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B. Tech 3rd Semester Examination

Analog Electronics Engineering (N.S.)

EC-212

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) Attempt five questions in all, select one question from each sections A, B, C and D. Section E is compulsory.

(ii) Assume suitable data if necessary.

SECTION - A

1. (a) Describe the low frequency & small signal analysis of CE configuration of a transistor amplifier and derive the equations for the following:

(a) Current gain (A_i)

(b) Voltage gain (A_v)

(c) Power gain (A_p)

(d) Input impedance (Z_i)

(e) Output impedance (Z_0)

(f) Output admittance (Y_0) **(10)**

(b) Calculate Current gain (A_i), Voltage gain (A_v), Power gain (A_p), Input impedance (Z_i), Output impedance (Z_0) for CE amplifier design with source internal resistance 800 ohms

and it is terminated with load resistance of 2 kilo ohms. Let h_{ie} = 1100 ohms, h_{fe} = 50, h_{re} = 2.5 × 10^{-4}, h_{oe}= 24 × 10^{-6}A/V. **(10)**

2. (a) Derive the formula for higher cut-off frequency and lower cut-off frequency of multi-stage amplifier circuit where N number of identical & non-interacting stages are cascaded. **(10)**

   (b) Compare the coupling techniques used for cascading of multi stage amplifier along with their merits and demerits. Also list the application where the coupling techniques are used. **(10)**

SECTION - B

3. (a) Why hybrid model is used for transistor? Draw the hybrid ∏ model at low frequency and high frequency for an CE amplifier. **(10)**

   (b) Derive an expression for high frequency current gain with resistive load for an amplifier. **(10)**

4. (a) Explain class A, class B, class AB and push-pull amplifier operation with their advantages, disadvantages and applications. **(10)**

   (b) What do you understand by distortion in large signal amplifier and how is it calculated for class A, class B, class AB amplifier? **(10)**

SECTION - C

5. (a) Draw and explain the operation of a tuned amplifier circuit. Draw its equivalent cascade pair representation. Also draw y-parameter two port model for the same and define the y-parameter. **(10)**

   (b) Derive an expression for the efficiency of Class C amplifier. **(10)**

6. (a) Discuss in detail the effects of negative voltage series feedback on the performance parameters of an amplifier? **(10)**

   (b) What do you understand by tuned amplifier and discuss the merits and demerits of single and double tuned amplifier. **(10)**

SECTION - D

7. (a) Derive an expression for the frequency of oscillation of Hartley Oscillator. **(10)**

   (b) What is need of voltage regulator in electronic circuit? Describe the OP AMP based voltage regulator. **(10)**

8. (a) Derive an expression for the frequency of oscillation of Colpitts Oscillator. **(10)**

   (b) How will you differentiate between voltage regulator and voltage? Describe the Zener diode based voltage regulator. **(10)**

SECTION - E

9. Answer the following precisely:

   (i) Compare CE, CC, and CB configuration of BJT.

   (ii) Derive the equation of transconductance of CASCADE amplifier.

   (iii) What are the advantages and disadvantages of increasing emitter resistance (R_e)?

   (iv) In the miller's theorem, if the series impedance Z connected between input & output terminals of a network happens to be a capacitor, then what will happen to the miller components?

(v) Compare series and shunt amplifier.

(vi) Write down advantage & disadvantage of positive feedback.

(vii) Draw the circuit diagram of RC coupled phase shift oscillator & write the equation of its frequency of operation.

(viii) Define load regulation & line regulation.

(ix) Draw the circuit diagram of RC coupled amplifier.

(x) Write short note on IC regulator. **(2×10=20)**