Printed Page:-04 Subject Code:- BEC0201Z /BECH0201Z

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - 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. A 2 kW water heater operates 8 hrs per day, If the cost of each unit is Rs. 3.00 per unit, then calculate the total bill for one month (30 days), assuming the charges for the first 100 units are nil.(CO1,K3) 1

(a) Rs. 1140.00

(b) Rs. 1040.00

(c) Rs. 1440.00

(d) Rs. 1540.00

1-b. Which of the following theorems is applicable for both linear and nonlinear circuits? (CO1,K1) 1

(a) Superposition

(b) Thevenin's

(c) Norton's

(d) None of these

1-c. An ideal diode in the conducting state is equivalent to…… (CO2,K1) 1

(a) a resistor

(b) a capacitance

(c) a closed switch

(d) an open switch

1-d. Ripple factor of Full Wave Rectifier is: ….....(CO2,K1) 1

(a) 0.483
(b) 0.383
(c) 0.283
(d) 0.83

1-e. The output of an OR gate is LOW when:(CO3,K1) 1

(a) All inputs are HIGH
(b) Any input is LOW
(c) All inputs are LOW
(d) Any input is HIGH

1-f. How many cells are there in a 4-variable K-map?(CO3,K3) 1

(a) 2
(b) 4
(c) 8
(d) 16

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

(a) $X \bullet Y \bullet Z$
(b) X + Y + Z
(c) $X + Y \bullet Z$
(d) $X \oplus Y \oplus Z$

1-h. Encoder is a combinational circuit that has 2^n input lines and ____ output lines. (CO4,K2) 1

(a) 1
(b) 2n
(c) n
(d) none of these

1-i. To provide serial output , minimum clock pulse are used in SIPO Register are_____.(CO5,K1) 1

(a) n
(b) n-1
(c) 0
(d) 2n-1

1-j. In JK flip flop output will be invalid when _____.(CO5,K1) 1

(a) J=1,K=0
(b) J=0,K=1
(c) J=1,K=1
(d) None of These

2. Attempt all parts:-

2.a. Two resistor of 4Ω and 6Ω are connected in parallel. If the total current is 30 A. 2

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find the curent through each resistor. (CO1,K1)

2.b. In a BJT with $\beta = 100$, calculate the value of α. ……(CO2.K2) 2

2.c. Encode the decimal number 46 to XS3 code. (CO3,K3) 2

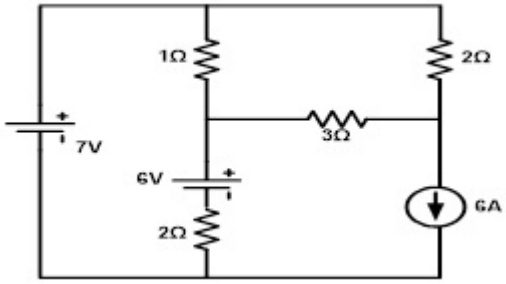
2.d. What are the combinational logic circuits. (CO4,K2) 2

2.e. What do you mean by the term triggering. What is edge triggered?(CO5,K1) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Find the current in all the branches using mesh analysis in given circuit. (CO1,K1) 6



3-b. Explain the general layout and components of power system with neat sketch.(CO1,K1) 6

3-c. Define the term α and β with respect to BJT. Derive the relationship between them. (CO2,K2) 6

3-d. How depletion layer is formed in PN junction .Enumerate your answer with neat levelled diagram in both forward and reverse bias .(CO2,K2) 6

3.e. Perform the following conversion. (CO3,K3) 6
(1)$(10100101110000)_2=(\ )_8$ (ii) $(222)_8=(\ )_2$ (iii) $(65)_{10}=(\ )_8$ (iv) 2's complement of 0111001 (v) $(546)_{10}=(\ )_{16}$ (vi) $(17)_{10}$=XS3

3.f. Design a circuit for full subtractor with logic expression. How it can be implemented using half subtractor? (CO4,k3) 6

3.g. What is the difference between synchronous and asynchronous counters?(CO5,K1) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. State and prove maximum power transfer theorem. Also mention the limitation of Superposition theorem? (CO1,K1) 10

4-b. Calculate the amount of electrical energy consumption for a month of 30 days in household of 220 V line with the following appliances being used: (a) five 60 W bulb for six hours. (b) two 1000W heater for 2 hours. (c) 750 w electric iron for 2 hours.(d) 100W refrigerator for 24 hours. (e) 1100W microwave oven for 3hours. The cost of first 200 units is Rs 2.40 and next 200 units is rupees 3.90 per unit respectively .(CO1,K2) 10

5. Answer any one of the following:-

5-a. Draw and explain the working of Full wave bridge rectifier. Calculate its 10

efficiency showing the outputs.(CO2,K2)

5-b. Draw and explain the input and output characteristics of CE configuration of BJT. Indicate all the region of operations.(CO2,K2) 10

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

6-a. (i) Draw the truth table of De-Morgan's Law showing (A.B)'=A'+B' (CO3,K2) 10
(II) Draw 8:1 multiplexer using 2:1 multiplexer showing data and select lines. (CO3,K2)

6-b. Simplify the logic function F(A,B,C,D)=∑m(3,5,6,11,13.14.15)+d(4,9,10) using K-Map. Also express it in POS (CO3,K3) 10

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

7-a. Design a circuit with logic expression to enumerate the mathematical operation using 2bit Comparator. (CO4,K3) 10

7-b. Design a 8:1 MUX using the function F(A,B,C,D)= ∑m(0,1,5,6,10,12,14,15) taking ACD as select lines and B as data lines.(CO4,K3) 10

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

8-a. Realize JK Flip flop deriving their characteristics equations and excitation table(CO5,K2). 10

8-b. What is registers. Explain the working SISO and PISO with timing diagram. (CO5,K3) 10

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