NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: I - THEORY EXAMINATION (2024 - 2025)
Subject: Basic Electrical and Electronics Engineering

Time: 3 Hours   **Max. Marks: 100**

General Instructions:
IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*
*1. This Question paper comprises of **three Sections -A, B, & C.** It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A   20

1. Attempt all parts:-

1-a.   Consider a circuit with two unequal resistances in parallel, then (CO1,K1)   1

     (a)   large current flows in large resistor

     (b)   current is same in both

     (c)   potential difference across each is same

     (d)   smaller resistance has smaller conductance

1-b.   The superposition theorem is used when the circuit contains .... (CO1, K1)   1

     (a)   a single voltage source

     (b)   a number of voltage sources

     (c)   passive elements only

     (d)   none of the above

1-c.   The forward voltage drop across a silicon diode is about…………………(C02, K1)   1

     (a)   0.7

     (b)   7.7

     (c)   7

     (d)   0.07

1-d.   Which of the following is true for the saturation region of BJT transistor? (CO2, K1)   1

(a) The collector current is inversely proportional to the base current

(b) The collector current is proportional to the square root of the collector current

(c) The collector current is directly proportional to the base current

(d) None of the mentioned

1-e. According to boolean law: A + 1 = ? (CO3, K2)　　　　　　1

(a) 1

(b) A

(c) 0

(d) A'

1-f. What is the 2's complement of the binary number 111111? (CO3, K2)　　　　1

(a) 101001

(b) 101010

(c) 101100

(d) None of these

1-g. The output of SUM is equal to output of (CO4, K1)　　　　1

(a) OR gate

(b) AND gate

(c) X-OR gate

(d) X-Nor gate

1-h. What is a multiplexer? (CO4, K1)　　　　1

(a) It is a type of decoder which decodes several inputs and gives one output

(b) A multiplexer is a device which converts many signals into one

(c) It takes one input and results into many output

(d) It is a type of encoder which decodes several inputs and gives one output

1-i. To provide serial output , minimum clock pulse are used in SISO Register are_____(CO5, K2)　　　　1

(a) n+1

(b) n-1

(c) n

(d) 2n-1

1-j. Asynchronous circuit is also called _____ circuit.(CO5, K1)　　　　1

(a) Combinational

(b) Self-timed

(c) Clock circuit

(d) Delayed

2. Attempt all parts:-

2.a. Define Linear and non-linear elements. (CO1, K1)　　　　2

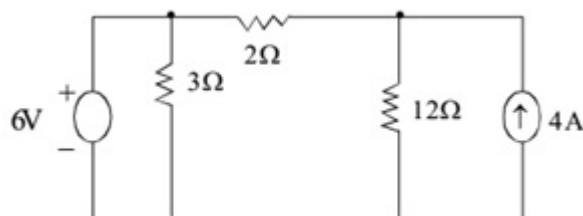2.b. Derive expression $\gamma = \beta + 1$ in reference to BJT . (CO2, K2)　　　　2

2.c.	Convert 10100110 to gray code. (CO3, K2)	2
2.d.	Design a logic diagram of 1X2 lines de-multiplexer with its truth table. (CO4, K2)	2
2.e.	What is meant by the term "edge triggered"?(CO5, K1)	2

SECTION-B 30
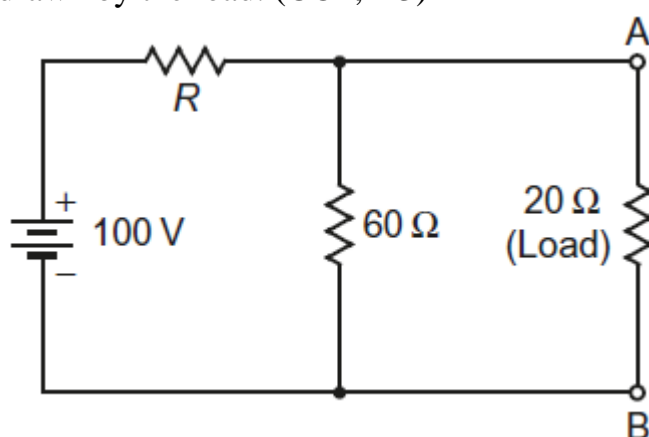
3. Answer any <u>five</u> of the following:-

3-a. Calculate currents in all the resistance of the circuit using nodal analysis method.(CO1, K3) 6

3-b. Consider the electric circuit shown in Figure Determine the value of R so that load of 20 Ω should draw the maximum power and the value of the maximum power drawn by the load. (CO1, K3) 6


3-c. With neat and clean energy band diagram classify conductors, semiconductors and Insulators. (CO2, K1) 6

3-d. Draw the circuit diagram of Full Wave Rectifier (Bridge) and explain its operation with output waveforms. (CO2, K2) 6

3.e. make the following conversions:(CO3, K3) 6

$(1001101001)_2 = (\quad)_{10}$

$(101001)_2 = (\quad)_{BCD}$
$(2AC)_{16} = (\quad)_2$
$(412)_8 = (\quad)_2$

$(21B7)_{16} = (\quad)_{10}$
$(525.75)_{10} = (\quad)_2$

3.f. Implement the function using 4:1 MUX. F=min(1,3,4,6,7) (CO4, K3) 6

3.g. Explain the working of serial in serial out (SISO) shift register in detail.(CO5, K1) 6

SECTION-C 50

4. Answer any <u>one</u> of the following:-

4-a. A household uses the following electric appliances:(a) Refrigerator of rating 500   10
W for 12 hours each day.(CO1, K2)
(b) three electric fans of rating 70 W each for twelve hours each day.
(c) five electric tubes of rating 32 W each for 6 hours each day.
Calculate the electricity bill of the household for the month of may if the cost per
unit of electric energy is ₹ 5.50.

4-b. Using mesh equation method, find current in the resistance R1 of the network   10
shown in Figure (CO1, K3)
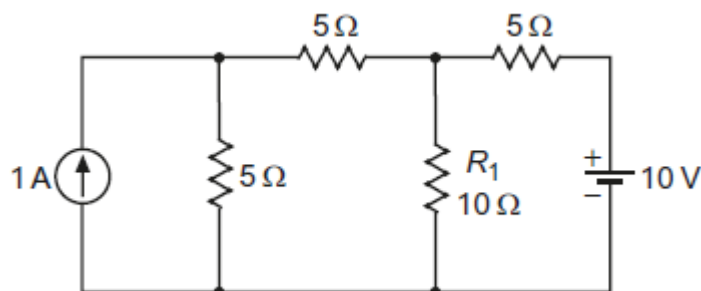
5. Answer any <u>one</u> of the following:-

5-a. Why biasing is necessary for transistor? List the name of various methods of   10
biasing and explain voltage divider biasing. (CO2, K3)

5-b. Draw and explain the input and output characteristics of CE configuration of BJT.   10
Indicate all the region of operations. (CO2, K3)

6. Answer any <u>one</u> of the following:-

6-a. Draw the logic circuit and make truth table for : F(A,B,C) =A'+A'C+B(A'+C)   10
(CO3, K2)

6-b. Simplify the logic function F (A, B, C, D) = ∑ m(0,1,3,5, 8,10, 11, 13, 15)   10
using K-map in SOP and draw circuit using various gates. What
are the don't care conditions for any logical circuit (CO3, K2)

7. Answer any <u>one</u> of the following:-

7-a. Explain full subtractor circuit and find out its output. How can it be realized using   10
two half- subtractors. (CO4, K1)

7-b. Explain and design BCD to gray code conversion circuit.(CO4, K2)   10

8. Answer any <u>one</u> of the following:-

8-a. How do different types of memory devices, such as RAM, ROM in terms of their   10
applications, data volatility, and performance characteristics, and how do these
differences impact their usage in modern computing systems?(CO5, K1)

8-b. Draw circuit of JK flip flop using NAND gate and write its truth table,   10
characteristic table and characteristic equaton. How can we overcome race around
condition of JK flip flop?(CO5, K1)