

**Code No: 153AC****JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech II Year I Semester Examinations, April/May - 2023****ANALOG ELECTRONICS****(Electrical and Electronics Engineering)****Time: 3 Hours****Max. Marks: 75****Note:** i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

**PART – A****(25 Marks)**

- 1.a) Sketch a combinational Clipper Circuit. [2]
- b) Define diffusion and transition capacitance of p-n junction diode. [3]
- c) Define transconductance  $g_m$  and drain resistance of a FET. [2]
- d) Why the input impedance of FET is higher than BJT? [3]
- e) What is harmonics distortion in power amplifier? [2]
- f) What are the advantages of direct coupled amplifiers? [3]
- g) What are the advantages and disadvantages of Negative feedback in Amplifier? [2]
- h) Write the equation for frequency of oscillations in RC phase shift Oscillator? [3]
- i) Define CMRR. [2]
- j) What are the applications of Op-Amp? [3]

**PART – B****(50 Marks)**

- 2.a) Obtain the expression for Ripple factor for Full Wave Rectifier.
- b) Explain the need for biasing in electronic circuits. What are the factors affecting the stability factor. [5+5]

**OR**

- 3.a) Obtain the DC conditions for voltage divider bias-circuit for a CE-BJT amplifier and give design constraints along with stability of Q-point.
- b) Derive an expression for Voltage gain  $A_v$  of small signal CE BJT amplifier. [5+5]
- 4.a) Explain the construction and operation of Enhancement type Metal Oxide Semiconductor FET with neat diagrams.
- b) Draw the small signal AC equivalent circuit of a Common Drain FET amplifier. Derive the expression for voltage gain, input impedance and output impedance. [5+5]

**OR**

- 5.a) How MOSFET is used as switch? What are applications of it?
- b) Draw the small-signal high-frequency circuit of a Common Source amplifier and derive the expression for voltage gain. [5+5]

- 6.a) Draw the circuit of a Two stage RC-Coupled Amplifier and explain its working along with its advantages.  
b) Derive the equation for Power Output and conversion efficiency of a Class A series fed Amplifier. [5+5]

**OR**

- 7.a) Derive the expression for voltage gain of a dual input balanced output differential amplifier.  
b) Discuss the operation of a class B power amplifier and derive its maximum power conversion efficiency. [5+5]
- 8.a) Briefly explain the four basic feedback topologies with necessary block diagram.  
b) Explain the working of Colpitt's oscillator and also discuss the drawback of this oscillator. [5+5]

**OR**

- 9.a) Explain the working of a voltage series feedback amplifier with a neat block diagram. Obtain the expressions for gain, input resistance and output resistance with feedback.  
b) With a neat diagram explain the working of a Hartley oscillator. [5+5]
- 10.a) How do the open-loop voltage gain and closed-loop voltage gain of an op-amp differ? What is the limiting value of output voltage of Op Amp Circuit? Justify.  
b) Draw the circuit diagram of an ideal differentiator using op-amp with corresponding input and output waveforms. Why the circuit cannot be recommended for practical use? [5+5]

**OR**

- 11.a) Draw the inverting and non-inverting amplifier circuits of OP-AMP in closed loop configuration. Obtain the expressions for the closed loop gain in these circuits.  
b) Design a three input summing amplifier using op-amp having resistors with values of 2, 3 and 5 respectively for each input. [5+5]

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