RAMAIAH
Institute of Technology

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

SEMESTER END EXAMINATIONS – JANUARY 2019

Course & Branch	**:**	**B.E : Electronics and Communication Engineering**	**Semester**	**:**	**III**
Subject	**:**	**Analog Electronic Circuits**	**Max. Marks**	**:**	**100**
Subject Code	**:**	**EC32**	**Duration**	**:**	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT- I

1. a) Draw the block diagram of N-stage cascaded amplifiers and list its advantages. A given amplifier has the following voltage gains, A_{v1}=10, A_{v2}=20 and A_{v3}=40. What is the overall voltage gain in dB. CO1 (06)

   b) Draw and explain the Darlington circuit. Also mention its advantages and limitations. CO1 (05)

   c) The transistor amplifier shown in Fig.1 (c) uses a transistor whose h-parameters are as follows: h_{ie}=1.2kΩ, h_{fe}=75, h_{re}=2.4×10^{-4} hoe=25×10^{-6} A/V. Calculate I_o/I_i , A_v ,A_{vs} ,$R_{i'}$. CO1 (09)

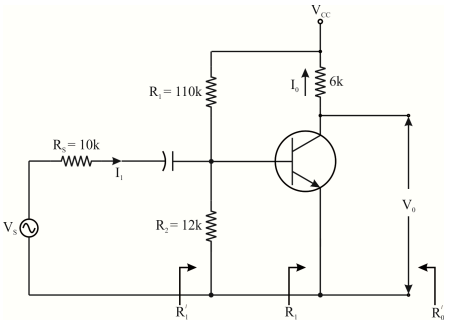

Fig.1 (c)

2. a) Determine A_i, R_i, A_v , A_{is} and R_0 for the circuit shown in fig. 2(a) with R_s= 1KΩ ,R_1=50KΩ, R_2= 2KΩ, R_c= 1KΩ, R_L=1.2KΩ, h_{fe}=50 ,h_{ie}=1.1kΩ, hoe=25 μA/V and h_{re}=2x10^{-4}. CO1 (09)

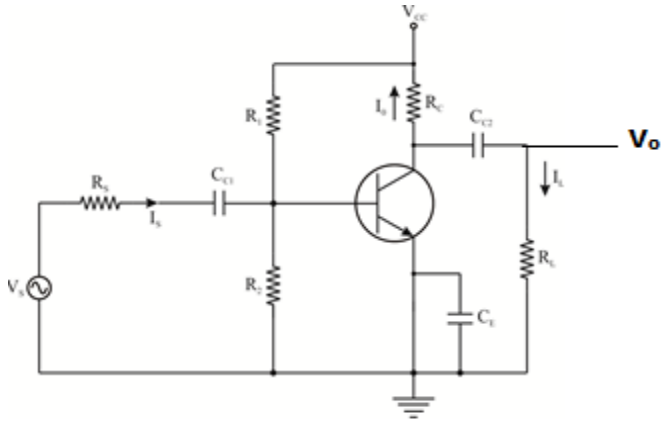

Fig.2(a)

	b)	Derive an expression for Miller input and output capacitances.	CO1	(05)
	c)	What are the advantages of using hybrid model to represent the transistor? Explain how h parameters are obtained from the static characteristics of the transistor.	CO1	(06)

UNIT– II

3.	a)	An amplifier total harmonic distortion is reduced from 8% to 2% when 5% negative feedback is used. (i) What was the initial voltage gain when distortion was 8%. (ii) What was the gain with 2% distortion? How much distortion would be there if the gain with feedback were reduced to 10?	CO2	(08)
	b)	How oscillators are classified? Discuss the different types.	CO2	(08)
	c)	Show that negative feedback reduces the noise in amplifier.	CO2	(04)
4.	a)	Frequency response of an amplifier improves in presence of negative feedback, Justify with suitable mathematical analysis.	CO2	(08)
	b)	A crystal L=0.4H, C=0.085pF and CM=1pF with R=5KΩ, Find (i) Series resonant frequency (ii) Parallel resonant frequency (iii) By what percentage parallel resonant frequency exceeds the series resonant frequency Quality factor of the crystal.	CO2	(08)
	c)	Calculate frequency of oscillation for Hartley oscillator having L1= 0.5mH,L2=1mH and C=0.2μF.	CO2	(04)

UNIT- III

5.	a)	Show that the even harmonics are absent in the output of a class B push pull power amplifier.	CO3	(06)
	b)	A class A transformer coupled audio power amplifier is required to deliver a maximum of 1 W into a loud speaker of 10Ω resistance. If the output resistance of the amplifier is 1000Ω, Calculate Turns ratio of the transformer required Power supply voltage. Assume an ideal transformer.	CO3	(06)
	c)	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%.	CO3	(08)
6.	a)	Apply the three point method to calculate the second harmonic distortion.	CO3	(10)

b) A complementary symmetry push pull amplifier is operated using Vcc=±10V and delivers power to a load of RL=5Ω,Calculate: CO3 (10)
(i) Maximum output power
(ii) Power ratings of transistors
(iii) DC input power
(iv) Conversion efficiency.

UNIT- IV

7. a) Derive expression for Av, R_I and R_0 of JFET CS amplifier with R_s unbypassed. CO4 (08)
b) Draw the small signal equivalent circuit of a FET and explain the significance of each component in the model. CO4 (08)
c) List the differences between FET and BJTs. CO4 (04)

8. a) For the JFET amplifier shown in Fig. 8(a),calculate voltages gain and input impedance Given: IDSS= 8mA, V_p= -5V, V_{GSQ}=-2.5v CO4 (10)

Fig.8(a)

b) With neat circuit diagram and characteristics, explain negative resistance region in Unijunction transistor. CO4 (10)

UNIT- V

9. a) With neat sketches, explain the low frequency response using small signal model of CS MOSEFT amplifier and derive an expression for F_L? CO5 (10)
b) Explain the voltage divider biasing technique in E-MOSFET and show that it is better than other bias techniques. CO5 (10)

10. a) It is required to design the circuit of fig.10(a) 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)

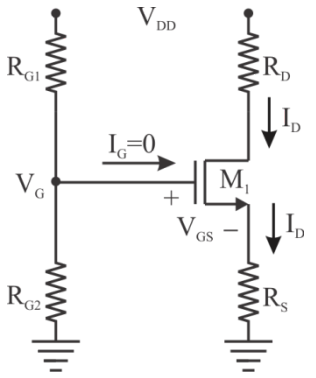

fig.10(a)

b) With neat circuit diagram explain the operation of CS MOSFET amplifier & draw the transfer characteristics, also show that it can be used as a linear amplifier. CO5 (10)

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