USN

15ELN15/25

First/Second Semester B.E. Degree Examination, July/August 2021
Basic Electronics

Time: 3 hrs.

Max. Marks: 80

Note: *Answer any FIVE full questions.*

1   a. Draw and explain the V – I – characteristics of Si – diode and Ge – diode. **(06 Marks)**
    b. With neat circuit diagram, explain the working principles of full wave bridge rectifier. **(06 Marks)**
    c. Calculate I_C and I_E for a transistor that has $\alpha_u = 0.98$ and $I_B = 100\mu A$ and also determine the value of β_{dc} for the transistor. **(04 Marks)**

2   a. Distinguish between Avalanche break down and Zener break down. **(04 Marks)**
    b. A half wave rectifier uses a diode whose Internal resistance is 30Ω to supply power to $1.1k\Omega$ load from 110V (rms) source of supply. Calculate i) DC Load Voltage   ii) DC Load Current   iii) AC Load Current   iv) Efficiency of the rectifier. **(06 Marks)**
    c. Draw and explain the input and output characteristics of a transistor in common emitter configuration. **(06 Marks)**

3   a. For the base bias circuit $V_{CC} = 18V$, $R_C = 2.2K\Omega$, $R_B = 470\ K\Omega$, β 100 and $V_{BE} = 0.7V$. Find I_B , I_C and V_{CE}. **(06 Marks)**
    b. Explain the Ideal Op – Amp characteristics. **(04 Marks)**
    c. Show how an Op-amp can be used as an differentiator. Derive expression for output voltage. **(06 Marks)**

4   a. Explain Voltage divider bias circuit, with neat circuit diagram. **(05 Marks)**
    b. With a neat circuit diagram and waveform, explain how Op-amp can be used as a Inverting amplifier. **(06 Marks)**
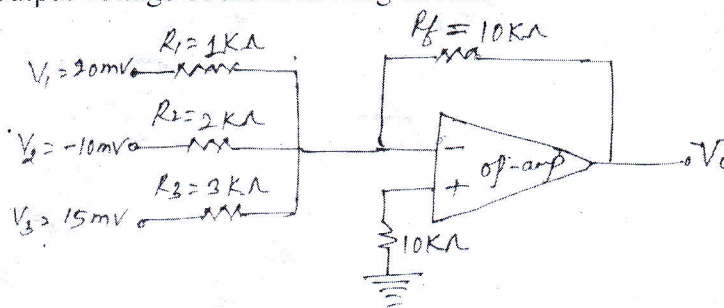   c. Determine the output voltage of the following circuit.

Fig. Q4(c) **(05 Marks)**

5   a. Convert   i) $(59)_{10} = (?)_2$ ii) $(10000101)_2 = (?)_{10}$ iii) $(AEF5)_{16}$ $(?)_2$
       iv) $(1543)_8 = (?)_{10}$. **(06 Marks)**
    b. Realize the i) OR   ii) AND   iii) NOT gates using NAND and NOR gate only. **(06 Marks)**
    c. Design a half adder circuit and realize using Basic gates. **(04 Marks)**

6 a. Factorize the following Boolean equations :
   i) $Y = \overline{A}\,\overline{B}\,\overline{C}\,\overline{D} + \overline{A}\,\overline{B}\,\overline{C}\,D + A\,B\,\overline{C}\,\overline{D} + A\,B\,\overline{C}\,D$.
   ii) $Y = ABC + A\overline{B}C + AB\overline{C} + \overline{A}BC$.   (06 Marks)

   b. Perform (22 17) using 1's and 2's Complement method.   (04 Marks)
   c. Draw and explain the Full adder circuit.   (06 Marks)

7 a. What is Flip – Flop? Explain the operation of NAND – gate latch with its truth table.
                                                                                  (04 Marks)
   b. With neat diagram, explain the architecture of 8051 micro controller.   (06 Marks)
   c. Explain the working of clocked R – S Flip – flop with logic diagram and truth table.
                                                                                  (06 Marks)

8 a. Explain R – S Flip – Flop using its circuit diagram, logic symbol the truth table.   (06 Marks)
   b. Explain with neat diagram, Microcontroller based stepper motor control system.   (06 Marks)
   c. Identify the value of Q and $\overline{Q}$ for the Fig. Q8(c), when i) $R = S = 0$ ii) $R\ S\ 1$
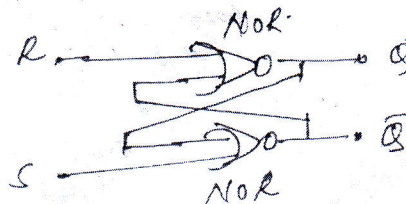   iii) $R = 0$, $S = 1$ and   iv) $R = 1$, $S = 0$.   (04 Marks)

Fig.Q8(c)

9 a. Explain the elements of Communication system, with a neat block diagram.   (06 Marks)
   b. What is Modulation? Derive the expression for Amplitude Modulation.   (06 Marks)
   c. What is Transducer? Differentiate between Active and Passive transducer.   (04 Marks)

10 a. A 500W, 1MHz carrier is amplitude modulated with a Sinusoidal signal of 1KHz. The depth
       of modulation is 60%. Calculate the i) Bowl width   ii) Power in the sidebands and
       iii) The total power transmitted.   (06 Marks)
   b. Explain the working of LVDT, with neat diagram.   (05 Marks)
   c. Explain the differences between Amplitude and Frequency modulation.   (05 Marks)

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