First/Second Semester B.E. Degree Examination, June/July 2017
Basic Electronics

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, choosing at least two from each part.*

PART – A

1 a. Choose the correct answers for the following :
   i) The cut in voltage of a silicon diode is about _____
      A) 0.6V   B) 0.6mV   C) 1.2V   D) 1.2mV
   ii) The ripple factor for a full wave rectifier is
      A) 0.482   B) 0.5   C) 1.21   D) −1.21
   iii) PIV rating of a diode in a bridge rectifier is _____

      A) V_m B) $2V_m$ C) $\dfrac{V_m}{2}$ D) $\dfrac{V_m}{\sqrt{2}}$

   iv) The zener resistance of a zener diode, which exhibits 50mV change in V_z for a 2.5mA
      change in I_z is ____
      A) 10Ω   B) 40Ω   C) 20Ω   D) 60Ω   **(04 Marks)**
   b. Draw and explain the V-I characteristics of silicon diode   **(04 Marks)**
   c. Deduce the following for Fullwave rectifier i) I_{dc} ii) I_{rms} iii) Ripple factor
      iv) Effeciency of rectification.   **(08 Marks)**
   d. A full wave rectifier (bridge) supplies a load of 400Ω in parallel with a capacitor of 500μF.
      If the ac-supply voltage is 230 sin 314t, V find the i) Ripple factor   ii) Dc load current.
         (04 Marks)

2 a. Choose the correct answers for the following :
   i) The transistor acts as an amplifier in the _____ region.
      A) cut off   B) active   C) saturation   D) inverse.
   ii) In a transistor the current conduction is due to _____ carriers.
      A) Majority   B) Minority   C) Both   D) None of these.
   iii) The input resistance is highest for _____
      A) CB amplifier   B) CC amplifier   C) CE amplifier   D) None of these.
   iv) The position of Q-point on the dc load line should be _____
      A) stable   B) unstable   C) bistable   D) all the above.
         (04 Marks)
   b. Draw input and output characteristics of a transistors in common emitter configuration and
      explain in detail.   **(04 Marks)**
   c. Obtain the relationship between α_{dc} and β_{dc}.   **(08 Marks)**
   d. Calculate the values of I_c, I_E and β_{dc} for a transistor with α_{dc} = 0.98 and I_B = 120μA.
         (04 Marks)

3 a. Choose the correct answers for the following :
   i) The reverse saturation current doubles for every _____ °C rise in temperature.
      A) 40   B) 45   C) 10   D) 50.
   ii) The stability factor "S" as the rate of change of collector current with _____
      A) Base current   B) Reverse saturation current
      C) Emitter current   D) V_{cc}.
   iii) For an emitter follower, the voltage gain is _____
      A) unity   B) greater than unity   C) less than unity   D) zero.

iv) In the fixed bias circuit, the stabilization of the Q-point is _____.

    A) very poor   B) very high   C) better   D) very good.

(04 Marks)

b. Explain the circuit operation and analysis of voltage divider bias.   **(08 Marks)**

c. In the circuit shown in Fig. Q3(c), a NPN transistor with $\beta = 100$ is used. Find I_B, I_C and V_{CE}. Draw the dc load line and indicate the Q-point. Take $V_{BE} = 0.7$ volts.   **(08 Marks)**
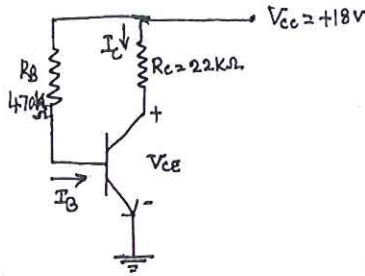

Fig. Q3(c)

4   a. Choose the correct answers for the following :

    i) An SCR has_____ number of p-n junctions

        A) One   B) Two   C) Three   D) Four

    ii) FET is a _____ controlled device.

        A) Voltage   B) Current   C) Power   D) None of these.

    iii) The holding current is an SCR is _____ the latching current.

        A) More than   B) Less than   C) Equal to   D) none of these

    iv) A relaxation uses

        A) MOSFET   B) SCR   C) UJT   D) BJT. **(04 Marks)**

   b. Draw and explain the V-I characteristic of SCR.   **(08 Marks)**

   c. Explain the basic construction and equivalent circuit of UJT.   **(08 Marks)**

PART – B

5   a. Choose the correct answers for the following :

    i) Bandwidth of an amplifer is given by _____

        A) $BW = f_L - f_H$ B) $BW = f_H - f_L$ C) $BW = f_L + f_H$ D) $BW = 2f_L - f_H$

    ii) An amplifier is RC phase shift oscillator contributes _____ phase shift.

        A) 180°   B) 0°   C) 90°   D) 60°.

    iii) The crystal oscillator finds use, when the _____ stability is required.

        A) Amplitude   B) Frequency   C) Phase   D) None of these.

    iv) In an oscillator, we use _____ feedback.

        A) Positive   B) Negative   C) Unity grain   D) None of these.

(04 Marks)

   b. Draw a neat circuit diagram of Hartley's oscillator and explain its working. What is the frequency of oscillations?   **(08 Marks)**

   c. With a neat circuit diagram and frequency response, explain the operation of single stage RC coupled amplifier.   **(08 Marks)**

6   a. Choose the correct answers for the following :

    i) An audio amplifier works over the frequency range _____.

        A) 20Hz to 20KHz   B) 20Hz to 1MHz   C) 1KHz to 4KHz   D) None of these.

    ii) Op-amp is basically a _____ amplifier.

        A) Power   B) Differential   C) Optical   D) Current.

    iii) In inverting amplifier there is _____ phase shift between input and output.

        A) 0°   B) 90°   C) 180°   D) 360°

    iv) The maximum rate at which amplifier output can change in volts per microseconds (V/µs) is called _____.

        A) over rate   B) slew rate   C) under rate   D) None of these.

(04 Marks)

b. List the characteristics of an ideal op.amp. **(06 Marks)**

c. Show with a circuit diagram, how the op-amp can be used as an integrator. **(05 Marks)**

d. Find the O/pP voltage of the 3 i/p adder circuit shown below Fig. Q6(d). **(05 Marks)**
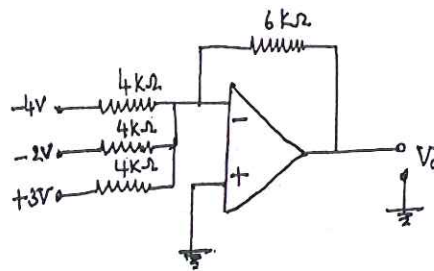

Fig. Q6(d)

7 a. Choose the correct answers for the following :

    i) The radio communication uses _____ as communication medium.

      A) Optical fibre   B) Free space   C) conducting wire   D) None of these.

    ii) The circuit that recovers the original modulating information from an AM signal is known as

      A) Modulator   B) Mixer   C) Demodulator   D) Oscillator.

    iii) 2's complement of binary number 10110 as

      A) 00011   B) 01010   C) 11100   D) 11111.

    iv) $(28)_{10} = (\quad)_2$

      A) 11100   B) 01110   C) 11000   D) 00011. **(04 Marks)**

b. Explain the need for modulation. **(04 Marks)**

c. Draw the block diagram of a super heterodyne receiver and explain the function of each block. **(06 Marks)**

d. Perform the following :

    i) Convert $(725.25)_8 = (\quad)_{10} = (\quad)_2$

    ii) Subtract using 2's complement $(4 - 9)_{10}$

    iii) $(11010.101)_2 = (\quad)_8 = (\quad)_{16}.$ **(06 Marks)**

8 a. Choose the correct answers for the following :

    i) Universal gates are _____ and _____.

      A) NOT and NOR   B) AND or OR   C) NAND and NOR   D) EX-OR and EX-NOR.

    ii) $(A+B)(B+C) = $ _____

      A) $B + \overline{A}C$ B) $B + \overline{B}C$ C) $B + AC$ D) AB.

    iii) The output is high, when all the inputs are low, such a gate is called _____.

      A) NAND   B) AND   C) OR   D) EX-OR

    iv) Full adder has _____ inputs.

      A) 1   B) 2   C) 3   D) 4. **(04 Marks)**

b. State and prove De Morgan's theorem. **(04 Marks)**

c. Simplify

    i) $\overline{A}\,\overline{B}\,\overline{C} + \overline{A}BC + AB\overline{C} + A\overline{B}\,\overline{C}$, realize using basic gates.

    ii) $(A + \overline{B} + C)(\overline{A} + B + C)$, realize using two input NAND gates. **(08 Marks)**

d. Realize a full adder using 2 Half adder and OR gate. **(04 Marks)**

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