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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: I - CARRY OVER THEORY EXAMINATION - AUGUST 2022

Subject: Basic Electrical and Electronics Engineering

Time: 3 Hours   Max. Marks: 100

General Instructions:

1. The question paper comprises three sections, A, B, and C. You are expected to answer them as directed.

2. Section A - Question No- 1 is 1 marker & Question No- 2 carries 2 marks each.

3. Section B - Question No-3 is based on external choice carrying 6 marks each.

4. Section C - Questions No. 4-8 are within unit choice questions carrying 10 marks each.

5. 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   Three equal resistances of value R are connected in star. If this star is converted into   1
equivalent delta, the resistance value of delta networks will be.......(CO1)

         (a) R/3

         (b) Zero

         (c) 3R

         (d) None of the above

1   Which of the following theorems is applicable for both linear and nonlinear circuits? (CO1)   1

         (a) Superposition

         (b) Thevenin's

         (c) Norton's

         (d) None of these

1-c.   What is the form factor of a square wave(CO2)   1

         (a) 1

         (b) 2

         (c) 1.1

(d) 3

1-d.   The capacitive reactance is ….. of frequency (CO2)   1

        (a) directly proportional

        (b) indirectly proportional

        (c) independent

        (d) none of above

1-e.   An inverter converts _____.   (CO3)   1

        (a) AC to DC

        (b) DC to AC

        (c) DC to AC and vice-versa

        (d) AC to AC (with changed frequency)

1-f.   How to reduce eddy current loss in transformer?   (CO3)   1

        (a) By using thin laminated strips

        (b) By using soft magnetic material

        (c) By using hard magnetic material

        (d) By using solid piece of magnetic material

1-g.   The full form of LCD is _____. (CO4)   1

        (a) Liquid Crystal Display

        (b) Liquid Crystalline Display

        (c) Logical Crystal Display

        (d) Logical Crystalline Display

1-h.   The clipper circuit are used for………… (CO4)   1

        (a) Rectification

        (b) Removal of a part from the applied waveform

        (c) Shifting of DC level

        (d) None of these

1-i.   The controlling of light by smartphone is the application of ………….. (CO5)   1

        (a) Internet of Things

        (b) Machine Learning

        (c) Artificial Intelligence

        (d) Cloud Computing

1-j.   The input offset current is defined as .... (CO5)   1

        (a) IB1 + IB2

        (b) IB1 - IB2

        (c) IB1 x IB2

        (d) None of these

2. Attempt all parts:-

2.a.   State the Superposition theorem. (CO1)   2

2.b.   If the bandwidth of a resonant circuit is 10 KHz and lower half frequency is 120 KHz, Find   2
the upper half frequency and Quality Factor.(CO2)

2.c.   In a transformer copper loss at full load is 1000 watt. then copper loss at half load is....(CO3)   2

2.d.   What do you mean by depletion layer? (with respect to p-n Junction) (CO4)   2

2.e.   What are the characteristics of an ideal Operational Amplifier ? (CO5)   2

<div align="center">SECTION B</div>   30

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

3-a.   State and prove maximum power transfer theorem. (CO1)   6

3-b.   Calculate the currents and voltages of all the resistance of the circuit using nodal analysis   6
method. (CO1)
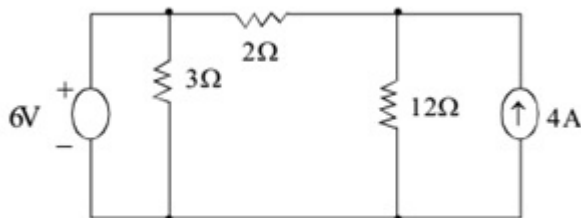
3-c.   Calculate the average and rms values for half and full wave rectifier.(CO2)   6

3-d.   In parallel Resonant circuit (tank circuit) if R=50 ohm, L=0.1H and C=140F,   6
Calculate(a)Quality Factor (b) Impedance at resonance (c)Band width.(CO2)

3-e.   Derive the e.m.f equation of a single phase transformer .Also mention different types of   6
losses occur in it.   (CO3)

3.f.   6

    1. For the Zenar Diode network, Determine V_L, V_R, I_Z and P_Z.

    2. Repeat part 1 with R_L=3 kΩ

(Refer Figure Below) (CO4)
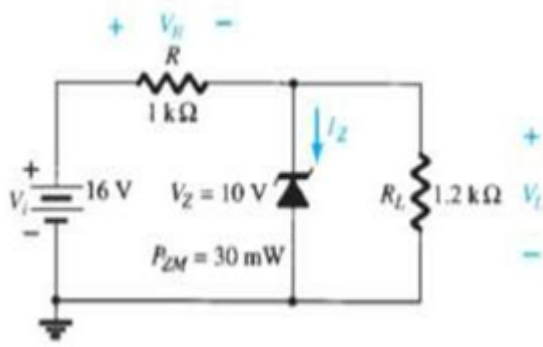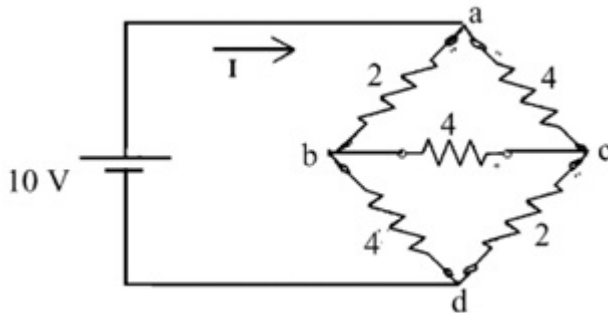
3.g.   Give the characteristics of an ideal Operational Amplifier. Also draw its transfer   6
        characteristics . (CO5)

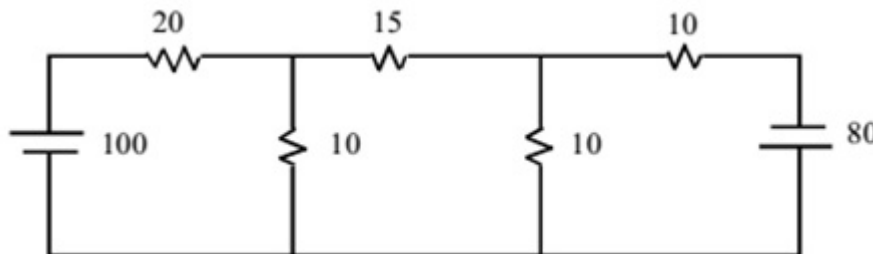   SECTION C   50

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

4-a.   Using star-delta transformation, find the current in the branch b-c of the circuit. Consider all   10
        the values of resistances are in ohms. (CO1)

4-b.   Find the current in various branches of circuit. Using mesh Analysis. (CO1)   10

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

5-a.   The instantaneous values of the alternating voltages are represented as $V_1 = 60 \sin \omega t$, $V_2 =$ 10
        $40 \sin (\omega t - \pi/3)$ and $V_3 = 90 \sin (\omega t + \pi/6)$. Derive the expression of voltage as sum
        and difference of given voltages.(CO2)

5-b.   A balanced delta-connected load of $(12+j9)$ ohm is connected to a 3- phase 400V supply,   10
        calculate line current, power factor and power drawn by it.(CO2)

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

6-a.   Calculate the Electricity bill of the house for the month of July with following load data of   10
        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   10
            level.   (CO3)

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

7-a.   Write short notes on a) n-type semiconductor b) p-type semiconductor c) potential Barrier d)   10
            Effect of temperature on conductivity of a Semiconductor. (CO4)

7-b.   Write Short notes on : (CO4)   10

                1. LED Display
                2. LCD
                3. OLED
                4. 7-Segment Display

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

8-a.   Derive the output voltage of a differentiator circuit.. and hence find the expression for output   10
            voltage Vo for a differentiator having R =100 kΩ and C =0.1μF. Given that input voltage
            Vin =5t Volts. Also draw the waveform of the output voltage. (CO5)

8-b.   Explain the working of Digital Voltmeter with proper block diagram. What is difference   10
            between sensors and transducers? (CO5)