Printed Page:-

Subject Code:- AMIEC0101

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech (Integrated)

SEM: I - THEORY EXAMINATION (2022 - 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. Consider a circuit with two unequal resistances in parallel, then (CO1) 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. By using source transformation voltage source in series resistor is replaced by __________(CO1) 1

(a) Voltage source in series with a resistor

(b) Current source in parallel with a resistor

(c) Voltage source in parallel with a resistor

(d) Current source in series with a resistor

1-c. In power triangle VICosΦ is referred as (CO2) 1

(a) true power

(b) reactive power

(c) apparent power

(d) none of the above

1-d.	The power factor at resonance in R-L-C parallel circuit is(CO2) (a) Zero (b) 0.08 lagging (c) 0.8 leading (d) Unity	1
1-e.	For a transformer with primary turns 600, secondary turns 200, if 30A current is flowing through primary, we will get ___________(CO3) (a) 900A at secondary (b) 90A at secondary (c) 10A (d) 5A	1
1-f.	An oven with a power rating of 3600 Watt is used to bake a cake for 1 hour. What is its energy consumption (CO3) (a) 0.36 kWh (b) 3.6 kWh (c) 36 kWh (d) 3.60 kWh	1
1-g.	The cut in voltage for Si diode is (CO4) (a) 0.5 V (b) 0.7 V (c) 1.1 V (d) 0.3 V	1
1-h.	The input offset current is .... the input bias current. (CO5) (a) Less than (b) Greater than (c) Equal to (d) None of these	1
1-i.	Which of the following consumes less power?(CO4) (a) Incandescent lamp (b) LCD (c) Fluorescent tube	1

(d) LED

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. Define Active & Passive elements. (CO1) 2

2.b. An ac series circuit has R=60 ohm, XL=20 ohm, XC=12 ohm, Calculate the value of power factor of the circuit. (CO2) 2

2.c. What is the difference between SFU and MCB?(CO3) 2

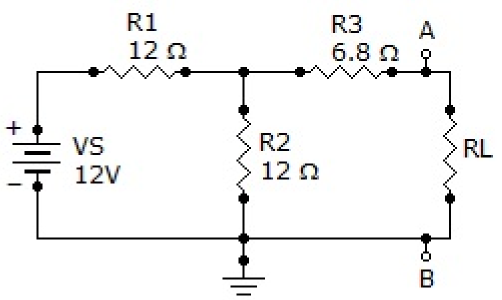
2.d. What are donor and acceptor impurities?(CO4) 2

2.e. Write down the Ideal characteristics of op-amp (CO5) 2

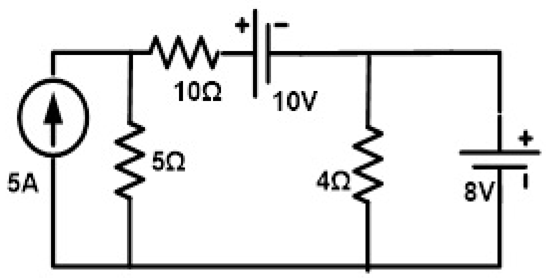
SECTION B **30**

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

3.a. Find the Norton circuit, that is, IN and RN, for the circuit given for load resistance RL. (CO1) 6



3.b. Determine the current in all the branches using nodal analysis. (CO1) 6



3.c. Find the relationships between line current and phase current in a delta connected system. (CO2) 6

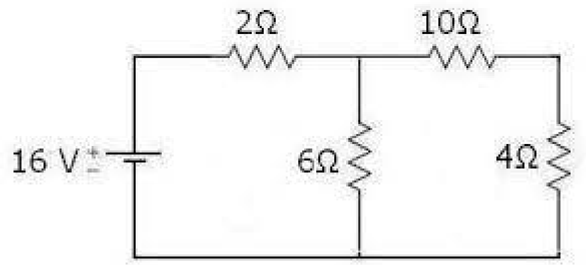
3.d. The instantaneous equation of an alternating current is i = 42.42 sin (628t). Determine:(a) Maximum Current (b) Frequency (c) RMS Current (d) Average Current (e) Form Factor (f) Peak Factor (CO2) 6

3.e.	Discuss the various levels of power system. (CO3)	6
3.f.	Explain the formation of the Depletion layer. (CO4)	6
3.g.	Design a circuit with one op-amp that provides a gain of 5.5. Assume you have a resistor Ri =10kΩ, what value would you choose for Rf? (CO5)	6

SECTION C **50**

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

4.a.	Derive the expression for Star to Delta transformation. (CO1)	10
4.b	Determine the current in 6-Ω resistor of the network shown in Figure.(CO1)	10



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

5.a.	A series RLC circuit has R = 5 Ω, L = 0.2 H and C = 50 μF. The applied voltage is 200 V. Find (i) resonant frequency (ii) Q-factor (iii) bandwidth (iv) upper and lower half-power frequencies (v) current at resonance (vi) current at half-power points (vii) voltage across inductance at resonance. (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 (e) Time taken by the voltage to reach 100V for the first time after crossing through zero (CO2)	10

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

6.a.	Derive the condition of maximum efficiency of single phase transformer. The efficiency of a 400 KVA transformer is 98.77% at full-load, 0.8 p.f and 99.13% at half-load, unity p.f. Find iron loss & cu loss at both full load & half load. (CO3)	10
6.b.	Derive the emf equation of a single phase transformer also explain its principle and working. (CO3)	10

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

7.a.	Draw and explain the characteristics of a PN junction diode and also write diode current equation. (CO4)	10
7.b.	Draw the circuit and discuss working of full wave bridge rectifier with suitable input-output waveform. What is PIV of bridge rectifier? (CO4)	10

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

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8.a.	Show that how input voltage gets reversed using operational amplifier. Also derive the expression for voltage gain using inverting amplifier.(CO5)	10
8.b.	Explain the working of digital multimeter(DMM) using block diagram. Also write it's applications (CO5)	10