USN | | | | | | | | | | |

First/Second Semester B.E. Degree Examination, June/July 2023
Basic Electronics

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a. Explain how Zener diode can be used as a voltage Regulator with and without load resistance. **(07 Marks)**
    b. Define the following parameters and mention its ideal values for both half wave and bridge rectifier
       i) Ripple factor
       ii) Power conversion Efficiency
       iii) PIV **(07 Marks)**
    c. Explain the working of Light Emitting Diode and mention its Applications. **(06 Marks)**

OR

2   a. Draw the circuit diagram of a Full wave bridge rectifier and explain it. **(07 Marks)**
    b. Draw the functional block diagram of the 78XX series voltage regulator and mention the function of each block. **(07 Marks)**
    c. Write the ideal diode, piecewise Linear model and approximate model of a Diode with VI – characteristics. **(06 Marks)**

Module-2

3   a. Draw the Drain and Transfer Characteristics of N-channel JFET and explain it. **(07 Marks)**
    b. Explain the working of CMOS inverter and also mention its Advantages. **(07 Marks)**
    c. For JFET, $I_{DSS} = 6mA$, $V_p = -4.5V$, determine drain current at $V_{GS} = -2V$ and $-4V$. **(06 Marks)**

OR

4   a. Draw the characteristics of SCR and explain it. **(07 Marks)**
    b. Explain the construction and operation of N-channel Enhancement type MOSFET. **(07 Marks)**
    c. Compare FET with BJT and also write the square Law expression for drain current. **(06 Marks)**

Module-3

5   a. Define the following op-amp parameters and mention its ideal values
       i) CMRR   ii) Slew rate   iii) SVRR/PSRR   iv) Input bias current. **(08 Marks)**
    b. Design an adder circuit using op-amp to get the output $V_0 = -(0.1V_1 + V_2 + 10V_3)$. Assume $R_f = 10K\Omega$ and V_1, V_2, V_3 are the input voltages. **(06 Marks)**
    c. What is differentiator and obtain the expression of output voltage using op-amp. **(06 Marks)**

OR

6 a. What are the op-amp input modes and explain it. (08 Marks)
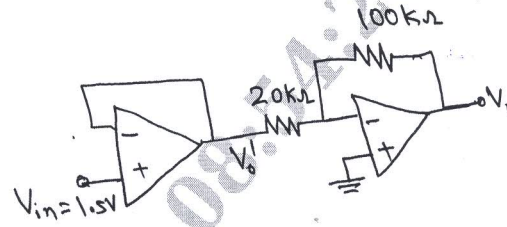   b. For the op-amp circuit shown in Fig Q6(b), find V_0' and V_0

Fig Q6(b) (06 Marks)

   c. Derive the expression of closed loop voltage gain of a non-inverting amplifier using op-amp.
   (06 Marks)

Module-4

7 a. Explain the operation of BJT can be used as a switch. (07 Marks)
   b. Mention the properties and advantages of Negative feedback. (07 Marks)
   c. State Barkhausen condition for oscillator. Write the circuit diagram, equations for sustained oscillation and frequency of oscillation. (06 Marks)

OR

8 a. Explain the operation of a Astable Multivibrator using IC-555 Timer and also write the equation of frequency of oscillation. (07 Marks)
   b. Draw the transistor switch circuit to switch ON/OFF on LED and explain it. (07 Marks)
   c. Design a wein bridge oscillator to get oscillation frequency of 5KHz. Assume R = 100KΩ and R_1 = 200KΩ. (06 Marks)

Module-5

9 a. Mention the differences between Analog and digital signals. Write the waveform for converting analog into digital signal. (07 Marks)
   b. Convert the following :
       i) $(FA876)_{16}$ in to Binary form
       ii) $(345.75)_{10}$ into Hexadecimal
       iii) $(0.705)_{10}$ into octal (06 Marks)
   c. What is multiplexer? Implement 8 to 1 multiplexer using basic Gates. (07 Marks)

OR

10 a. Implement the following Boolean functions
       i) $F = (A + C\overline{D} + \overline{D}\,\overline{E}$ using NAND Gates
       ii) $F = (\overline{C} + A)(\overline{C} + B)$ using NOR – Gates (07 Marks)

   b. Explain the operation of a JK-master slave flip-flop. (07 Marks)
   c. Draw the block diagram of a cellular mobile radio unit and mention the functions of each block. (06 Marks)

* * * * *