Printed Page:- Subject Code:- AEC0101

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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 - JUNE (2021 - 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 mark 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-a. A 12 mA current source has an internal resistance, Rs , of 1.2 kΩ The equivalent voltage source is…... (CO1) 1

(a) 144 V
(b) 14.4 V
(c) 7.2 V
(d) 72 mV

1-b. Resistivity of a wire depends on ….. (CO1) 1

(a) length of wire
(b) cross section area
(c) material
(d) all of the mentioned

1-c. The resistance of a 230 V, 100 W lamp is (CO2) 1

(a) 529
(b) 2300
(c) 5290
(d) 23

1-d. In a parallel resonant circuit, what will be the circuit current at resonance (CO2) 1

(a) Maximum
(b) Minimum
(c) Zero
(d) none of above

1-e. What is the energy usage of a 1000 watt hair dryer used for 10 minutes straight? (CO3) 1

(a) 10 kWh
(b) 100 kW/h
(c) 100,000 kWh
(d) None of the above

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. If the voltage of the potential barrier is V_O. A voltage V is applied to the input, at what moment will the barrier disappear? (CO4) 1

(a) $V < V_O$
(b) $V = V_O$
(c) $V > V_O$
(d) V<< V0

1-h. Ripple factor of full wave bridge rectifier is..... (CO4) 1

(a) 1.21
(b) 0.482
(c) 0.812
(d) 0.406

1-i. The average value $(I_{B1} + I_{B2})/2$ of the input currents is called as …… (CO5) 1

(a) Input offset current
(b) Input bias current
(c) Output bias current
(d) None of these

1-j. Change in output of sensor with change in input is ……. (CO5) 1

(a) Threshold
(b) Slew rate
(c) Sensitivity
(d) None of these

2. Attempt all parts:-

2.a. What is the internal resistance of ideal voltage and ideal current sources. Is it possible to convert an ideal voltage into ideal current source? (CO1) 2

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

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

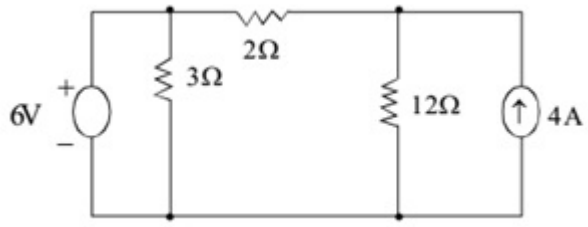
2.d. Draw the parallel negative clipper circuit with its output waveform. (CO4) 2

2.e. Define the slew rate of an operational amplifier (CO5) 2

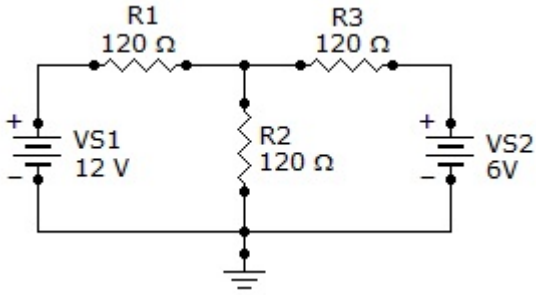
SECTION B 30

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

3-a. Calculate the currents and voltages of all the resistance of the circuit using nodal analysis method. (CO1) 6



3-b. Find the current in R_2 of the given circuit, using the superposition theorem. (CO1) 6



3-c. A non- inductive resistance of 10 Ω is connected in series with an inductive coil across 200V, 50Hz ac supply, the current drawn by the series combination is 10A. The resistance of the coil is 2Ω. Determine (i) inductance of coil (ii) Power factor (iii) Voltage across the coil (CO2) 6

3-d. Derive the relation between phase current and line current in a 3- ϕ delta connected system.(CO2) 6

3.e. Explain battery backup system with the help of its block diagram. (CO3) 6

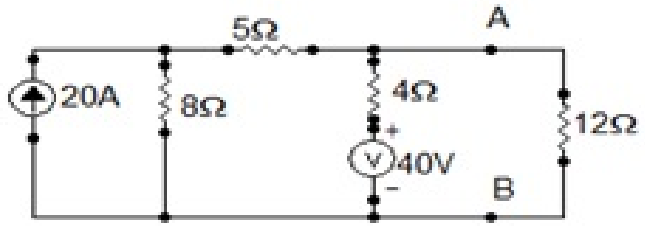
3.f. A 30KVA, 2000/200 V, single phase, 50Hz, transformer has a primary resistance of 3.5 ohms and reactance of 4.5 ohms. The secondary resistance and reactance are 0.015ohms and 0.02 ohms respectively. Find (i) equivalent resistance, reactance and impedance referred to the primary side (ii) total copper losses in the transformer. (CO4) 6

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

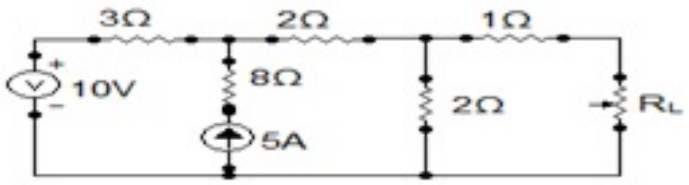
SECTION C 50

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

4-a. Determine the Norton's equivalent circuit across A-B and determine current flowing through 12Ω Resister for the network shown below. (CO1) 10



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



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

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

5-b. A coil connected to 100 V DC supply draws 10A current from supply. The same coil when connected to 100 V, 50 Hz AC supply draws 5A current. Calculate the parameters of coil and power factor of circuit.(CO2) 10

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

6-a. 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

6-b. Explain the working of a transformer with proper circuit diagram. Also draw the phasor diagram of an ideal transformer on load condition. (CO3) 10

7. Answer any one of the following:-

7-a. Draw V-I Characteristic of Zener Diode. For a zener regulator: I_z(min)=1mA, I_Z(max)=15mA, V_z =5Volt, R=1 kΩ , R_L=1kΩ . Assume Diode Resistance is Zero. Determine the range of input voltage over which the output remains constant. (CO4) 10

7-b. Describe the working principle of Light Emitting Diode. What are its advantages and disadvantages over LCD? (CO4) 10

8. Answer any one of the following:-

8-a. Why earthing is needed? Explain different methods of earthing along with its advantages and disadvantages. (CO5) 10

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