Electronic Circuits and Communication Fundamentals

DEC 18

Computer Engineering (Semester 3)

Total marks: 80
Total time: 3 Hours

INSTRUCTIONS
(1) Question 1 is compulsory.
*(2) Attempt any **three** from the remaining questions.*
(3) Draw neat diagrams wherever necessary.

1.a. Explain the concept and significance of CMRR and slew Rate in case of op-amps.   (5 marks)
1.b. Given β = 120 and I_E = 3.2 mA for a common-emitter configuration with
 r_0 = ∞ Ω, determine.
i) Z_i
ii) A_v if a load of 2 kΩ is applied.
iii) A_i with the 2 kΩ load.   (5 marks)
1.c. Discuss the factors that influence modulation index of an FM wave.   (5 marks)
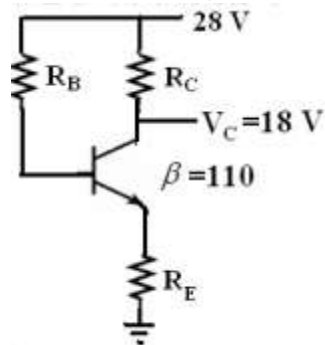**1.d.** Justify that adaptive delta modulation superior to delta modulation.   (5 marks)

2.a. The emmiter bias configuration as shown in following figure has the specifications:
I_{CQ} = $\frac{1}{2}I_{Csat}$ I_{Csat} = 8 mA
V_C = 18 V and β = 110
Determine R_C, R_E and R_a

                                                                                           (10 marks)

2.b. Explain how op-amp can be used comparator and zero crossing detector.
(10 marks)

3.a. What is the source of the leakage current in a transistor?
If the emitter current of a transistor is 8 mA and IBIB is 1/100 of ICIC
determine the levels of ICIC and IBIB.   (5 marks)
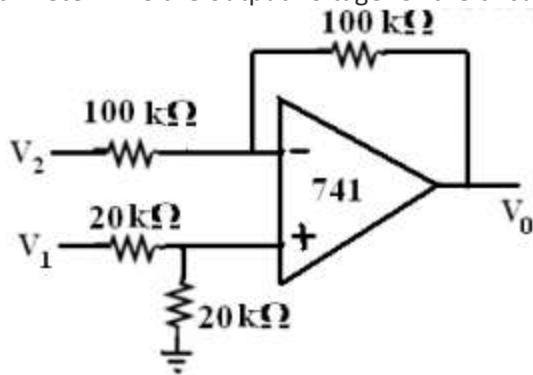**3.b.** Draw and explain Colpitts oscillator.   (5 marks)
3.c. Explain principle of FDM.   (5 marks)
3.d. Determine the output voltage for the circuit if V1V1 = 5V, and V2V2 = 3V

                                                                                           (5 marks)
4.a. What is DSBSC wave and explain its generation using balanced modulator.
(10 marks)

4.b. What is multiplexing in communication system? Draw block diagram
of TDM-PCM system and explain.   (10 marks)
5.a. State shannon's theorem on channel capacity.
What is the maximum capacity of a perfectly noiseless channel whose
bandwidth is 120 Hz, which the values of the data transmitted may
be indicated by any one of the 10 different amplitude?   (10 marks)
5.b. With respect to neat diagram explain the elements of analog
communication system,.   (10 marks)

6.a. What is meant by Nyquist rate in sampling and explain its significance.   (5 marks)
6.b. Give the proper definition for entropy and information rate.   (5 marks)
6.c. Write short note on op-amp as differentiator.   (5 marks)
6.d. Differentiate between Class A and Class C power amplifiers with
respect to cicuit diagram, operating cycle and power effificency.   (5 marks)