BIEL-005

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

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June, 2018

BIEL-005 : ANALOG ELECTRONIC CIRCUITS

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Any missing data may be suitably assumed and mentioned. Use of scientific calculators is permitted.*

1. (a) What are the h-parameters of a linear circuit ? Define them.   5

    (b) A Common Emitter (CE) amplifier has the following h-parameters : h_{ie} = 1100 Ω, h_{re} = 2·5 × 10^{-4}, h_{fe} = 50, h_{oe} = 25 $\mu\mho$. If load and source resistance both are 1 kΩ, find current gain and voltage gain.   5

2. (a) Describe briefly, shunt amplifier. Derive the relevant expressions.   5

(b)   Draw the series resonant circuit. Plot a
       curve showing the variations of circuit
       current with frequency and explain it briefly.   *5*

3. (a)   The gain of an amplifier is 50 and its
           collector resistance R_c = 600 Ω and the input
           impedance R_{in} = 1·2 kΩ. Calculate overall
           gain when two such amplifiers are cascaded
           through R-C coupling. Give highlights on the
           results.   *7*

    (b)   Calculate the total harmonic distortion for
           an output signal having fundamental
           amplitude of 2·5 V, second harmonic
           amplitude of 0·25 V, third harmonic
           amplitude of 0·1 V and fourth harmonic
           amplitude of 0·05 V.   *3*

4. Draw the hybrid-π model of BJT in CE connection
    and derive the equation for current gain.   *10*

5. (a)   What are the various methods of cascading a
           two-stage transistor amplifier ? Explain
           their relative advantages and disadvantages.   *6*

    (b)   Explain the operation principle of a cascode
           amplifier.   *4*

6. Draw and explain the high-frequency transistor small signal ac equivalent circuit of a BJT. Derive the expression of gain-bandwidth product (F_T). *10*

7. (a) Draw the block diagram representation of an oscillator and derive the expression for Barkhausen criterion of oscillations. *5*

   (b) Mention the classification of oscillators, and briefly explain each of them. *5*

8. (a) Draw the circuit of an astable multivibrator. Justify that it is a two-stage RC coupled amplifier using feedback. *5*

   (b) Discuss briefly the merits and demerits of RC coupled amplifier. *5*

9. (a) Distinguish current feedback and voltage feedback, with appropriate circuit diagram. *5*

   (b) Draw the circuit diagram of an emitter follower and explain its working principle. *3*

   (c) Explain the characteristics of negative and positive feedback. *2*

10. Write short notes on any *two* of the following : *2×5=10*

    (a)   Crystal Oscillator

    (b)   Wein Bridge Oscillator

    (c)   Push-Pull Amplifier

    (d)   IC-555 Timer

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