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B. E. (Fourth Semester) Examination, ~~2020~~ APR-MAY 2022

(New Scheme)

(IT Branch)

ANALOG ELECTRONICS CIRCUITS

Time Allowed : Three hours

Maximum Marks : 80

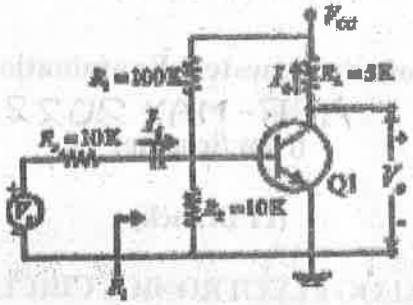
Minimum Pass Marks : 28

Note *: Answer all questions. Part (a) is compulsory and carries 2 marks. Answer any* ***two*** *parts from (b), (c) and (d) carries 7 marks.*

Unit - I

1. (a) Explain how CE configuration is suitable for every/ any stage.

(b) Calculate A_i, R_i, A_v, R_0, A_{vs} and A_{is} for the given circuit. Circuit parameters are $h_{ie} = 1{\cdot}1k$, $h_{re} = 2{\cdot}5\times10^{-4}$, $h_{fe} = 50$ and $h_{oe} = 2{\cdot}5\,\mu A/V$.



(c) Draw and explain emitter follower circuit and mention three characteristics of it. Derive the expression for current gain A_I, Input impedence R_i, voltage gain A_v output resisrtance R_0.

(d) Give comparison between CE, CB and CC configuration with the help of h-parameter model.

Unit - II

2. (a) Give any two reasons, why hybrid-π model is designed in high frequency region for a transistor.

(b) Consider a single stage CE transistor amplifier with the load resistor R_L shunted by a capacitance C_L. Prove that the internal voltage gain :

$$K = \frac{Vce}{Vb'e} = \frac{-g_m R_L}{1 + jw(C_C + C_L)R_L}$$

(c) Derive the expression for the CE sort circuit current gain A_I as a function of frequency.

(d) For hybrid π model drive expression for the following (derive any two) :

(i) Coductance $g_{b'e}$

(ii) Feedback conductance $g_{b'c}$

(iii) Base spreading resistance $r_{bb'}$

(iv) Output conductance g_{ce}

Unit - III

3. (a) What are the advantages of multistage amplifier?

(b) What is meant by amplifier noise? Define white noise, johnson noise, short noise, noise figure, signal to noise ratio.

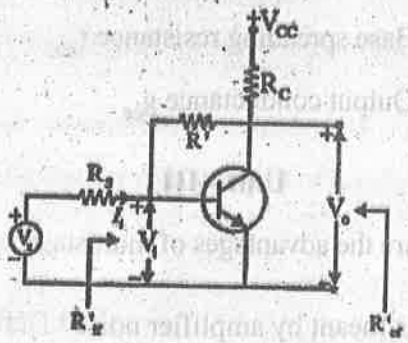
(c) Compare with circuit diagram direct coupling, RC coupling and transformer coupling.

(d) Explain the effect of cascading on bandwidth with the help of expression for higher and lower cutoff frequency.

Unit - IV

4. (a) What are the drawbacks of applying negative feedback in implifiers?

(b) For the circuti shown take $R_c = 4K$, $R' = 40K$, $R_s = 10K$, $h_{je} = 1{\cdot}1K$, $h_{fe} = 50$ and $h_{re} = h_{oe} = 0$ Find (a) A_{vf} and R_{mf} (b) R_{if} and (c) R_{of}.



(c) Drive the expression for input and output impedences of voltage shunt amplifier.

(d) Define negative feedback and positive feedback. What is the relationship between the transfer gain with feedback A_f and that without feedback A?

Unit - V

5. (a) Write one advantage and one diadvantages of positive feedback.

(b) Draw the basic circuit diagram of Hartley and Colpitts oscillator. Write an expression for oscillation frequency and also mention the minimum gain required for sustained oscillation.

(c) Draw the circuit diagram of Wien bridge oscillator. Derive an expression of requency of oscillation.

(d) What is the Barkhausen criteria for sustained oscillation. Explain crystal oscillator with proper diagram.