SUMMER-2023		
Exam Seat No.:		
Academic Year:2022-2023	Semester:I	
Name of Programme:B.Tech	Pattern:2022	
Name of Course:Fundamentals of Electrical Engineering	Course Code:FYE221006	
Max. Marks:60	Duration:2.50	

	Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use. 1. This question paper contains 04 pages. 2. Answer to each new question is to be started on a new page. 3. Assume suitable data wherever required, but justify it. 4. Draw the neat labelled diagrams, wherever necessary. 5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question	

Question No. 1 Attempt following Question

1)   (6) CO1

tempt any one of the following

(I) Derive the equation of insulation resistance for a single core cable.

OR

(II) With usual notation, show that

$$R_2 = R_1\big(1 + \alpha_1(t_2 - t_1)\big)$$

Question No. 2 Attempt following Question

2)

Attempt any one of the following

(I) Derive formula to convert star connected network into equivalent delta connected network.

(6) CO4

OR

(II) Convert a practical current source into equivalent voltage source and vice versa

Question No. 3 Attempt following Question

3a)

Define following terms related to AC fundaments.

(i) Maximum value (ii) Frequency (iii) Form factor (iv) Cycle (v) Instantaneous value

(5) CO1

OR

3b)

Define following terms related to single phase AC circuits.

(i) Power factor (ii) Impedance (iii) Active power (iv) Resonance frequency

(5) CO1

(v) Reactive power

3c) A pure capacitance is connected across single phase AC supply, derive equation of instantaneous current and average power.

(5) CO4

OR

3d)

A RC series circuit is connected across single phase AC supply, draw

(5) CO4

(i) Circuit diagram (ii) Phasor diagram (iii) Waveforms.

3e)

A single phase 230V, 50Hz AC supply is applied across a series combination of resistance of 10 Ohm and capacitance of 100 micro-Farad. Calculate

(6) CO4

(i) Capacitive reactance (ii) Impedance (iii) Current (iv) power factor (v) Active power (vi) Reactive power

OR

3f) A single-phase supply of v=200sin(314t) is applied across pure capacitance of 50 micro-Farad. Calculate (i) rms value of voltage (ii) Frequency (iii) Capacitive reactance (iv) Equation of current.   (6) CO4

Question No. 4 Attempt following Question

4a) Differentiate between fuse and MCB.   (5) CO3

OR

4b)
In ELCB, explain the working of following components:

(i) Iron core (iii) Sensing coil (iii) Test switch   (5) CO3

4c) For a delta connected load with the help of circuit and phasor diagram show that line current is $\sqrt{3}$ times of phase current.   (5) CO4

OR

4d) Show that power consumed in delta connected load is three times power consumed in star connected load for same impedance per phase and same line voltage.   (5) CO4

4e)
A series combination 50 Ohm resistance and 30 Ohm capacitive reactance per phase are connected in delta across three phase 400V, 50Hz power supply. Calculate

(i) Line and phase voltage (iii) Line and phase current (iii) Active and reactive power   (6) CO4

OR

4f)
A total load of 10kW at 0.8 power factor lagging is connected across 400V, 50Hz supply in star. Find

(i) Line and phase current (ii) Circuit parameter   (6) CO4

Question No. 5 Attempt following Question

5a) Draw the sketch/schematic diagram of bipolar stepper motor and explain working of it   (5) CO3

OR

5b) Draw the sketch/schematic diagram of DC machines showing all labels. Elaborate any two parts of it.   (5) CO3

5c) List the different types of losses in transformer. What are the ways to minimize it.   (5) CO6

OR

5d) Define following in case of transformer with formula.

(5) CO6

(i) Efficiency (ii) Regulation (iii) Transformation ratio

5e) In a 25 kVA, 2000/200V transformer has iron loss and full load copper loss 350 W and 400 W respectively. Calculate the efficiency at unity power factor on i) Full load ii) half full load.

(6) CO6

OR

5f) A 500 kVA, single phase transformer has efficiency of 92% at full load unity p.f. and 95% at half load 0.9 p.f. Determine its efficiency at 80% of the full load and 0.95 p.f.

(6) CO6