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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Electrical and Electronics Engineering

Semester End Examination; March / April - 2022

Analog Electronic Circuits

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Analyze and design Diode and Transistor circuit such as Clippers, Clampers, Voltage Multipliers and Amplifiers.

CO2: Analyze and design two port hybrid equivalent model for BJT amplifier and Various BJT Oscillator Circuits.

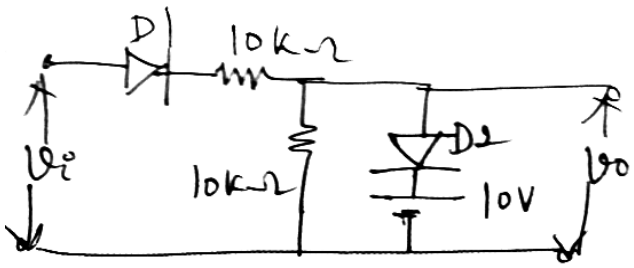
CO3: Analyze the effect of negative feedback in transistor amplifier.

CO4: Analyze and design various Power amplifier circuits and study the effect of distortions on Power amplifier.

CO5: Analysis of J-FET and MOSFET Circuit.

***Note**: I) **PART - A** is compulsory. **Two** marks for each question.*

*II) **PART - B**: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I : PART - A	**10**			
I a.	Draw the circuit of series clipper to clip the input sinusoidal signal below V_R. Sketch the input and output waveforms.	2	L1	CO1	PO1
b.	Write the h-parameter equations for common base mode and hence draw its h-parameter model.	2	L2	CO2	PO2
c.	State any two merits of negative feedback amplifier.	2	L3	CO3	PO1
d.	State any two features of Class *A* and Class *B* power amplifiers.	2	L3	CO4	PO4
e.	Show that the amplification factor in JFET is given by $\mu = r_d \times g_m$.	2	L2	CO5	PO2
	II : PART - B	**90**			
	UNIT - I	**18**			
1 a.	For the clipping circuit as in Fig. 1(a) draw the transfer characteristics draw input and output voltage waveforms. Assume $V_i = 50 \sin \omega t$.  Fig. 1(a)	9	L1	CO1	PO1
b.	For the voltage divider bias circuit R_C = 1 kΩ, R_E = 470 Ω, R_1 = 10 kΩ, R_2 = 5 kΩ, V_{CC} = 10 V, β = 100. Find the location of Q point (I_C, V_{CE}). Draw the circuit diagram.	9	L3	CO1	PO3
c.	Explain the high frequency responses of an amplifier with circuit diagram and obtain gain and phase response with diagram.	9	L3	CO1	PO4

Contd... 2

UNIT - II **18**

2 a. For the transistor amplifier in general form, derive expression for A_I, Z_i, A_V and Z_0. 9 L3 CO1 PO4

b. A single stage common emitter amplifier has R_S = 1 kΩ, R_1 = 50 kΩ, R_2 = 2 kΩ, R_E = 500 Ω, R_C = 1 kΩ, R_L = 1.2 kΩ, C_E = 47 μF, h_{ie} = 1.1 kΩ, h_{fe} = 50, h_{oe} = 25 μA/V and h_{re} = 2.5 x 10^{-4}. Calculate A_I, Z_i, A_V and A_{VS}. Draw the circuit diagram. 9 L1 CO2 PO2

c. Explain the working of RC phase shift oscillator. State expressions for f_0 and h_{fe} min of transistor. If f_0 = 1 kHz, C = 0.1 μF, calculate the resistance R of the above oscillator circuit. 9 L1 CO2 PO2

UNIT - III **18**

3 a. Explain the concept of feedback. Draw the required diagrams. 9 L2 CO3 PO3

b. For the voltage series feedback amplifier, obtain expressions for R_{if} and R_{of}. 9 L2 CO3 PO3

c. For the current series feedback amplifier R_L = 2.2 kΩ, R_E = 1.2 kΩ, R_S = 1 kΩ, calculate; β, D, G_m, A_{VF}, R_{if}, and R_{of}'. Draw the circuit diagram. Given h_{fe} = 50, h_{ie} = 1.1 kΩ. 9 L1 CO3 PO1

UNIT - IV **18**

4 a. Explain class '*B*' power amplifier circuit with related waveform and obtain conversion efficiency. 9 L1 CO2 PO2

b. Explain harmonic distortion in power amplifiers. Derive an expression for II harmonic distortion. 9 L2 CO4 PO3

c. A class-B push-pull amplifier is operated with V_{CC} = 10 V and R_L = 5 Ω, determine the maximum output power, power ratings of transistors and dc input power. Draw the circuit diagram also. 9 L1 CO3 PO1

UNIT - V **18**

5 a. In JFET, show that $g_m = g_{mo}\left(1-\frac{v_{gs}}{v_p}\right)$. For the circuit of Fig. 5(a) determine V_{GSQ}, I_{DQ}, V_{DS}, V_S, V_D. Assume I_{DSS} = 8 mA, V_P = –4 V, V_{DD} = 2 V.

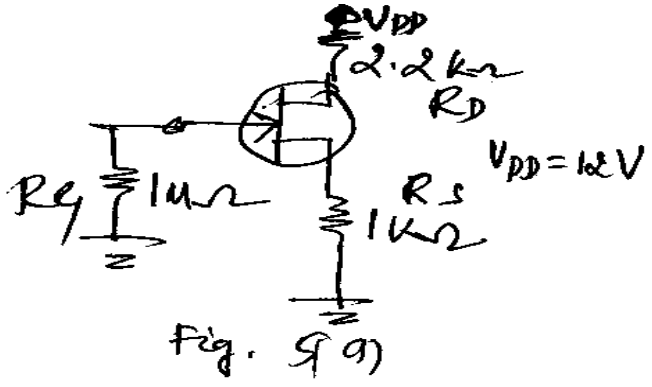


Fig. Q 5(a)

9 L2 CO3 PO1

b. Explain the construction and working of *n*-channel D-MOSFET. 9 L3 CO1 PO1

c. Explain the construction and working of P-channel J-FET. 9 L1 CO2 PO2

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