



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

|  |  |                       |  |
|--|--|-----------------------|--|
|  | WINTER-2023  |                       |  |
|  | Exam Seat No.:   |                       |  |
|  | Academic Year: 2023-2024                               | Semester: I           |  |
|  | Name of Programme: F. Y. B.Tech                        | Pattern: 2023         |  |
|  | Name of Course: Fundamentals of Electrical Engineering | Course Code: 2300105A |  |
|  | Max. Marks: 60   | Duration: 2.5 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 \_03\_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.

**Question No. 1 Attempt following Question**

- 1) Solve any one (6) CO4
- a) Derive formula for insulation resistance
- or
- b) With usual notation prove that,

$$\alpha_2 = \frac{\alpha_1}{1 + \alpha_1(t_2 - t_1)}$$

**Question No. 2 Attempt following Question**

- 2) Solve any one (6) CO4
- a) State and explain Thevenin's Theorem
- or
- b) Derive the formula for star to delta transformation

**Question No. 3 Attempt following Question**

- 3a) What is resonance frequency? Describe series resonance in RLC series circuit. (5) CO4

**OR**

3b) Explain the concept of resonance in Parallel RLC circuit (5) CO4

3c) Define the following terms 1) Admittance 2) Conductance 3) Susceptance (5) CO1

**OR**

3d) Define the following terms 1) Frequency, 2) Time period, 3) RMS Value (5) CO1

3e) An alternating current varying sinusoidally with a frequency 50Hz has RMS value of 25A. Find its value after passing through zero positive maximum. (6) CO4

1) 0.0015 Sec 2) 0.120 Sec

**OR**

3f) An emf given by  $v = 100 \sin 2\pi ft$  is impressed across a circuit consists of resistance of 35 ohm in series with 150  $\mu\text{f}$  capacitor and 0.125 Henry inductor. (6) CO4

Determine (i) RMS value of current (ii) Power consumed (iii) Power factor .

**Question No. 4 Attempt following Question**

4a) Derive the relation between line current and phase current and line voltage and phase voltage related to delta connected load. Draw circuit diagram. (5) CO4

**OR**

4b) Prove that the power absorbed by delta connected load is three times the power absorbed by star connected load having same impedance per phase. (5) CO4

4c) Explain working principle of HRC Fuse with neat circuit diagram (5) CO3

**OR**

4d) What is necessity of earthing? Write two points for comparison of types of Earthing. (5) CO3

4e) A balanced three phase star connected load is supplied from three phase 400 V, 50 Hz. supply. The resistance of each coil is  $6 \Omega$  and inductive reactance of  $8 \Omega$ . Find the value of phase current, line current and total power consumed in the circuit (6) CO4

**OR**

4f) A balanced three phase delta connected load is supplied from three phase 440 V, 50 Hz. supply. The load impedance of each is  $45 \angle 45^\circ \Omega$ . Find the value of phase current, line current and total power consumed in the circuit (6) CO4

**Question No. 5 Attempt following Question**

5a) Explain construction and working of DC Machine (5) CO3

**OR**

5b) Explain working principle of Transformer (5) CO3

5c) Enumerate the various losses in transformer and steps taken to minimize them (5) CO3

**OR**

5d) Write a short note on autotransformer (5) CO3

- 5e) A 11000 / 415V, 30 KVA transformer is having efficiency of 90 % both on half and full load at unity power factor. Find efficiency of transformer on 75 % of full load and 0.86 P.F. Lag . (6) CO6

**OR**

- 5f) A 33 KV / 11 KV, 50 Hz, 500 kVA, single phase transformer has iron losses of 1050 watt. Primary and secondary winding resistances are 1.5 ohm and 0.015 ohm respectively. Determine efficiency of transformer on full load and 0.8 P. F. Lag (6) CO6