 Subject Code: ACSBS0102

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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY ,GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

BACHELOR OF TECHNOLOGY (B.Tech)

SEM: First Theory Examination(2020-2021)

SUBJECT NAME: PRINCIPLES OF ELECTRICAL ENGINEERING

Time: 3Hours **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. 4-8 are Long answer type –II (within unit choice) questions carrying 10marks 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. The superposition theorem is essentially based on the concept of: **(1)** **CO2**
1.duality
2.linearity
3.reciprocity
4.non linearity

b. While calculating R_{th},constant current source in the circuit are: **(1)** **CO2**
1.replaced by opens
2.replaced by shorts
3.treated in parallel with other voltage source
4.converted into equivalent voltage source

c. Kirchhoff's current law is applicable only: **(1)** **CO1**
1.closed loops in a network
2.electronic circuits
3.junctions in a network
4.parallel circuits

d. A piece of resistance wire has resistance of 4ohm,if it is doubled on itself. So now it's resistance will be: **(1)** **CO1**
1.8 ohm
2.2 ohm
3.4 ohm
4.1 ohm

e. The unity of reluctance is: **(1)** **CO4**
1.Weber
2.Ampere-Turns
3.Maxwell
4.Ampere-Turns per Weber

f.	Calculate the MMF required to produce a flux of 0.015 Wb across the air gap 2.5 mm long, having a effective area 200 cm square. 1.1000 A 2.2000 A 3.3449 A 4.1492 A	**(1)**	**CO4**
g.	The value of average current in AC waveform is: 1.0.637 I_m 2.0.707 I_m 3.I_m 4.2.5 I_m	**(1)**	**CO3**
h.	If the frequency of the pure inductive circuit is half,the current of the circuit will be: 1.same 2.doubled 3.halved 4.fourth	**(1)**	**CO3**
i.	A 50 V battery is connected across a 10 ohm resistor.The current is 4.5 A.The internal resistance of battery is : 1.0 ohm 2.0.5 ohm 3.1.1 ohm 4.5.0 ohm	**(1)**	**CO5**
j.	The thermocouple instrument will measure: 1.current 2.voltage 3.flux 4.none of these	**(1)**	**CO5**

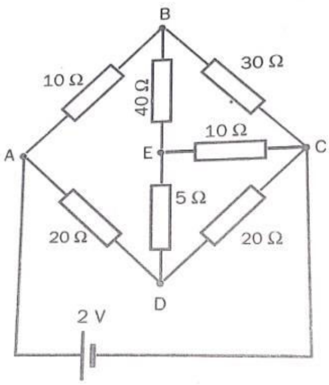
2.	**Answer all the parts-**	**[5×2=10]**	**CO**
a.	Three resistances of 10Ω each are connected in Star .Find the value of resistances in equivalent delta.	**(2)**	**CO2**
b.	Define Linear and nonlinear elements.	**(2)**	**CO1**
c.	Draw the equivalent circuit for a single phase transformer.	**(2)**	**CO4**
d.	Explain effect of temperature on resistance.	**(2)**	
e.	What are the objectives of Earthing and it's significance.	**(2)**	**CO5**

SECTION – B

3.	**Answer any five of the following-**	**[5×6=30]**	**CO**
a.	The equation of alternating current I = 50.42Sin628t. Determine: **1**.max value**, 2**.frequency**, 3**.rms value, **4**.average value,**5**.form factor	**(6)**	**CO3**
b.	Derive the expression for emf equation of single phase transformer.	**(6)**	**CO4**
c.	Write short notes on: a) Active and passive elements b) Idea and practical Sourses (both current & Voltage) c) Ohm's Law	**(6)**	**CO1**
d.	Explain the principle of piezoelectric transducer and its application.	**(6)**	**CO5**
e.	A balance 3-Phase star connected load of 140KW takes a leading current of 95A, when connected across a 3-phase, 1.1KV,50Hz supply. Obtain the value of resistance, impedance and capacitance of the load per phase and also calculate the power factor of the load.	**(6)**	**CO3**
f.	What is resonance and Derive the parallel R-L-C resonance and Q-factor.	**(6)**	**CO3**
g.	A 50 μF capacitor is charged from a 200 V supply. After being disconnected it is immediately connected in parallel with a 30 μF capacitor which is initially uncharged. Find: **1**.The p.d. across the combination, **2**.The electrostatic energy before and after the capacitors are connected in parallel.	**(6)**	**CO4**

SECTION – C

4		**Answer any one of the following-**	**[5×10=50]**	**CO**
	a.	A network arranged in the figure, and the battery having an emf of 2 V and negligible internal resistance across AC. Determine the value and direction of current in branch BE, using Thevenin's theorem.	**(10)**	**CO2**



	b.	State and explain the Norton's Theorem with it's applications and limitations.	**(10)**	**CO2**
5.		**Answer any one of the following-**		
	a.	Explain the Faraday's law of electromagnetic induction. Calculate the emf generated in the axle of a car travelling at 80 km/hr, assuming the length of the axle to be 2m and the vertical component of earth's magnetic field to be 40 μT.	**(10)**	**CO4**
	b.	Derive the relation of EMF equation of DC generator and explain the different type of DC generators and its characteristics and applications.	**(10)**	**CO4**
6.		**Answer any one of the following-**		
	a.	A single phase transformer has 1000 turns on the primary and 200 turns on the secondary. The no load current is 3 A at a power factor 0.2 lagging. When the secondary current is 280 A at a power factor of 0.8 lagging. Calculate the primary current and power factor. Draw the appropriate phasor diagram.	**(10)**	**CO4**
	b.	Explain the types of damping normally implied in moving iron instrument and explain the significance of damping in measuring devices.	**(10)**	**CO5**
7.		**Answer any one of the following-**		
	a.	Explain the requirement of earthing for electrical equipment and types of neutral earthing used in electrical system.	**(10)**	**CO5**
	b.	A 3-phase,400 V,50Hz,10 HP induction motor is operating at 0.75 power factor lagging. If the motor is operating at 85% efficiency, what should be the value of each capacitor connected in delta to improve the power factor to 0.95 lagging.	**(10)**	**CO3**
8.		**Answer any one of the following-**		
	a.	A capacitor of 8 μF takes a current of 1A when the alternating voltage applied across it is 220 Calculate: 1.the frequency of applied voltage 2.the resistance to be connected in series with the capacitor to reduce the current in the circuit to 0.5 A at the same frequency. 3.the phase angle of the resulting circuit.	**(10)**	**CO3**
	b.	Explain the voltage regulation of the single-phase transformer. The primary and secondary winding of a 30 KVA,11000/240 V transformer have resistance of 10 ohms and 0.016 ohm respectively. The total reactance of transformer referred to the primary is 23 ohms. Calculate the percentage regulation of the transformer at full load at 0.8 power factor lagging.	**(10)**	**CO4**