First/Second Semester B.E. Degree Examination, June/July 2013
Basic Electronics

Time: 3 hrs.   Max. Marks:100

Note:
1. Answer any FIVE full questions, choosing at least two from each part.
2. Answer all objective type questions only on OMR sheet page 5 of the answer booklet.
3. Answer to objective type questions on sheets other than OMR will not be valued.

PART – A

1   a.   Choose the correct answers for the following :   **(04 Marks)**
     i)   When forward – biased, a diode
         A) blocks current   B) conducts current
         C) has a high resistance   D) drops a large voltage
     ii)   The knee voltage of a Silicon diode is
         A) 0.3 V   B) 0.5 V   C) 0.7 V   D) None of these
     iii)   The ripple factor of half wave rectifier is about _____
         A) 40.6   B) 0.46   C) 1.21   D) 81.2
     iv)   The rms value of a load current in case of a full wave rectifier is
         A) $\dfrac{\pi}{2}$ B) $\dfrac{Im}{2}$ C) $\dfrac{Im}{\sqrt{2}}$ D) $\dfrac{Im}{\pi}$

   b.   Deduce the following for HWR
     i) I_{rms} ii) I_{dc} **(04 Marks)**
   c.   With a neat circuit diagram, explain the working principles of full wave bridge rectifier.
                                                                      (06 Marks)
   d.   Draw the circuit of full wave rectifier and show that the ripple factor = 0.48 and efficiency = 81%.   **(06 Marks)**

2   a.   Choose the correct answers for the following :   **(04 Marks)**
     i)   The current relationship between two current gain in a transistor is
         A) $\beta = \dfrac{\alpha}{1-\alpha}$ B) $\beta = \dfrac{1+\alpha}{1-\alpha}$
         C) $\beta = \dfrac{1-\alpha}{1+\alpha}$ D) $\beta = \dfrac{\beta+1}{\beta}$
     ii)   The β_{dc} of a transistor is its
         A) current gain   B) voltage gain
         C) power gain   D) internal resistance
     iii)   In a transistor the current conduction is due to _____ carries.
         A) majority   B) minority
         C) both (A) and (B)   D) None of these
     iv)   In a transistor circuit,
         A) $I_E = I_C$ B) $I_E > I_C$ C) $I_E < I_C$ D) $I_E \ll I_C$

   b.   Draw input and output characteristics of an NPN transistor in common base configuration and explain.   **(08 Marks)**
   c.   Calculate the value of I_C , I_E and β_{dc} for a transistor with α = 0.99 and I_B = 110 µA.
                                                                      (04 Marks)
   d.   Obtain the relation between 'α_{dc}' and 'β_{dc}'.   **(04 Marks)**

3 a. Choose the correct answers for the following : **(04 Mark.**
   i) The intersection of a dc load time and the output characteristics of a transistor is called
   - A) Q – point
   - B) Quiescent point
   - C) Operating point
   - D) All of these

   ii) For an emitter follower, the voltage gain is
   - A) unity
   - B) greater than unity
   - C) less than unity
   - D) zero

   iii) The best biasing stability is achieved by using _____ biasing circuit.
   - A) fixed
   - B) collector to base
   - C) voltage divider
   - D) None of these

   iv) In self bias or emitter bias circuit _____ is connected between emitter and ground
   - A) inductor
   - B) capacitor
   - C) resistor
   - D) transformer

   b. Explain the concepts of base bias techniques using NPN transistor. **(10 Marks)**
   c. Calculate the Q – point values for the circuit of collector to base circuit. Given $R_B = 100\ K\Omega$, $R_C = 10\ K\Omega$, $V_{CC} = 12\ V$ and $\beta_{dc} = 100$. **(06 Marks)**

4 a. Choose the correct answers for the following : **(04 Marks)**
   i) A SCR has _____ number of layers
   - A) one
   - B) two
   - C) three
   - D) Four

   ii) The minimum point in VI characteristic of UJT is known as _____ point
   - A) negative
   - B) valley
   - C) latching
   - D) conducting

   iii) The FET is a _____ controlled device
   - A) current
   - B) voltage
   - C) power
   - D) None of these

   iv) The relaxation oscillator uses
   - A) MOSFET
   - B) SCR
   - C) BJT
   - D) UJT.

   b. Draw two transistor equivalent circuit of SCR. Also plot V – I characteristics and explain various regions of operations. **(10 Marks)**
   c. Explain with suitable diagram and waveforms, how UJT can be used as a relaxation oscillator. **(06 Marks)**

PART – B

5 a. Choose the correct answers for the following : **(04 Marks)**
   i) Oscillator uses _____ type of feedback
   - A) positive
   - B) negative
   - C) both
   - D) None of these

   ii) A phase shift oscillator has
   - A) three RC circuits
   - B) three LC circuits
   - C) a T - type circuit
   - D) a π type circuit

   iii) The frequency of Hartley oscillator is f = _____
   - A) $\dfrac{1}{2\pi\sqrt{LC}}$
   - B) $\dfrac{1}{2\pi\sqrt{RC}}$
   - C) $\dfrac{1}{2\pi\sqrt{C}}$
   - D) $\dfrac{1}{2\pi LC}$

   iv) The upper and lower critical frequencies are sometimes called the
   - A) power frequencies
   - B) half power frequencies
   - C) 6 dB points
   - D) None of these

   b. Explain with a neat diagram, the working of single stage RC coupled amplifiers with its frequency response. **(08 Marks)**
   c. Give any four advantages of negative feedback in amplifier. **(04 Marks)**
   d. In a colpitts oscillator, if the desired frequency is 800 KHz, determine the values of L and C if $C_1 = C_2 = 10$ picofarad. **(04 Marks)**

6 a. Choose the correct answers for the following : (04 Marks)
   i) The CMRR is given by ____
      A) $A_d \times A_c$ B) A_c / A_d C) A_d / A_c D) 20 log A_c / A_d
   ii) The gain of the inverting amplifier using R_f = 10 KΩ and R_1 = 1 KΩ is _____
      A) – 10   B) – 11   C) 10   D) 11
   iii) The gain of the voltage follower is ____
      A) zero   B) infinite   C) negative   D) unity
   iv) The screen of CRT is coated with _____
      A) chromium   B) phosphor   C) carbon   D) germanium

   b. Calculate the output voltage of a three input summing amplifier : Given R_1 = 200 KΩ, R_2 = 250 KΩ, R_3 = 500 KΩ and R_f = 1 MΩ, V_1 = –2V, V_2 = 2V and V_3 = 1 V. (06 Marks)

   c. Show, how an op amp can be used as an integrator. Derive an expression for output voltage. (06 Marks)

   d. Give any four applications of CRO. (04 Marks)

7 a. Choose the correct answers for the following : (04 Marks)
   i) The modulating frequency is _____ carrier frequency
      A) lower than   B) higher than   C) equal to   D) None of these
   ii) The modulation is done in ____
      A) transmitter   B) receiver
      C) none of the above   D) between transmitter and receiver.
   iii) The 2's complement of 1010 gives
      A) 1111   B) 0110   C) 0010   D) 0101
   iv) In binary numbers, shifting the binary point one place to right
      A) divides by 2   B) decreases by 10
      C) increases by 10   D) multiplies by 2

   b. With suitable block diagram, explain the function of superheterodyne receiver. (08 Marks)
   c. Convert $(ABCD)_{16}$ = (   )$_2$ = (   )$_8$ = (   )$_{10}$ = (   )$_{BCD}$. (04 Marks)
   d. Subtract : $(28)_{10} - (19)_{10}$ using both 1's complement and 2's complement methods. (04 Marks)

8 a. Choose the correct answers for the following : (04 Marks)
   i) When demorganis theorem applied to $\overline{(A + B)}$, we get ____
      A) A + B   B) $\overline{A}\ \overline{B}$ C) A   D) B
   ii) $Y = \overline{A}B + \overline{B}A$ is a Boolean expression for _____
      A) EX - OR   B) EX – NAND
      C) EX – NOR   D) none of these
   iii) The example for universal gate is _____
      A) NOT   B) NOR   C) OR   D) AND
   iv) The expression for half adder carry 'C' with inputs 'A' and 'B' is given by
      A) A + B   B) AB   C) $\overline{A}\ \overline{B}$ D) none of these

   b. i) Realize the NAND gate using minimum number of NOR gates
      ii) Simplify $M = XY\overline{Z} + X\overline{Y}Z + \overline{Z}XY$ and realize using of NOR gates. (08 Marks)

   c. Realize a full adder using two half adders and an OR gate with truth table. (08 Marks)

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