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Subject Code:- AEC0101/AECH0101

Roll. No:

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - CARRY OVER THEORY EXAMINATION - MAY 2023

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. Application of Norton's theorem to a circuit yields..... (CO1) 1
- (a) Equivalent current source and impedance in series
 - (b) Equivalent current source and impedance in parallel
 - (c) Equivalent impedance
 - (d) Equivalent current source
- 1-b. An active element in a circuit is.... (CO1) 1
- (a) Current source
 - (b) Resistance
 - (c) Inductance
 - (d) Capacitance
- 1-c. A sinusoidal voltage has peak to peak value of 100 V. The rms value is (CO2) 1
- (a) 50
 - (b) 70.7
 - (c) 35.35

- (d) 141.41
- 1-d. In an ac circuit, the maximum and minimum values of power factor can be (CO2) 1
- (a) 2 and 0
 - (b) 1 and zero
 - (c) 0 and -1
 - (d) 1 and -1
- 1-e. What is the energy usage of a 1000 watt hair dryer used for 10 minutes straight? (CO3) 1
- (a) 1000 watt x 10 minutes = 10 kWh
 - (b) 1000 watts/10 min = 100 kW/h
 - (c) 1000 watts x 10 minutes = 100,000 kWh
 - (d) None of the above
- 1-f. In a transformer $N_1=100$, $N_2=1000$. Value of transformation ratio will be _____ (CO3) 1
- (a) 0.1
 - (b) 0.001
 - (c) 10
 - (d) 100
- 1-g. Which of the following is not a characteristic of LED? (CO4) 1
- (a) Fast action
 - (b) High Warm-up time
 - (c) Low operational voltage
 - (d) Long life
- 1-h. The average load voltage of FWR is.....(CO4) 1
- (a) V_m/π
 - (b) $2V_m/\pi$
 - (c) 0
 - (d) None of these
- 1-i. The input offset current is defined as (CO5) 1
- (a) $I_{B1} + I_{B2}$
 - (b) $I_{B1} - I_{B2}$
 - (c) $I_{B1} \times I_{B2}$

(d) None of these

- 1-j. The closed loop voltage gain of circuit is always greater than 1. (CO5) 1
- (a) Inverting Amplifier
- (b) Voltage Follower
- (c) Non-Inverting Amplifier
- (d) None of these

2. Attempt all parts:-

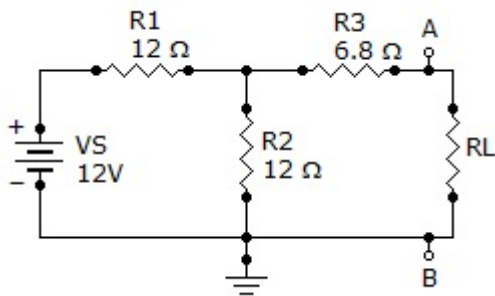
- 2.a. Three equal resistance of 5Ω are connected in star. Find resistance in each branch of the equivalent delta. (CO1) 2
- 2.b. With the help of phasors, explain why inductors and capacitors never consumes power. (CO2) 2
- 2.c. How eddy loss can be reduced? (CO3) 2
- 2.d. What is reverse saturation current? (CO4) 2
- 2.e. Define CMRR and Slew Rate for an Op-Amp. (CO5) 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) 6
- 3-b. Find the Norton circuit, that is, I_N and R_N , for the circuit given below. (CO1) 6



- 3-c. Derive RMS and Average values of half and full wave rectifier output waveform. (CO2) 6
- 3-d. Explain Frequency vs Current graph in series resonance and explain different zones. (CO2) 6
- 3.e. Calculate the energy consumption per day in a house using 5 CFLs of 20 W each, 3 Fans of 60 W each, for 3 hours a day. (CO3) 6
- 3.f. Describe Avalanche and Zener Breakdown in a zener diode. (CO4) 6
- 3.g. Analyze the differential amplifier with suitable circuit in two modes of operation. (CO5) 6

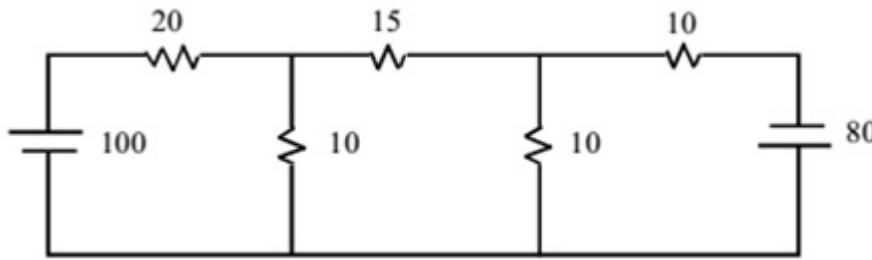
SECTION C

50

4. Answer any one of the following:-

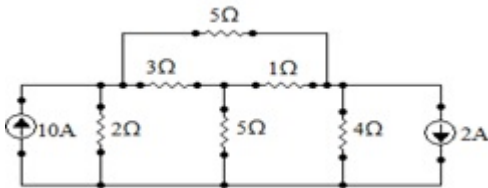
- 4-a. Find the current in various branches of circuit. Using mesh Analysis. (CO1)

10



- 4-b. Find the current through various resistors using nodal analysis. (CO1)

10



5. Answer any one of the following:-

- 5-a. Parallel combination of two impedances $Z_1=10+j5\Omega$ and $Z_2= 8-j6\Omega$ are connected in series impedance of $Z_3= (8+j10)\Omega$ across a voltage of $V= (200+j0)$ V. Calculate circuit current, power factor and reactive power.(CO2)
- 5-b. An alternating voltage is expressed as $v = 141.4 \sin (314t)$. Find: (a) Frequency (b) rms value (c) average value(d) Voltage after 3m sec (d) Time taken by the voltage to reach 100V for the first time after crossing through zero.(CO2)

6. Answer any one of the following:-

- 6-a. Calculate the Electricity bill of the house for the month of July with following load data of one day: a. An AC of 1500 W is operated for 120 Minutes. b. A Washing Machine of 300 W is operated for 40 Minutes. c.A Toaster of 1000 W is operated for 15 Minutes. d.Two Fluorescent light of 40 W each is operated for 8 Hours. e. Three Fans of 60 W is operated for 4 Hours.(Use the cost per unit of electricity as Rs 6 in your calculations) (CO3)
- 6-b. Draw single line diagram of power system and explain different components and voltage level. (CO3)

7. Answer any one of the following:-

- 7-a. Write short notes on a) n-type semiconductor b) p-type semiconductor c) potential Barrier d) Effect of temperature on conductivity of a Semiconductor. (CO4)
- 7-b. What is the working principle of Light Emitting Diode? Give its advantages and Disadvantages. (CO4)

8. Answer any one of the following:-

- 8-a. How will you generate a triangular waveform using Op-Amp circuit. Draw circuit and explain its working. (CO5) 10
- 8-b. Explain the operation of inverting and non-inverting amplifier with the necessary diagram. (CO5) 10

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