

Roll No.

Total No. of Pages : 03

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B.Tech. (Electronics & Communication Engineering) (Sem-4)

**ANALOG CIRCUITS**

Subject Code : BTEC-401-18

M.Code : 77565

Date of Examination : 23-06-2023

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTIONS TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A**

**1. Write briefly :**

- a) What is Q-point in transistor biasing?
- b) Compare the common collector configuration to common emitter of BJT amplifier.
- c) What is negative voltage clamping?
- d) Draw the output and transfer characteristics of MOSFET.
- e) Draw the circuit diagram for Colpitt oscillator.
- f) What is Barkhausen criteria?
- g) Compare Class-B to Class-C power amplifier.
- h) What is Zener breakdown in PN junction diode?
- i) Draw the high-frequency model of BJT.
- j) Define the stability factors of the BJT amplifier.

SECTION-B

2. For the following circuit, if  $R_B = 1\text{K}\Omega$ ,  $R_E = 1\text{K}\Omega$ ,  $R_C = 10\text{K}\Omega$ ,  $V_{BE} = 0.7\text{V}$ ,  $V_{cc} = 5\text{V}$  common base current gain ( $\alpha$ ) of the transistor is 0.99. Find out the base current.

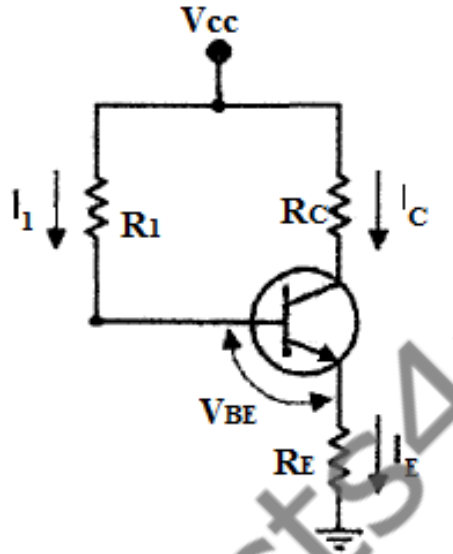


Fig.

3. a) The open loop gain ( $A_{OL}$ ) of a voltage amplifier is 50. The overall gain ( $A_{CL}$ ) was reduced to 25 when negative feedback was applied. Calculate the fraction of the output voltage feedback.
- b) If this fraction is maintained, calculate the value of the amplifier gain required if overall stage gain is to be 30.
4. Determine and sketch output voltage,  $V_o$  for the network shown in the following figure:

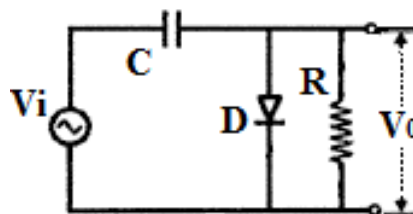


Fig.

Input voltage  $V_i$  is a square pulse varying from  $-20\text{V}$  to  $+20\text{V}$ . Diode  $D$  is the ideal diode. Justify your answer.

5. A Hartley Oscillator circuit having two individual inductors of 0.5mH each, are designed to resonate in parallel with a variable capacitor that can be adjusted between 100pF and 500pF. Determine the upper and lower frequencies of oscillation and also the Hartley oscillators bandwidth.
6. What is cross-over distortion? How can that be eliminated?

### SECTION-C

7.
  - a) Differentiate a power amplifier from a voltage amplifier.
  - b) Derives the maximum efficiency of Class-B power amplifiers.
8. Derive an expression for input impedance, output impedance, voltage gain and current gain for the emitter follower circuit.
9.
  - a) Discuss types of feedback and compare them.
  - b) Explain the operation of RC-phase shift oscillator.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**