Printed Page:- 05 **Subject Code:- BMIEC0201**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech (Integrated)

SEM: II - THEORY EXAMINATION (2023 - 2024)

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. Three 2 ohm resistors are connected to form a triangle. The resistance between any two corners is (CO1) 1

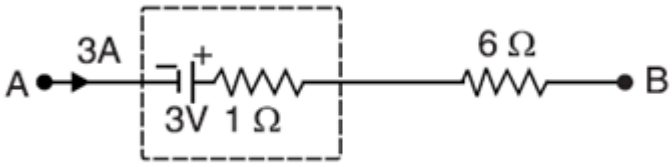
(a) 6Ω

(b) 2Ω

(c) 3/4Ω

(d) 4/3Ω

1-b. Figure shown below represents a part of a closed circuit. The potential difference between A and B (i.e. VA – VB) is (CO1) 1



(a) 24 V

(b) 0

(c) 18 V

(d) 6 V

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. The average value of 2A DC current is (CO2) 1

(a) 1

(b) 2

(c) 3

(d) 4

1-e. An ideal transformer will have maximum efficiency at a load such that _____(CO3) 1

(a) copper loss > iron loss

(b) cannot be determined

(c) copper loss = iron loss

(d) copper loss < iron loss

1-f. Which of the following losses varies with the load in the transformer?(CO3) 1

(a) Core loss

(b) Copper loss

(c) Both core & copper loss

(d) None of the above

1-g. Ripple factor of Half Wave Rectifier is: (CO4) 1

(a) 3.21

(b) 2.21

(c) 1.21

(d) 0.21

1-h. In 7 segment display, how many LEDs are used? (CO4) 1

(a) 8

(b) 10

(c) 9

(d) 7

1-i. Op - Amp is a ..... amplifier. (CO5) 1

(a) Single Stage

(b) Double Stage

(c) Multistage

(d) None of these

1-j. What is the primary purpose of a humidity sensor in an IoT weather monitoring station? (CO5) 1

(a) To measure the speed of wind

(b) To detect rainfall

(c) To measure the moisture content in the air

(d) To monitor barometric pressure

2. Attempt all parts:-

2.a. State superposition theorem. (CO1) 2

2.b. Derive the expression to calculate resonant frequency in series resonance. (CO2) 2

2.c. Draw the no load equivalent circuit of transformer. (CO3) 2

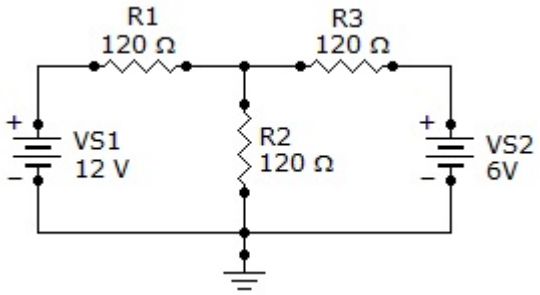
2.d. Write four applications of LED. (CO4) 2

2.e. Define differential and common mode gain. (CO5) 2

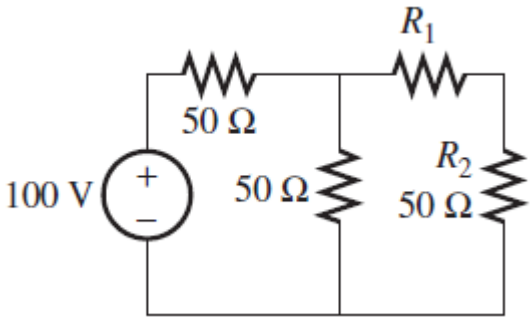
SECTION B **30**

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

3-a. Find the current in R2 of the given circuit, using the superposition theorem.(CO1) 6



3-b. Find the resistance R1 in Figure ,to transfer maximum power to R2 . (CO1) 6

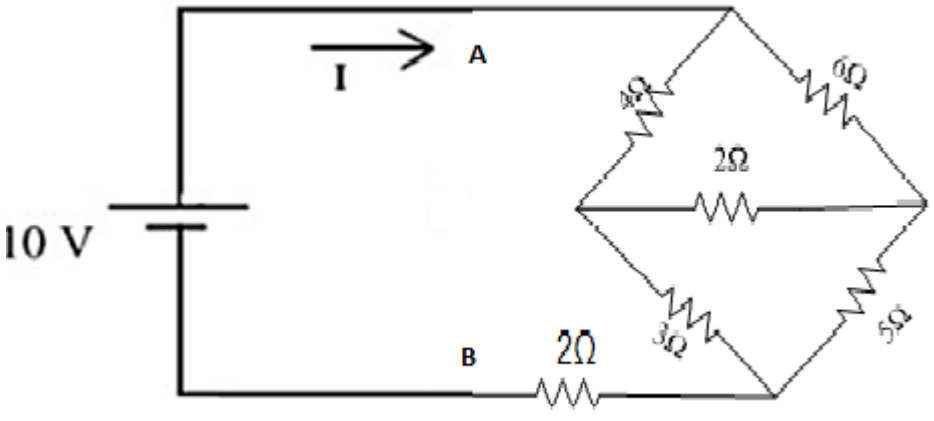


3-c.	For an AC circuit expression of voltage and current are given as v = 200 sin (377t) V and i = 8 sin (377t – 30) A respectively. Find: (a) Power Factor (b) True Power (c) Apparent Power (d) Reactive Power (CO2)	6
3-d.	Calculate the total bill generated for the month of may if the price for one unit is Rs7.The loads are given as follows: (1) five tube light of 40W each working for 6hrs (2) one toaster of 1KW for 15mins (3) 2 AC of 1.5KW for 4hrs (4) Regridgerator of 150W working for 24Hrs (ON for 8Hrs) (5) 750 W Motor for 30Mins. (CO2)	6
3.e.	The efficiency of 200 kVA single phase transformer is 94.77% when delivering full-load at 0.8 power factor and 98.13% at half-load at unity power factor. Calculate iron losses and full load copper losses. (CO3)	6
3.f.	Explain the following terms: (a) Potential Barrier (b) Knee Voltage (c) PIV (d) Reverse bias (CO4)	6
3.g.	Explain the charachteristics of an ideal Op-Amp. Give value for these for IC741.(CO5)	6

SECTION C **50**

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

4-a.	State and prove maximum power transfer theorem. Enumerate limitations of Superposition theorem (CO1)	10
4-b.	Using star-delta transformation, find the current I in the given circuit. Consider all the values of resistances are in ohms. (CO1)	10



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

5-a.	A coil of resistance 8 Ω and inductance 0.12 H is connected in series with a loss free capacitor of 140 μF capacitance. The circuit is then connected across 230 V, 50 Hz AC supply. Determine:(a) Impedance of entire circuit (b) Current through capacitor (c) Power Factor of the circuit (d) Voltage across capacitor (CO2)	10
5-b.	Two impedances given by Z1 = 5 + j10 Ω and Z2 = 10 – j15 Ω , are connected in	10

parallel. If the total current supplied is 20 A, then find (i) current taken by each branch, (ii) power factor, (iii) power consumed in each branch. (CO2)

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

6-a. Compare the conventional and non-conventional energy source based power generating plants along with their advantages and disadvantages.(CO3) 10

6-b. In a 25 kVA, 2000 V/200 V transformer the iron and copper losses are 350 W and 400W respectively. Calculate the efficiency of half load and 0.8 pf. lagging. Also determine the maximum efficiency and corresponding load KVA.(CO3) 10

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

7-a. Write Short note on : a) LED b) LCD c) OLED. (CO4) 10

7-b. A crystal diode having internal resistance rf = 20Ω is used for half-wave rectification. If the applied voltage v = 50 sin ω t and load resistance RL= 800 Ω, find : (i) Im, Idc, Irms (ii) a.c. power input and d.c. power output (iii) d.c. output voltage (iv) efficiency of rectification. (CO4) 10

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

8-a. Define CMMR of a differential amplifier. Design an adder circuit using an op-amp to give the output Vo= -(V1+4V2+8V3); where V1 , V2 and V3 are the three inputs. (CO5) 10

8-b. Draw the Block diagram of Digital multimeter. Give some aaplication of DMM. (CO5) 10