Registration No:

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B.TECH. DEGREE EXAMINATION-NOV-DEC.2018
End Semester Examination-III Semester
BECPC3010 Analog Electronics Circuits
(Regulations 2017)(Common to AEIE and ECE Branches)

Time : 3 Hours   **Maximum : 100 Marks**   **Question Code:281712**
Answer ALL Questions
PART A - (10 X 2 = 20 Marks)

1. (a) A transistor has a β_{DC} of 250 and a base current, I_B, of 20 µ A. The collector current, I_C, equals

   A) 500 µ A   B. 5 mA   C. 50 mA   D. 5 A   [CO1][PO2]

   (b) Junction Field Effect Transistors (JFET) contain how many diodes?   [CO1][PO1]

   A. 4   B. 3   C. 2   D. 1

   (c) When VGS = 0.5 Vp gm is .... the maximum value.   [CO2] [PO3]

   A) one-fourth B) one-half C) three-fourths D) two-thirds

   (d) Transconductance is the ratio of changes in ....   [CO2] [PO1]

   A) ID to VGS   B) ID to VDS   C) VGS to IG   D) VGS to VDS

   (e) An amplifier has an input signal voltage of 0.054 mV. The output voltage is 12.5 V.
   The voltage gain in dB is   [CO3] [PO2]

   A) 53.6 dB.   B) 107.3 dB.   C) 231 dB.   D) 116 dB.

   (f) Halving the power corresponds to a…….dB…….   [CO3] [PO2]

   A) 3, decrease B) 10, decrease C) 3, increase D) 10, increase

   (g) ………..is the unit for the slew rate, SR.   [CO2] [PO1]

   A) V/ms   B) ms/V   C) V   D). V/s

   (h) Negative feedback in an amplifier: [CO4] [PO4]

   A)Causes oscillation. B. Increases sensitivity. C) Reduces the gain.
   D) Is used in an Armstrong oscillator.

   (i) A feedback circuit usually employs……….network.   [CO4] [PO3]

   1. Resistive   2. Capacitive 3.Inductive 4.None of the above

   (j) The main features of a large-signal amplifier is the circuit's……….   [CO2] [PO1]

   a) power efficiency b)maximum power limitations
   c) impedance matching to the output device d).All of the above

PART B - (10 X 2 = 20 Marks)

2. (a) What is load line? Explain its significance.   [CO4] [PO1]
   (b) Write the difference between BJT and FET   [CO1] [PO1]
   (c) State an application of emitter follower circuit.   [CO2] [PO1]
   (d) Explain how g_m is determined graphically in a JFET.   [CO2] [PO3]
   (e) Define the frequency response of Amplifier?   [CO3] [PO1]
   (f) What is the significance of gain bandwidth product?   [CO3][PO1]
   (g) What do you mean by CMRR?   [CO2] [PO1]
   (h) What is a virtual ground? What is its effect on op-amp operation?   [CO2] [PO1]
   (i) Draw the electrical equivalent circuit of a crystal.   [CO4] [PO4]
   (j) What is the advantage of using a crystal oscillator?   [CO4] [PO3]

PART C - (4 X 15 = 60 Marks)

3. (a) (i) Explain the comparison of CB, CC and CE transistor amplifiers.   [5][CO1] [PO1]
   (ii) Give the dc load line for a fixed bias circuit with $V_{CC} = 9$ V, $\beta = 100$
        and $R_B = 20$ KΩ that uses a silicon transistor   [10][CO1] [PO2]

   (or)

   (b) (i) Design a voltage-divider bias network using a supply of 24 V, a transistor
       with a beta of 110, and an operating point of $I_{CQ} = 4$ mA
       and $V_{CEQ} = 8$ V. Chose $V_E = \frac{1}{8} V_{CC}$ [5][CO1] [PO2]

(ii) Determine V_C and V_B for the network [10][CO1] [PO2]
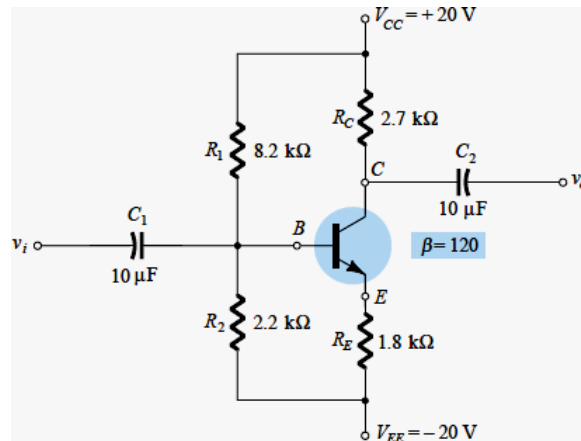
4. (a) (i) Determine the following for a common-emitter amplifier if $\beta = 80$,
   $I_E(dc) = 2$ mA, and $r_o = 40$ KΩ. [10][CO2][PO1]
   a. Z_i
   b. I_b
   c. $A_i = I_o / I_i = I_L / I_b$ if $R_L = 1.2$ KΩ
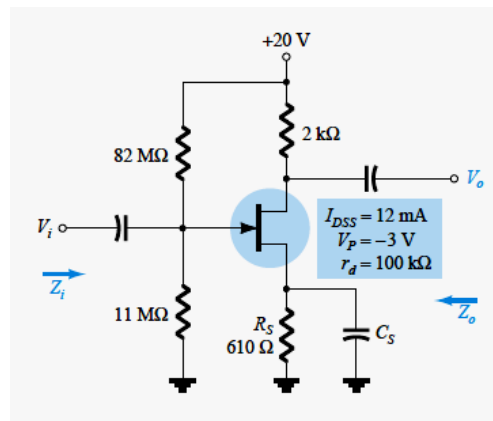   d. A_v if $R_L = 1.2$ KΩ

   (ii) Derive the voltage gain for a Common Base configuration using its r_e equivalent circuit. [5][CO2][PO1]

   (or)

(b) (i) Determine Z_i, Z_o, and V_o for the network of Fig. if $V_i = 20$ mV. [10][CO2] [PO4]

   (ii) An n-channel FET has $V_P = -2.0$ V and $I_{DSS} = 1.65$ mA. It is desired to
   bias the circuit at $I_D = 0.8$ mA at $V_{DD} = 24$ V. Find V_{GS}, g_m, R_S and R_d. [5]CO2] [PO3]

5. (a) (i) Write short notes on Miller effect capacitance. [7][CO3] [PO1]
   (ii) Derive an expression for the upper 3-dB cut off frequency for a CE amplifier.
   State your assumptions clearly. [8][CO3][PO2]

   (or)

(b) (i) Explain frequency response of BJT amplifiers. [7][CO3] [PO1]
   (ii) Explain frequency response of JFET. [8][CO3] [PO1]

6. (a) (i) What do you mean by power amplifier? Draw circuit diagram of push pull
   amplifier using a pair of complementary transistors and explain its operation. [10][CO4] [PO1]
   (ii) An amplifier with negative feedback has voltage gain of 120. It is found
   that with feedback, an input signal of 60 mV is required to produce a
   particular output, where as with feedback the input signal must be
   0.5 V to get the same output. Find the A_v and β of the amplifier. [5][CO4] [PO4]

   (or)

(b) (i) Write various advantages of negative feedback? Draw the block diagrams of
   different topologies? [5][CO4] [PO3]
   (ii) For the voltage-series feedback configuration, find out the expression for
   voltage gain, input impedance, and out impedance. [10][CO4] [PO4]

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