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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (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 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:-

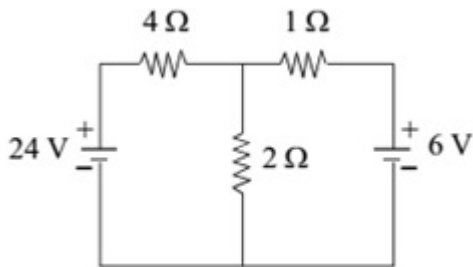
- 1-a. A bilateral element is..... (CO1) 1
- (a) Resistor
 - (b) Inductor
 - (c) Capacitor
 - (d) All of these
- 1-b. Resistivity of a wire depends on (CO1) 1
- (a) length of wire
 - (b) cross section area
 - (c) material
 - (d) all of the mentioned
- 1-c. The capacitive reactance is of frequency (CO2) 1
- (a) directly proportional
 - (b) indirectly proportional
 - (c) independent
 - (d) none of above

- 1-d. Find the effective value of the given equation $I = 200 \sin (\omega t - 30)$ (CO2) 1
- (a) 141.4
 - (b) 100
 - (c) 200
 - (d) none of above
- 1-e. Which of these statements is not correct . (CO3) 1
- (a) Power can be expressed as work done per unit of time
 - (b) Energy can be expressed as Power x Time
 - (c) The unit of Power is Kilowatts/hr
 - (d) Power can be described in terms of Volts x Amps = Watts
- 1-f. A 1000/100 V Transformer is supplied by 220 V ,50 Hz AC. Output frequency will be...(CO3) 1
- (a) 0.5 Hz
 - (b) 0.005 Hz
 - (c) 500 Hz
 - (d) 50 Hz
- 1-g. The reverse saturation current for every 100 C rise in temp (CO4) 1
- (a) decrease
 - (b) increase
 - (c) double
 - (d) None of these
- 1-h. The Fermi-level in a n type semiconductor is shifted towards(CO4) 1
- (a) Conduction band
 - (b) Valance band
 - (c) Does not shift
 - (d) None of these
- 1-i. Which of the following is the way in which an IoT device is associated with data?(CO5) 1
- (a) Internet
 - (b) Cloud
 - (c) Automata
 - (d) Network

- 1-j. CMRR value indicates the capability to reject (CO5) 1
- (a) Power supply variation
 - (b) Difference of signal
 - (c) Common mode signal
 - (d) None of these

2. Attempt all parts:-

- 2.a. Find current in $2\ \Omega$. (CO1) 2

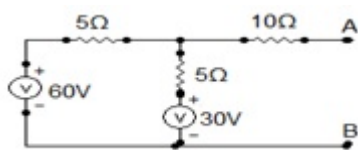


- 2.b. In parallel ckt if $R=50\ \Omega, L=0.1\ \text{H}$ and $C=140\ \mu\text{F}$, Calculate the Quality Factor. (CO2) 2
- 2.c. Why earth pin is made thicker and bigger than line and neutral? (CO3) 2
- 2.d. What is the typical value of thickness of liquid layer of LCD's. (CO4) 2
- 2.e. Mention the application of DMM?(CO5) 2

SECTION B 30

3. Answer any five of the following:-

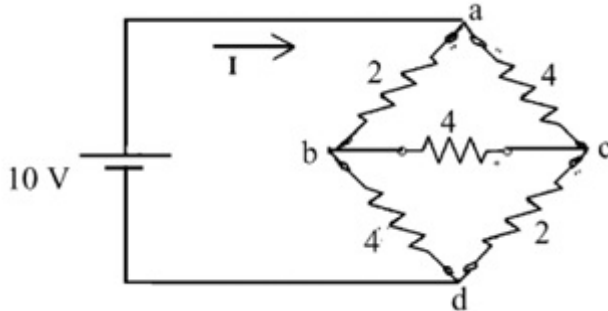
- 3-a. State and prove maximum power transfer theorem. (CO1) 6
- 3-b. Find the Thevenin's equivalent circuit of the given network. (CO1) 6



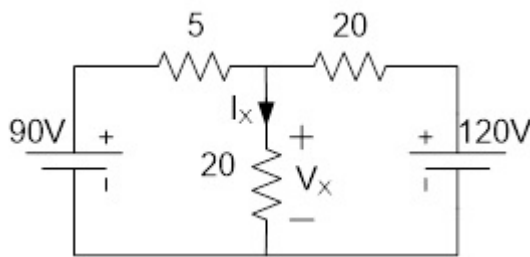
- 3-c. Derive the relationship between phase and line current in 3- ϕ Delta connection. (CO2) 6
- 3-d. A 100V, 60W lamp is to be operated on 220V, 50Hz supply. Find the value of (i) Non inductive resistance (ii) pure Inductance in series with the lamp so that the lamp is not Over run, which would be preferable.(CO2) 6
- 3.e. Draw the single line diagram of power system. (CO3) 6
- 3.f. For a zenar regulator: $I_z(\text{min})=2\ \text{mA}$, $I_z(\text{max})=20\ \text{mA}$, $V_z=5\ \text{V}$, $R_s=1\ \text{k}\Omega$, $R_L=1\ \text{k}\Omega$. Assume Diode Resistance is Zero. Determine the range of input voltage over which the output remains constant. (CO4) 6
- 3.g. Give an introduction to IoT and its application. What are the main Challenges of Internet of 6

4. Answer any one of the following:-

- 4-a. Using star-delta transformation, find the current I as shown in figure given below Consider all the values of resistances are in ohms. (CO1) 10



- 4-b. Find the current I_x and V_x in the circuit using Norton' Theorem. (CO1) 10



5. Answer any one of the following:-

- 5-a. Two impedances given by $Z_1 = 5 + j10 \Omega$ and $Z_2 = 10 - j15 \Omega$, are connected in 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) 10
- 5-b. For an AC circuit expression of voltage and current are given as $v = 200 \sin (377t) \text{ V}$ and $i = 8 \sin (377t - 30) \text{ A}$ respectively. Find:(a) Power Factor (b) Active Power (c) Apparent Power (d) Reactive Power.(CO2) 10

6. Answer any one of the following:-

- 6-a. Calculate the Electricity bill of the house for the month of June with following load data of one day: a. A Kettle of 2000 W is operated for 900 Seconds. b. A Washing Machine of 300 W is operated for 45 Minutes. c. A Toaster of 750 W is operated for 15 Minutes. d. Two Fluorescent light of 40 W each is operated for 5 Hours and 6 Hours respectively. e.Three Fans of 60 W is operated for 4 Hours, 6 Hours and 12 hours respectively.f.A Refrigerator of 250 W is operated for 24 Hours (8hrs-on)(Use the cost per unit of electricity as Rs 7 in your calculations) (CO3) 10
- 6-b. The efficiency of a 400 KVA transformer is 98.77% at full load 0.8 p.f & 99.13% at half load, unity p.f. Find iron & cu loss at both full & half load. (CO3) 10

7. Answer any one of the following:-

7-a. Explain the Bridge rectifier with diagram and calculate Ripple Factor (derive) for various rectifiers. (CO4) 10

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

1. LED Display

2. LCD

3. OLED

4. 7-Segment Display

8. Answer any one 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. What do you mean by sensors? How they differ from transducers? What are the different types of sensors? (CO5) 10