K. K. Wagh Institute of Engineering Education & Research, Nashik
(An Autonomous Institute From A.Y. 2022-23)

WINTER- 2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester: I
Class: FY	Program: B.Tech
Branch Code: FYE COM/ELE/ INT /ADS/ROB/CSD	Pattern: 2023
Name of Course: Fundamentals of Electrical Engineering	Course Code: 2300105A
Max. Marks: 60	Duration: 2.30 Hrs.

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 ___02__page(s).
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.

Marks CO

Question No. 1

1) Define insulation resistance. Derive Formula to calculate insulation resistance for single core cable. (6) CO1

Question No. 2

2) Derive formulae to convert DELTA connected network into its STAR connected equivalent network. (6) CO1

Question No. 3

3a) i) Define following terms in AC fundamentals with its values. (8) CO1

1) Form Factor 2) Amplitude factor (2 Marks)

ii) An alternating current varying sinusoidally with a frequency 50Hz has RMS value of 20A. Find its value after passing through zero positive maximum.

1) 0.0025 Sec 2) 0.125 Sec (6 Marks)

OR

3b) What is meant by resonance in series R-L-C circuit connected across sinusoidal A.C. supply? Derive the equation for resonant frequency. (8) CO1

3c) The voltage and current, in simple series circuit are given by $V = 150 \angle 30^0$ Volt and $I = 2 \angle -15^0$ amp. If the supply frequency is 50 Hz, determine, i) impedance, ii) resistance, iii) reactance and iv) power consumed by the circuit, v) Draw phasor diagram. (8) CO4

OR

3d) Three impedances $Z_1 = 40\angle 0^0\ \Omega$, $Z_2 = 20\angle 90^0\ \Omega$ and $Z_3 = 30\angle -90^0\ \Omega$ are connected in series across single phase 250 V, 50 Hz supply, Calculate, (8) CO4

i) Total Impedance, ii) Current Drawn iii) Power Factor iv) Power Consumed by Circuit.

v) Draw Phasor Diagram

Question No. 4

4a)	Derive the relation of line & phase values of voltage and current for three phase delta connected balanced load, Draw Circuit diagram & phasor diagram	(8)	CO3

OR

4b)	Explain the technical differences between an Earth Leakage Circuit Breaker (ELCB) and a Miniature Circuit Breaker (MCB)	(8)	CO3
4c)	A balance Delta connected load of $45\angle 36.86^\circ$ ohm per phase is connected to a Three phase 440 volt 50 Hz supply. Calculate i) Phase current ii) line current iii) Power Factor iv) Active Power v) Reactive Power vi) Total Volt amperes vii) Draw Phasor Diagram	(8)	CO4

OR

4d)	A balance Star connected load of (40 - j 25) Ω/phase is connected to a three phase 415 V, 50 Hz supply Calculate i) Phase and Line current ii) Phase voltage iii) Power Factor iv) Active Power v) Reactive Power vi) Total Volt amperes vii) Draw Phasor Diagram	(8)	CO4

Question No. 5

5a)	What are the different types of losses in a transformer? Also, discuss the methods used to minimize these losses to improve efficiency.	(8)	CO3

OR

5b)	Mention Advantages and Disadvantages of Stepper motor	(8)	CO3
5c)	A Transformer is rated at 270 KVA, at full load its copper losses is 2.5 KW and its iron losses is 1850 Watt. Calculate i) Efficiency at 70 % of full load, at 0.8 power factor. ii) Efficiency at 80% of full load at 0.75 power factor iii) Efficiency at full load, unity power factor	(8)	CO6

OR

5d)	A 3000V/200V, 50Hz, single phase transformer is built on a core having an effective cross-sectional area of $120cm^2$ and 80 turns on the secondary winding. Calculate i) The value of maximum flux density, ii) The number of turns on the HV winding	(8)	CO6

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