First/Second Semester B.E. Degree Examination, June/July 2018
Basic Electronics

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting ONE full question from each module.*

Module-1

1 a. Draw and explain the V-I characteristics of Si and Ge diode.   **(06 Marks)**
   b. A Zener diode with $V_z = 4.3V$ and Z_Z equal to 22Ω when $I_z = 20mA$. Calculate the upper and lower limits of V_Z when I_Z changes by ± 5 mA.   **(06 Marks)**
   c. Sketch the typical input and output characteristics for the CE configuration. Briefly explain the three regions of operation.   **(08 Marks)**

OR

2 a. Explain the working of positive clamping.   **(05 Marks)**
   b. A diode with $V_F = 0.7V$ is connected as a Half wave rectifier. The load resistance is 500Ω, and the (r.m.s) ac input is 22v. Determine the peak output voltage, the peak load current, and the diode peak inverse voltage.   **(05 Marks)**
   c. Calculate I_C and I_E for a transistor that has $\alpha_{dc} = 0.98$ and $I_B = 100\mu A$. Determine the value of β_{dc} (or h_{FE}) for the transistor.   **(04 Marks)**
   d. With a circuit diagram, explain the working of a centre tapped FWR.   **(06 Marks)**

Module-2

3 a. List the factors, which affect the stability of operating point.   **(04 Marks)**
   b. For CE – circuit shown in Fig Q3 (b) draw the DC load line and obtain Q-point values. Assume $\beta = 100$ and $V_{BE} = 0.7V$.

Fig Q3(b)   **(08 Marks)**

   c. With a neat diagram, explain how op-amp can be used as differentiator   **(04 Marks)**
   d. For the op-amp circuit of Fig Q3(d), find the output voltage and closed loop gain.

Fig Q3(d)   **(04 Marks)**

OR

4 a. With a neat circuit diagram, explain the voltage divider biasing circuit and derive the expression for V_{CE} and I_C.   **(08 Marks)**
   b. List the characteristics of an ideal op-amp and draw the three input inverting summer circuit using an op-amp and derive an expression for output voltage.   **(08 Marks)**

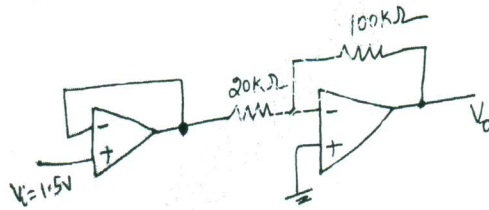c. Find the output of the op-amp circuit shown in Fig Q4(c) (04 Marks)

Fig Q4(c)

Module-3

5 a. Convert $(BCDE)_{16} = (\quad)_2 = (\quad)_8 = (\quad)_{10}$. (03 Marks)
   b. Subtract $(57)_{10}$ from $(43)_{16}$ using 2's complement form. (05 Marks)
   c. Simplify the following Boolean expression
      i) $Y = \overline{ABC} + \overline{AB}\overline{C} + A\overline{BC} + AB\overline{C}$
      ii) $Y = (A\overline{B} + \overline{A}C)(BC + B\overline{C})(ABC)$ (06 Marks)
   d. Draw the logic diagram of a full adder and also write its truth table with sum and carry expressions. (06 Marks)

OR

6 a. Design a logic diagram using basic gates with 3 inputs A, B, C and output Y that goes high only when A is high. (05 Marks)
   b. Simplify and realize the Boolean expressions, using two input NAND gates only
      i) $ABCD + A\overline{B}CD$ ii) $AB + ABC + AB\overline{C} + \overline{A}BC$ iii) $AB + ABC + AB(D + E)$ (10 Marks)
   c. Perform the following :
      i) $(110011)_2 - (11001)_2 = (?)_2$ – using 2's compliment
      ii) $(11110101)_2 - (10010101)_2 = (?)_2$ – Using 1's complement. (05 Marks)

Module-4

7 a. With the help of logic diagram and truth table explain the working of the clocked RS Flip Flop. (06 Marks)
   b. List the differences between Microprocessor and Microcontroller. (05 Marks)
   c. What is Transducer? Distinguish between active and passive Transducers. (04 Marks)
   d. Explain the working of Piezoelectric Transducer. (05 Marks)

OR

8 a. With a neat block diagram explain architecture of 8051 microcontroller. (10 Marks)
   b. Explain the working of LVDT. (06 Marks)
   c. Explain: i) Hall effect   ii) Seeback effect. (04 Marks)

Module-5

9 a. Draw the block diagram of communication system and explain each element. (08 Marks)
   b. With a network diagram explain the working of typical switched telephone system. (05 Marks)
   c. Mention the advantages and applications of Optical Fibre Communications. (07 Marks)

OR

10 a. Define FM. Draw the FM signal. Write the expression for FM wave. (05 Marks)
    b. A 500W, 100KHz carrier is modulated to a depth of 60% by modulating signal frequency of 1KHz. Calculate the total power transmitted. What are the side band components of the AM wave? (06 Marks)
    c. Give the comparision between AM and FM. (05 Marks)
    d. Explain the principle of operations of mobile phones. (04 Marks)