RAMAIAH
Institute of Technology

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(Approved by AICTE, New Delhi & Govt. of Karnataka)

(Autonomous Institute, Affiliated to VTU)
Accredited by NBA & NAAC with 'A' Grade

SEMESTER END EXAMINATIONS FEBRUARY - MARCH 2021

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

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) Find V_y using mesh current analysis for the circuit as shown in Fig.1(a). CO1 (10)

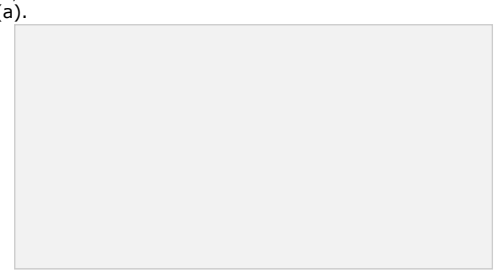


Fig.1(a)

b) Convert the given circuit as shown in Fig.1(b) into a current source in parallel with a resistor across A - B. CO1 (10)

Fig.1(b)

2. a) Find the equivalent resistance between terminals AB using star – delta transformation for the network as shown in Fig.2(a). CO1 (10)

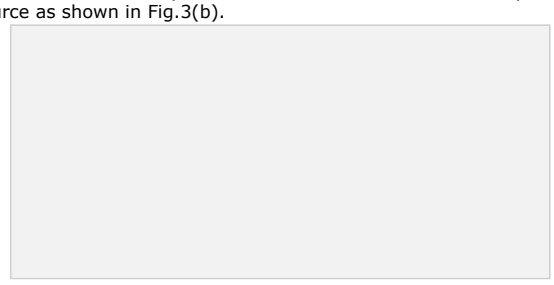
Fig.2(a)

b) Using nodal analysis find i_1 and i_3 currents in the circuit shown in Fig.2(b). CO1 (10)

Fig.2(b)

UNIT – II

3. a) State and Prove Superposition theorem. CO2 (10)
   b) Find the thevenin's equivalent network which includes a dependent source as shown in Fig.3(b). CO2 (10)



4. a) State and prove thevenin's theorem. CO2 (10)
   b) For the circuit as shown in Fig.4(b), find the value of R_L which results in maximum power transfer. Also calculate the value of the maximum power. CO2 (10)

UNIT – III

5. a) State the advantages and disadvantages of h-parameters and draw the small signal model of CE amplifier. CO3 (05)

   b) Show that negative feedback decreases the output resistance of voltage series feedback amplifier. CO3 (06)

   c) The transistor with h_{ie}=1kΩ, h_{fe}=60, h_{re}=205×$10^{-4,}$ hoe=25×10^{-6} A/V. is connected in CE configuration as shown in Fig.5(c). Calculate: $A_i = I_o/I_i$,A_v ,R_i ,$R_{i',}$ R_o. CO3 (09)

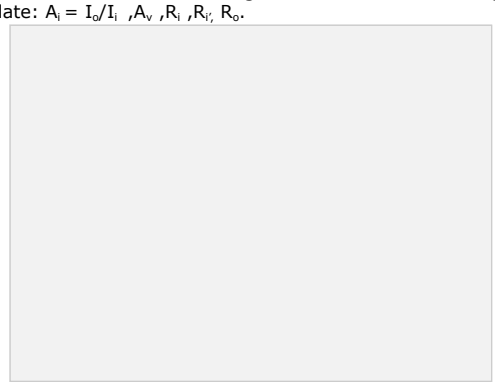


Fig.5(c)

6. a) The transistor used in the circuit as shown in Fig.6(a) has the following parameters, h_{fe}=60, h_{ie}=500Ω, h_{oe}=1/40K and h_{re}=2.4x10^{-4} Calculate R_i, R_i',A_i, Av and $A_{vs.}$ CO3 (09)

Fig.6(a)

	b)	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 A_{vf}, R_{if} and BW_f.	CO3	(06)
	c)	State and prove Miller's Dual theorem.	CO3	(05)

UNIT – IV

7.	a)	Derive an expression for the output power and conversion efficiency of a transformer coupled class B push pull power amplifier.	CO4	(08)
	b)	With neat sketches explain the thermal analogy of a power transistor.	CO4	(04)
	c)	Design a single ended class A power amplifier and draw the circuit with proper design components to meet the following specifications. i)Maximum 400mW to be delivered to a load of 8Ω ii)Transformer efficiency of 80% iii)Power supply available of 7V Transistors available i)SL100 with $(P_d)max$=500mW ii)2N 176 with (Pd)max=10W iii)40309 with (Pd)max=2.5W	CO4	(08)
8.	a)	State the heat sink selection criterion for a transistor operating with V_{CE}=20V and I_C=1.5A. Its thermal resistance from junction to case is 1°C/W. The junction temperature should not exceed 85°C if the ambient temperature is 25°C.	CO4	(07)
	b)	With neat sketches explain the operation of class C power amplifier.	CO4	(08)
	c)	A power amplifier has harmonic distortions D_2=0.1, D_3=0.02, D_4=0.01, the fundamental current I_1=4A and R_L= 8Ω.Calculate the total harmonic distortion, fundamental power and total power.	CO4	(05)

UNIT – V

9.	a)	Explain the V-I characteristics of an N-channel E-MOSFET with neat sketches?	CO5	(06)
	b)	To establish a dc current I_D=0.5mA, the MOSFET is specified to have V_T=1V,K_nW/L =1mA/v^2, λ=0,V_{DD}=15V Calculate %change in I_D when MOSFET is replaced having the same K_nW/L but V_T=1.5Vas shown in Fig.9(b)	CO5	(10)