NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute)
Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow
B.Tech
SEM: I - THEORY EXAMINATION (2021 - 2022)
Subject: Basic Electrical and Electronics Engineering

Time: 03:00 Hours   Max. Marks: 100

General Instructions:

1. All questions are compulsory. It comprises three Sections A, B and C.

- Section A - Question No- 1 is objective type question carrying 1 mark each & Question No- 2 is very short type questions carrying 2 marks each.
- Section B - Question No- 3 is Long answer type - I questions carrying 6 marks each.
- Section C - Question No- 4 to 8 are Long answer type - II questions carrying 10 marks each.
- 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.   Find the Thevenin equivalent (V_{TH} and R_{TH}) between terminals A and B of the   1
         circuit given below…......(CO1)
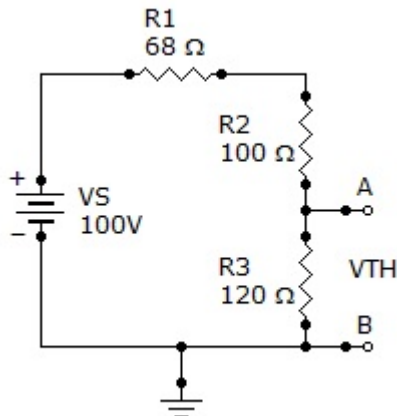
         1. 4.167 V, 120Ω
         2. 41.67 V, 120Ω
         3. 4.167 V, 70Ω
         4. 41.67 V, 70Ω

1-b.   Consider a circuit with two unequal resistances in parallel, then …... (CO1)   1
         1. large current flows in large resistor
         2. current is same in both
         3. potential difference across each is same
         4. smaller resistance has smaller conductance

1-c.   An series ac circuit has R=6ohm,X_L=20ohm,X_C=12ohm,The circuit p.f is (CO2)   1
         1. 0.8
         2. 0.6
         3. 0.5

4. none of above

1-d. The average value of 2A DC current is (CO2)   1
        1. 1
        2. 2
        3. 3
        4. 4

1-e. A fuse has _____.   (CO3)   1
        1. High Resistivity and Low Melting Point
        2. Low Resistivity and High Melting Point
        3. High Resistivity and High Melting Point
        4. Low Resistivity and Low Melting Point

1-f. Which of the following losses varies with the load in the transformer?   (CO3)   1
        1. Core loss
        2. Copper loss
        3. Both core & copper loss
        4. None of the above

1-g. If the voltage of the potential barrier is V_O. A voltage V is applied to the input, at what   1
moment will the barrier disappear? (CO4)
        1. $V < V_O$
        2. $V = V_O$
        3. $V > V_O$
        4. $V << V0$

1-h. The reverse saturation current in Si diode is the order of………….(CO4)   1
        1. 10^{-09}
        2. 10^{-06}
        3. 10^{-11}
        4. None of these

1-i. An inverting amplifier having feedback path resistance of 10KΩ and series input   1
resistnace of 1KΩ, has a gain of ……… (CO5)
        1. -0.1
        2. 0.1
        3. -10
        4. 10

1-j. The input offset current is defined as …………… (CO5)   1
        1. IB1 + IB2
        2. IB1 - IB2
        3. IB1 x IB2
        4. None of these

2. Attempt all parts:-

2-a. Two resistor of 4Ω and 6Ω are connected in parallel. If the total current is 30 A. find   2
the curent through each resistor. (CO1)

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

2-c. In a transformer full load copper loss is 1200 watt and iron loss is 800 watt . find the   2
percentage of full load at which maximum efficiency occurs.   (CO3)

2-d. Find ripple factor for the output of Half Wave Rectifier circuit. (CO4)   2

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

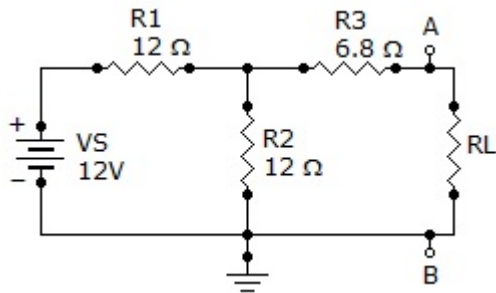SECTION B   30

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

3-a.   Derive the expression for Star to Delta transformation.(CO1)   6

3-b.   Obtain the equivalent Norton circuit and also calculate I_N and R_N, for the circuit   6
given below. (CO1)

3-c.   A capacitor of capacitance 79.5μF is connected in series with non-inductive   6
resistance of 30 ohm across 100V,50Hz supply. Find (i) Impedance (ii) current (iii)
phase angle (iv)equation for instantaneous current.(CO2)

3-d.   Derive the relationship between phase and line current in 3-ϕ Delta connection.   6
(CO2)

3-e.   The primary and secondary windings of a 40kVA, 6600/250 V single phase   6
transformer have resistances of 10Ω and 0.02Ω respectively. The leakage reactance
of the transformer referred to the primary is 35Ω. Calculate the primary voltage
require to circulate full load current when the secondary is short circuited. Neglect the
no load current.   (CO3)

3-f.   Explain the Breakdown Mechanism in Zener diode. How does a Zener diode works as   6
Voltage regulator? (CO4)

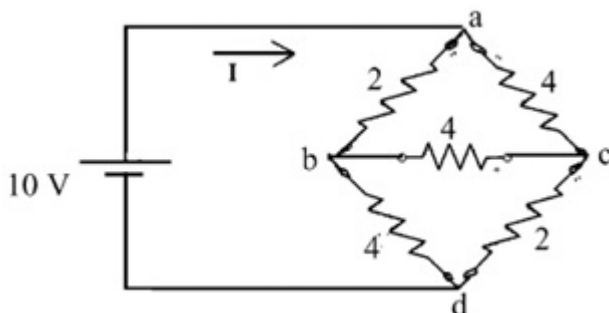3-g.   What are advantages of IOT and also write its application? What are the main   6
challenges of Internet of Things ? (CO5)

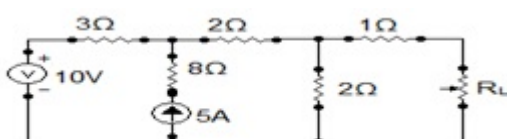SECTION C   50

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.   10
Consider all the values of resistances are in ohms. (CO1)

4-b.   Using maximum power transfer theorem, find the value of the load resistance for the   10
maximum power flow through it in the network shown in the figure. (CO1)

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

5-a.   Two impedances given by $Z_1 = 5 + j10\ \Omega$ and $Z_2 = 10 - j15\ \Omega$, 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)

5-b.   Three sinusoidal voltages acting in series are given by $V_1 = 10 \sin 440t$, $V_2 = 105 \sin (440t - 45^o)$ and $V_3 = 20 \cos 440t$. Find the expression of resultant voltage. Also calculate frequency and RMS value of resultant voltage.(CO2)   10

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

6-a.   Explain the need of earthing and different methods of earthing. Also list the limitations of each method.   (CO3)   10

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

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

7-a.   Derive expression for efficiency of HWR and FWR. What is PIV rating of a diode? (CO4)   10

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

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

8-a.   For the inverting amplifier if the input voltages are 2V, 4V and 6V and corresponding resistances are 2K, 4K and 6K respectively and feed back resistor is 3K. Calculate the output voltage. (CO5)   10

8-b.   Explain the working of DMM with its block diagram. Also mention its advantages and disadvantages. (CO5)   10