc= 20V, N2=2N1 and RL=20Ω.The transistors have hfe=20. Let the input be sinusoidal. For the maximum output signal at Vm=Vcc, determine, the output signal power the collector dissipation in each transistor and conversion efficiency.	CO4	(08)
	b)	Explain the working of series fed, directly coupled class A amplifier, with the help of neat circuit diagram and prove that the maximum efficiency is 25%.	CO4	(07)
	c)	What are the different possible distortions in AF power amplifier? Which is the most significant? Why?	CO4	(05)

UNIT - V

9.	a)	It is required to design the circuit of figure below to establish a dc drain current $I_D = 0.5mA$. The MOSFET is specified to have $V_t = 1V$ and $K_n' \frac{W}{L} = 1mA/V^2$. For simplicity neglect the channel length modulation (i.e. assume $\lambda = 0$). Use a power supply $V_{DD} = 15V$. Calculate the percentage change in the value of I_D obtained when the MOSFET is replaced with another unit having the same $K_n' \frac{W}{L}$ but $V_t = 1.5V$.	CO5	(10)

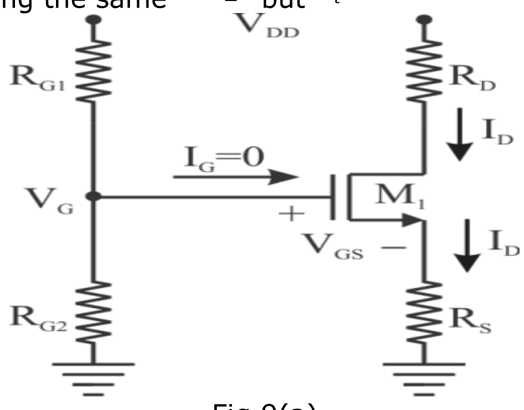

Fig.9(a)

	b)	Explain the biasing technique using drain to gate feedback and compare with other techniques.	CO5	(06)
	c)	Draw the small signal model of a Common source amplifier and explain the model.	CO5	(04)
10.	a)	Derive the voltage gain expression and low frequency response for a CS amplifier using T-model.	CO5	(10)
	b)	With neat circuit diagram explain the operation of CS amplifier & draw the transfer characteristics. Show that it can be used as a linear amplifier.	CO5	(10)

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