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Subject Code: AEC0101
Roll No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

BACHELOR OF TECHNOLOGY (B.Tech).

(SEM: FIRST SEMESTER, THEORY EXAMINATION (2020-2021)

SUBJECT NAME: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Time: 3 Hours **Max. Marks:100**

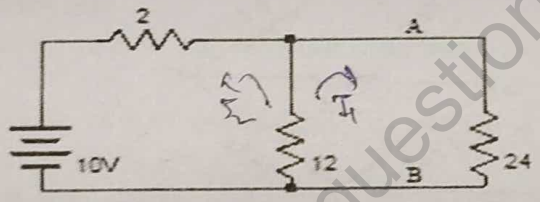
General Instructions:

- All questions are compulsory. Answers should be brief and to the point.
- This Question paper consists of 03 pages & 8 questions.
- It comprises of three Sections, A, B, and C. You are to attempt all the sections.
- Section A -Question No- 1 is objective type questions carrying 1 mark each, Question No- 2 is very short answer type carrying 2 mark each. You are expected to answer them as directed.
- Section B - Question No-3 is Long answer type–I questions with external choice carrying 6 marks each. You need to attempt any five out of seven questions given.
- Section C - Question No.4 to 8 are Long answer type –II (within unit choice) questions carrying 10 marks each. You need to attempt any one part *a* or *b*.
- Students are instructed to cross the blank sheets before handing over the answer sheet to the invigilator.
- No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION – A

1. Answer all the parts- **[10×1=10]** **CO**

a. Consider the circuit shown below. Find the equivalent Thevenin's voltage (volts) between nodes A and B **(1)** **CO1**



(A) 8 (B) 8.5 (C) 9 (D) 9.5

b. In a delta network each element has value R. The value of each element in equivalent star network will be: **(1)** **CO1**

(A) 3R (B) R/3 (C) R/6 (D) R/12

c. In a series R, L circuit, voltage across resistor and inductor are 3 V and 4 V respectively, then what is the applied voltage? **(1)** **CO2**

(A) 7V (B) 1V (C) 5V (D) 25V

d. In RLC series circuit, if the voltage across capacitor is greater than voltage across inductor, then power factor of the network is: **(1)** **CO2**

(A) Lagging (B) Leading (C) Unity (D) Zero

e. Normally the efficiency of a transformer lies in the range of..... **(1)** **CO3**

f. MCB & ELCB stands for.....&.....respectively. **(1)** **CO3**

g. A Zener diode is used as..... **(1)** **CO4**

(A) an amplifier (B) a rectifier (C) a voltage regulator (D) a multivibrator

h. If PIV rating of a diode is exceeded, the diode..... **(1)** **CO4**

(A) stops conduction (B) is destroyed

(C) conducts heavily in forward direction (D) None of these

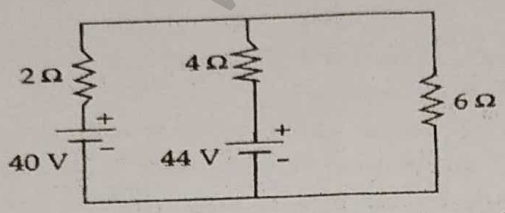
i. An ideal Op-Amp has..... (1) CO5
(A) Infinite input resistance (B) Infinite voltage gain
(C) Zero output resistance (D) All of these

j. Internet domain name and hostname are translated into IP address by..... (1) CO5
(A) Domain name system (B) Domain name database
(C) Router (D) Domain information System

[5×2=10] CO

2. **Answer all the parts-**

a. Calculate the current in 6 Ω branch for the circuit shown in Figure given below- (2) CO1



b. An RLC circuit consisting of resistance 40 Ω, capacitance 120μF and inductance 5H are connected in series with a supply of 250V, 50Hz source. Calculate quality factor (2) CO2

c. Explain the principle of operation of a 1-phase Transformer on no-load. (2) CO3

d. Explain the breakdown mechanism in a diode. (2) CO4

e. Draw the diagrams of Inverting and Non-inverting Op-Amps. (2) CO5

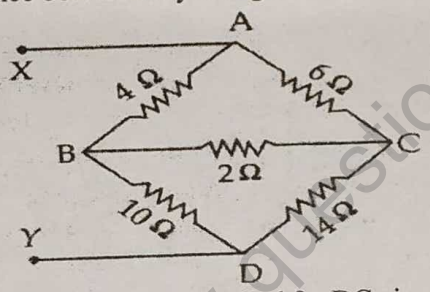
CO

SECTION – B

[5×6=30]

3. **Answer any five of the following-**

a. Find the equivalent resistance between x-y using star-delta transformation in the Fig.2 shown. (6) CO1
Fig.2



b. State Maximum Power Transfer Theorem applied for DC circuits. Derive its condition also. (6) CO1

c. The voltage applied to a circuit is $v = 100 \sin(\theta+30^0)$ and the current flowing in the circuit is $I = 15 \sin(\theta+60^0)$. Determine the impedance, resistance, reactance, power and the power factor of the circuit. (6) CO2

d. What are the necessities and advantages of using 3-phase system? Derive $V_L=\sqrt{3}V_{ph}$ for star connection. (6) CO2

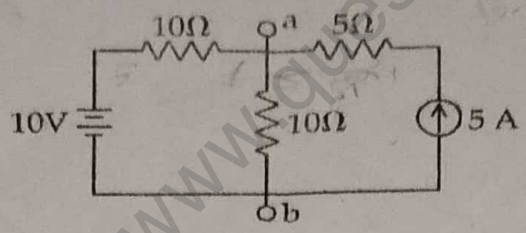
e. A 50KVA transformer is operating at 0.9 power factor lagging and 75% of the full load. Find the efficiency of the transformer if the core and copper losses at full load are 900W and 1200W respectively. (6) CO3

f. Describe a half wave rectifier using a junction diode. Derive the expressions for ripple factor and efficiency for half wave rectifier circuit. (6) CO4

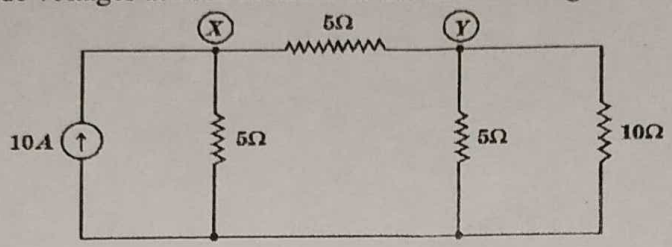
g. Draw the circuit diagram of an Integrator using Op-Amp and find the expression of output voltage. (6) CO5

SECTION – C

4	**Answer any one of the following-**		[5×10=50]	CO
	a.	Find the Thevenin equivalent model across a-b in Fig.3.	(10)	CO1



	b.	Find the node voltages at node X and Y in the circuit of Fig.4. using Nodal Analysis.	(10)	CO1



5.	**Answer any one of the following-**			
	a.	A series RLC circuit consisting of resistance 20 Ω, capacitance 150μF and inductance 2H are connected with 250V, 50Hz source. Calculate: (i) Power factor (ii) The frequency of supply to be adjusted to make the power factor unity. (iii) Net reactance and impedance.	(10)	CO2
	b.	Derive the expression for power in a three-phase star connection. A balanced star connected load of (8+j6) Ω per phase is connected to a balanced 3-phase, 400V supply. Find the line current, power factor and power.	(10)	CO2
6.	**Answer any one of the following-**			
	a.	Develop the equivalent circuit of a single-phase transformer on no-load and on-load conditions.	(10)	CO3
	b.	Draw a one-line diagram of a Power System from generating station to end user. Mention the different voltage levels.	(10)	CO3
7.	**Answer any one of the following-**			
	a.	State and explain the characteristics of a Zener diode. How it can be used as a voltage regulator?	(10)	CO4
	b.	Clearly explain the difference in principle of operation between LED and LCD. Why are LCDs preferred for displays in the pocket calculators?	(10)	CO4
8.	**Answer any one of the following-**			
	a.	In a Non-inverting Op-Amp, the value of gain is 1.5. If the input resistance is 4kΩ, what should be the feedback resistance R_f to have desired gain?	(10)	CO5
	b.	Find the gain of the amplifier shown in Fig.5. Open loop gain is 10^5.	(10)	CO5