



MARWADI UNIVERSITY

MU-FOT

CE-AI, CE-FOT1 (MU), SI-CE-AI, SI-CE-FOT1 (MU), SI-IT-FOT1 (MU)

Semester 1 - Winter

Subject : EEE (01EE0101)**Date : 09-Mar-2021****Total Marks : 100****Time : 3 Hours****Instructions :**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Que.1 Answer the following objectives**[10]**

- (A)
- (1) For a given line voltage, four heating coils will produce maximum heat when connected
 - (A) All in parallel
 - (B) all in series
 - (C) with two parallel pairs in series
 - (D) One pair in parallel with the other two in series.
 - (2) The direction of induced e.m.f. in a conductor (or coil) can be determined by
 - a) work law
 - b) Ampere's law
 - c) Fleming's right-hand rule
 - d) Fleming's left-hand rule
 - (3) What is the energy stored in the magnetic field if the current in a coil has a constant inductance of L henrys grows at a uniform rate?
 - a) $LI/2$
 - b) $LI^2/2$
 - c) $L/2I$
 - d) $L/2I^2$
 - (4) During charging the specific gravity of the electrolyte of a lead-acid battery
 - (A) decreases.
 - (B) increases.
 - (C) remain same.
 - (D) none of the above.
 - (5) The power consumed by a pure inductance connected to a.c source is
 - a) Zero
 - b) Very high
 - c) Very low
 - d) Infinite
 - (6) A series resonance circuit implies
 - a) Zero power factor and maximum current
 - b) Unity power factor and maximum current
 - c) Unity power factor and minimum current

- d) Zero power factor and minimum current
- (7) For a series RC circuit V_R is 4V and V_C is 3V. Then ac source voltage will be
- a) 7V
 - b) 4V
 - c) 5V
 - d) 1V
- (8) The basic requirement for inducing e.m.f. in a coil is that
- a) flux should link the coil
 - b) there should be change in flux linking the coil
 - c) coil should form a closed loop
 - d) none of the above
- (9) The period of a sine wave is 0.02 seconds. Its frequency is
- (A) 20 Hz
 - (B) 30 Hz
 - (C) 40 Hz
 - (D) 50 Hz
- (10) Inductance opposes in current in a circuit.
- a) only increase
 - b) only decrease
 - c) change
 - d) none of the above

Que.1 Answer the following questions.

[10]

(B)

- (1) Define Reluctance
- (2) What is the condition for Series resonance.?
- (3) In Voltaic Cell, which of the material is used as Anode?
- (4) Define Magnetic Flux.
- (5) Define Magnetic Flux Density.
- (6) Define Fringing
- (7) Derive the expression for resonant frequency.
- (8) Define Permeability.
- (9) Define Permeance.
- (10) Define Resistance and list the factor effecting the value of resistance.

Que.2

- (A) Write down the advantages of three phase system over the single phase system.

[8]

- (B) Find the average value, r.m.s. value, form factor and peak factor for halfwave rectified alternating current. [8]

OR

- (B) A resistance of $20\ \Omega$, an inductance of 0.2 H and a capacitance of $100\ \mu\text{F}$ are connected in series across 220 V , 50 Hz supply. Find (1) Impedance (2) Voltage across R, L & C (3) Power factor & angle of lag [8]

Que.3

- (A) Three voltages are represented by [8]

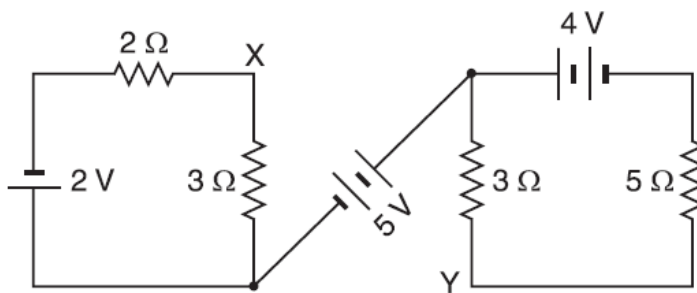
$$e_1 = 20 \sin \omega t,$$

$$e_2 = 30 \sin (\omega t - 45^\circ)$$

$$e_3 = 40 \cos (\omega t + 30^\circ)$$

Find the expression for the resultant addition of voltage. Represent them by appropriate vectors.

- (B) What is the potential difference between X and Y in the network shown in Fig. [4]



- (C) Compare Series and Parallel Circuit [4]

OR

- (A) Derive the equation of Current when alternating Voltage applied to pure Capacitor . and Draw Voltage current and Power wave form. [8]

- (B) What is major difference in pipe earthing and plate earthing? [4]

- (C) Draw the Voltage current and power wave form AC voltage applied to Purely Inductive Circuit [4]

Que.4

- (A) A circuit consists of four loads in series ; the voltage across these loads are given by the following relations measured in volts : [8]

$$v_1 = 50 \sin \omega t ; v_2 = 25 \sin (\omega t + 60^\circ)$$

$$v_3 = 40 \cos \omega t ; v_4 = 30 \sin (\omega t - 45^\circ)$$

Calculate the supply voltage giving the relation in similar form.

- (B) Derive the expression for the rise of current in an inductive circuit when a DC supply is switched on to it. [8]

OR

- (A) Explain the graphical representation of series resonance. [8]

- (B) The following four e.m.fs. act together in a circuit : [8]

$$e_1 = 10 \sin \omega t ; e_2 = 8 \sin (\omega t + \pi/3)$$

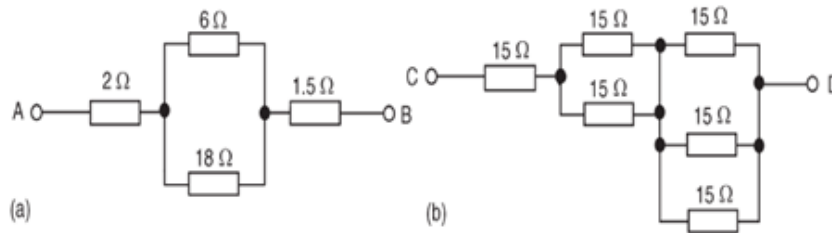
$$e_3 = 4 \sin (\omega t - \pi/6) ; e_4 = 6 \sin (\omega t + 3\pi/4)$$

Calculate the e.m.f. represented by $e_1 - e_2 + e_3 - e_4$.

Que.5

(A) What is earthing? Explain the Plate Earthing [6]

(B) Find the total resistance between terminals A and B as well as between terminals C and D of the circuit shown in Figure below [6]



(C) Derive the Average value of alternating wave [4]

OR

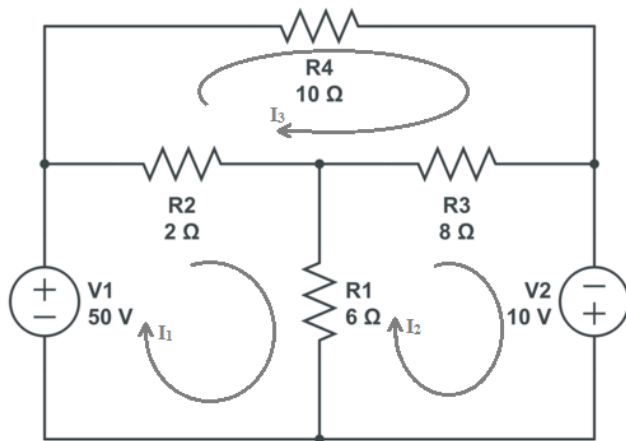
(A) Derive the equation for energy stored in Capacitor. [6]

(B) Resistors of $20\ \Omega$, $20\ \Omega$ and $30\ \Omega$ are connected in parallel. What resistance must be added in series with the combination to obtain a total resistance of $10\ \Omega$? If the complete circuit consumes $0.36\ \text{kW}$ power, find the total current flowing through the circuit. [6]

(C) Explain the mutually induced e.m.f in detail. [4]

Que.6

(A) Find current I_1 , I_2 and I_3 by using mesh current analysis [8]



(B) Draw Power Triangle for an AC circuit. Define Active, Reactive and Apparent Power [4]

(C) An air cored solenoid has length of 15 cm and inside diameter of 1.5cm. If the coil has 900 turns, determine the total flux within the solenoid when the coil current is 100mA. [4]

OR

(A) A $8\ \mu\text{F}$ capacitor is connected in series with $0.5\ \text{M}\Omega$ resistance across 200 V supply. Calculate (i) initial charging current (ii) the current and p.d. across capacitor 4 seconds after it is connected to the supply. [8]

(B) What do you mean by self inductance? Derive the equation of Self-inductance. [4]

(C) Draw 3 phase waveform and also prove that the algebraic sum of all three phases is zero. [4]

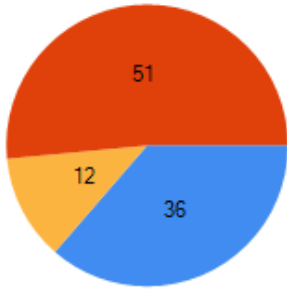
---Best of Luck---

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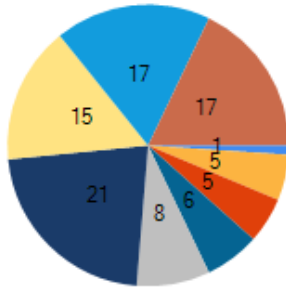
Difficulty Level	Weightage		No of Question	Total Marks	Question List
	Recommended	Actual			
High	20	36	12	62	1(A), 1(B), 3(A), 3(B), 4(B), 5(A), 6(A)
Low	20	12	13	22	1(A), 1(B), 3(C), 5(C)
Medium	60	51	20	88	1(A), 1(B), 2(A), 2(B), 3(B), 3(C), 4(A), 5(A), 5(B), 6(B), 6(C)

Module Name	Weightage		No of Question	Total Marks	Question List
	Recommended	Actual			
Batteries	3	1	2	2	1(A), 1(B)
Resonance:	5	5	3	10	1(B), 4(A)
Safety and Protection	6	5	2	10	3(B), 5(A)
Three Phase Systems:	7	6	2	12	2(A), 6(C)
Electrostatics and Capacitance:	13	8	2	14	5(A), 6(A)
Fundamental of AC Quantities:	15	21	6	37	1(A), 2(B), 3(A), 4(A), 4(B), 5(C)
Analysis of AC circuits:	16	15	7	27	1(A), 2(B), 3(A), 3(C), 6(B)
Fundamental of DC circuits:	17	17	7	30	1(A), 1(B), 3(B), 3(C), 5(B), 6(A)
Magnetic Circuits and Electromagnetics:	18	17	14	30	1(A), 1(B), 4(B), 5(C), 6(B), 6(C)

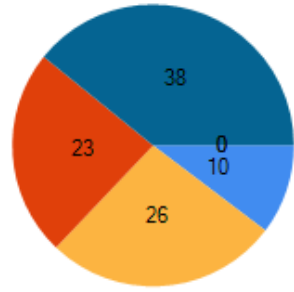
Blooms Taxonomy	Weightage		No of Question	Total Marks	Question List
	Recommended	Actual			
Remember/Knowledge	20	10	12	18	1(A), 1(B), 3(B), 5(C)
Understand	30	26	14	46	1(A), 1(B), 2(A), 3(C), 5(A), 5(C), 6(B), 6(C)
Apply	25	23	8	41	1(A), 3(B), 3(C), 5(B), 6(A), 6(C)
Analyze	15	38	11	67	1(A), 1(B), 2(B), 3(A), 4(A), 4(B)
Evaluate	10	0	0	0	
Higher order Thinking	0	0	0	0	



High Low Medium



Batteries Resonance:



Remember/Knowledge Under...