Printed Page:- Subject Code:- AMIEC0101

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

M.Tech. (Integrated)

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 equivalent delta, the resistance value of delta networks will be.....(CO1) 1

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

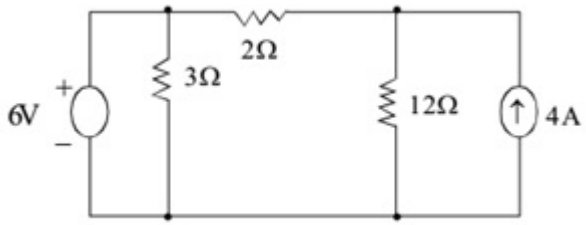
2.e. What are the characteristics of an ideal Operational Amplifier ? (CO5) 2

SECTION B 30

3. Answer any five 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 method. (CO1) 6



3-c. Calculate the average and rms values for half and full wave rectifier.(CO2) 6

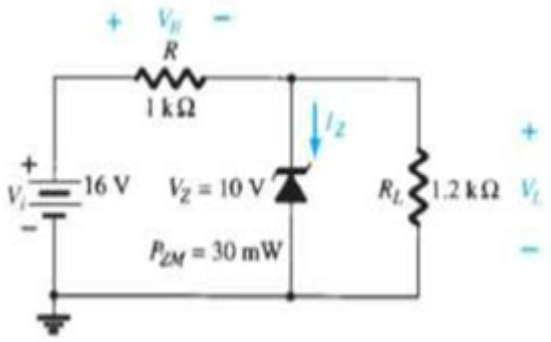
3-d. In parallel Resonant circuit (tank circuit) if R=50 ohm, L=0.1H and C=140μF, Calculate(a)Quality Factor (b) Impedance at resonance (c)Band width.(CO2) 6

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

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)

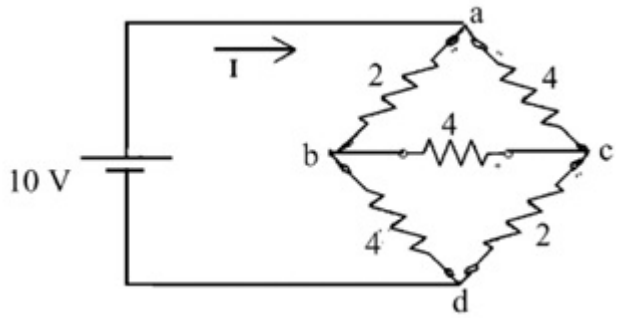


3.g. Give the characteristics of an ideal Operational Amplifier. Also draw its transfer characteristics . (CO5) 6

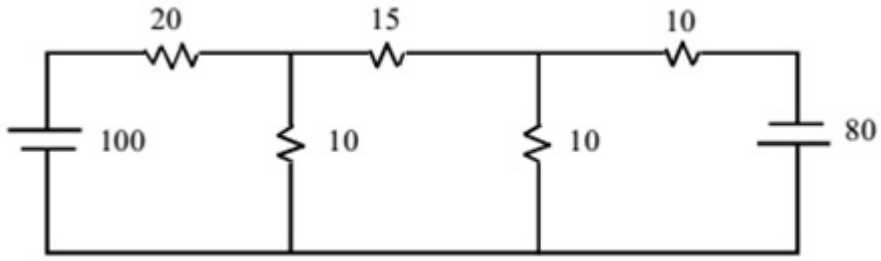
SECTION C 50

4. Answer any one of the following:-

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



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



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

6. Answer any one of the following:-

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

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 level. (CO3) 10

7. Answer any one of the following:-

7-a. Write short notes on a) n-type semiconductor b) p-type semiconductor c) potential Barrier d) Effect of temperature on conductivity of a Semiconductor. (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. Derive the output voltage of a differentiator circuit.. and hence find the expression for output 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) 10

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