II B. Tech II Semester Supplementary Examinations, December - 2022
ELECTRONIC CIRCUIT ANALYSIS
(Common to ECE, EIE, & ECT)

Time: 3 hours   Max. Marks: 70

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks
~~~~~~~~~~~~~~~~~~~~~~~~

UNIT--I

1 a) Derive the expressions for high frequency parameters in terms of low frequency parameters of a BJT. [7M]
   b) Discuss about hybrid-π capacitances. [7M]

Or

2 a) The following low frequency (i.e hybrid-π) parameters for a given transistor are $I_C = 10$ mA , $V_{CE} = 10$ V and at room temperature $h_{ie} = 500\,\Omega$, $h_{oe} = 4 \times 10^{-4}\,\mho$, $h_{fe} = 100$, and $h_{re} = 10^{-4}$. At the same operating point $f_T = 50$ MHz, $C_c = 3$ pF. Find all the values of hybrid-π parameters. [7M]

   b) Derive the expression for CE short circuit current gain. [7M]

UNIT--II

3 a) What are the different types of coupling methods used in multistage amplifiers? Explain. [7M]
   b) What is Boot-strap technique? Explain with the help of neat diagrams, how it improves the input impedance of Darlington pair circuits? [7M]

Or

4 a) Draw the circuit diagram of Cascode amplifier and also obtain the overall voltage gain, current gain, input impedance and output impedance? Also mention its advantages. [7M]
   b) Three identical cascaded amplifier stages have overall upper 3 dB frequency of 100 KHz and overall lower 3 dB frequency of 20 Hz. Find the upper and lower 3 dB frequency of individual stages. [7M]

UNIT--III

5 a) Derive an expression for the input and output impedances with feedback of a voltage shunt feedback amplifier? [7M]
   b) In a negative feedback amplifier $A_v = 100, \beta = 0.02, V_S = 25$ mV. Determine A_{vf}, V_0, V_f and loop gain $A\beta$. [7M]

Or

6 a) What is feedback? Why is it employed in an amplifier circuit? How many types of feedback are possible? Discuss. [7M]
   b) Voltage gain of an amplifier without feedback is 60 dB. It decreases to 40 dB with feedback. Calculate the feedback factor. [7M]

UNIT--IV

7 a) Discuss about Barkhausen criteria. Draw the circuit of BJT based RC phase shift oscillator and explain how this condition can be satisfied. [7M]
   b) A Colpitts oscillator is designed with $C_1 = 100$ pF and $C_2 = 7500$ pF. Find the range of inductance values if the frequency of oscillation vary between 950 KHz and 2050 KHz. [7M]

Or

8   a)   Derive the expressions for condition of oscillation and frequency of oscillation for general sinusoidal LC oscillators.   [7M]
    b)   Explain the frequency and amplitude stability criterion for sinusoidal oscillators.   [7M]

UNIT--V

9   a)   Define conversion efficiency in power amplifiers? Find the conversion efficiency for a series fed class-A power amplifier.   [7M]
    b)   A sinusoidal signal $V_s = 1.95 \sin 400t$ is applied to a power amplifier. The resulting current is $i = 12 \sin 400t + 1.2 \cos 800t + 0.9 \sin 1200t + 0.4 \cos 1600t$. Find
    i) the total harmonic distortion
    ii) percentage of increase in power because of distortion   [7M]

Or

10 a)   Derive an expression for bandwidth and Q-factor of a single tuned amplifier? Also, list the assumptions made for the derivation.   [8M]
    b)   Write short notes on thermal stability.   [6M]

|'''|'|'|''|'|''|II'|III