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Subject Code:- AEC0201

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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)  $V_m/\pi$
  - (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:-**

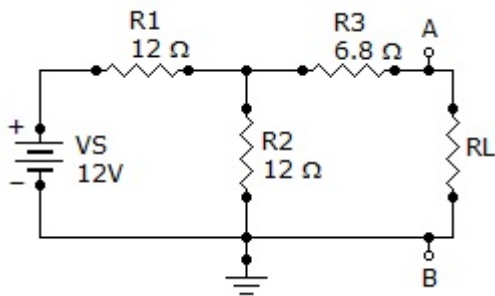
- 2.a. Three equal resistance of  $5\Omega$  are connected in star. Find resistance in each branch of the equivalent delta. (CO1) 2
- 2.b. With the help of phasors, explain why inductors and capacitors never consumes power. (CO2) 2
- 2.c. How eddy loss can be reduced? (CO3) 2
- 2.d. What is reverse saturation 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

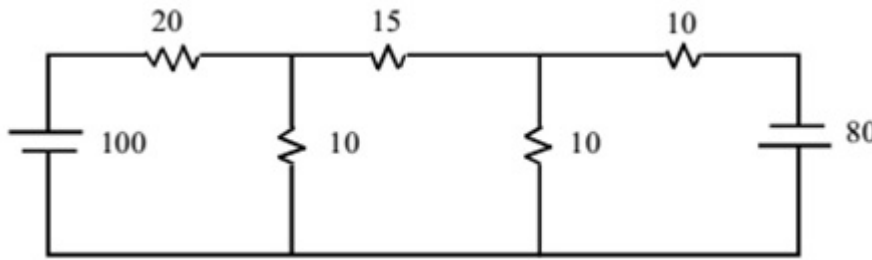
**SECTION C**

**50**

**4. Answer any one of the following:-**

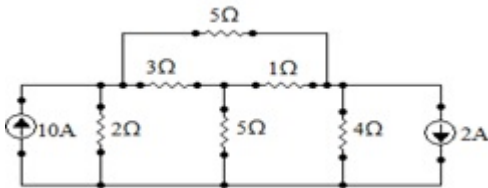
- 4-a. Find the current in various branches of circuit. Using mesh Analysis. (CO1)

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) 10
- 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) 10

**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) 10
- 6-b. Draw single line diagram of power system and explain different components and voltage level. (CO3) 10

**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) 10
- 7-b. What is the working principle of Light Emitting Diode? Give its advantages and Disadvantages. (CO4) 10

**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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