USN | | | | | | | | | | **17ELN15/25**
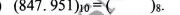
First/Second Semester B.E. Degree Examination, Dec.2018/Jan.2019
Basic Electronics

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a. Explain the operation of PN junction diode under forward and reverse bias condition.
    (07 Marks)
    b. Discuss the load and line regulations using zener diode with neat circuit diagrams and appropriate expressions.
    (08 Marks)
    c. Design a 9V DC reference source consisting of a zener diode and series connected resistor to operate from a 24V supply. [$I_{ZT} = I_Z = 20$ mA].
    (05 Marks)

OR

2   a. With a neat circuit diagram, explain the operation of centre tapped full wave rectifier. Draw input and output waveforms.
    (07 Marks)
    b. Draw common emitter circuit, sketch input and output characteristics and explain three regions of operation.
    (08 Marks)
    c. Derive the relationship between α and β. Find I_C and I_E for the transistor with $\alpha = 0.99$ and $I_B = 20\mu A$.
    (05 Marks)

Module-2

3   a. Precisely analyse the circuit of voltage divider bias.
    (08 Marks)
    b. What is Op-Amp? List out the ideal and particle characteristics of Op-Amp.
    (07 Marks)
    c. Calculate the output voltage of a summer. Given : $R_1 = 200k\Omega$, $R_2 = 250k\Omega$, $R_3 = 500k\Omega$. $R_f = 1M\Omega$, $V_1 = -2V$, $V_2 = -1V$ and $V_3 = +3V$.
    (05 Marks)

OR

4   a. Design a base bias circuit to have $V_{CE} = 5V$ $I_C = 5mA$. The supply voltage is 15V and transistor has $h_{fe} = 100$.
    (07 Marks)
    b. Derive an expression for the voltage gain of inverting and Non-inverting amplifier.
    (08 Marks)
    c. Analyse the circuit of an op-amp as an integrator.
    (05 Marks)

Module-3

5   a. Interpret the following :
    i) $(48350)_{10} = (\quad)_{16} = (\quad)_8$

    ii) $(FACE)_{16} = (\quad)_2 = (\quad)_8$

    iii) $(847.951)_{10} = (\quad)_8$.
    (06 Marks)
    b. Write the logical symbol, truth table and Boolean expressions of all the logic gates :
    (AND, OR, NOT, NOR, NAND, EX-OR, EX-NOR).
    (09 Marks)
    c. Realize EX-OR gate using NAND gates only.
    (05 Marks)

OR

6 a. Which are the universal gates? Realize basic gates using universal gates? **(07 Marks)**
   b. Design a full adder using two half adder. Derive the necessary expressions. **(08 Marks)**
   c. Perform the subtraction using 2's complement method :
      i) $(11010)_2 - (10000)_2$
      ii) $(11)_{10} - (15)_{10}$. **(05 Marks)**

Module-4

7 a. With diagram and truth table explain NAND gate latch. **(06 Marks)**
   b. Explain the operation of 8051 microcontroller with neat block diagram. Mention the salient features. **(10 Marks)**
   c. Distinguish between flip-flop and latch. List out the applications of flip-flop. **(04 Marks)**

OR

8 a. Explain the operation of clocked RS flip-flop. **(07 Marks)**
   b. With a neat block diagram, explain microcontroller based stepper motor control system. **(07 Marks)**
   c. With a diagram and truth table, explain NOR Gate Latch. **(06 Marks)**

Module-5

9 a. What is modulation? Explain the need for modulation. **(04 Marks)**
   b. Derive the expression for frequency modulation with a neat waveforms. **(10 Marks)**
   c. Explain the piezoelectric and photo electric transducers. **(06 Marks)**

OR

10 a. Discuss the comparison between AM and FM modulation. **(06 Marks)**
    b. Explain the construction and principle of operation of LVDT. **(07 Marks)**
    c. A carrier of 1MHz, with 400 Watt of its power is amplitude modulated with a sinusoidal signal of 2500 Hz. The depth of modulation 75%. Calculate the side band frequencies, the band width, the power in the side bands and the total power in the modulated wave. **(07 Marks)**

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