



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

	InSem Examination-I Winter 2023		
	Exam Seat No.:		
	Academic Year:2023-2024	Semester:III	
	Name of Programme: S. Y. B.Tech Electrical Engineering	Pattern:2022	
	Name of Course:Transformer and Induction Machines	Course Code:ELE222005	
	Max. Marks:30	Duration: 1 hour	

	<p><b>Instructions:</b> 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.</p> <ol style="list-style-type: none"><li>1. This question paper contains _____page(s).</li><li>2. Answer to each new question is to be started on a new page.</li><li>3. Assume suitable data wherever required, but justify it.</li><li>4. Draw the neat labelled diagrams, wherever necessary.</li><li>5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question</li></ol>	
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**Question No. 1 Attempt following Question**

- a) Draw equivalent circuit of single phase transformer referred to primary side with all labels (4) CO3

**OR**

- b) Draw equivalent circuit of single phase transformer referred to secondary side with all labels (4) CO3

- c) A 1 phase 10kVA 1100/110 transformer has primary & secondary resistances as 2.15 ohm and 0.0095 ohm respectively. Leakage reactances are  $X_1 = 2.1$  ohm and  $X_2 = 0.0085$  ohm. Calculate equivalent resistance, reactance referred to primary and secondary side. Calculated equivalent impedance referred to primary or secondary side. (5) CO3

**OR**

- d) A 1 phase 10kVA 1100/110 transformer has primary & secondary resistances as 2.15 ohm and 0.0095 ohm respectively. Leakage reactances are  $X_1 = 2.1$  ohm and  $X_2 = 0.0085$  ohm. Calculate total full load copper losses. (5) CO3

- e) A 6600/660 volt, single phase transformer on full load had impedance drop of 20 volts and resistance drop of 10 volts. Calculate 1. power factor when its regulation is zero (6) CO4  
2. regulation at 0.8 p. f. lagging

**OR**

- f) In a 20 kVA, 1100/110 volts transformer, the iron and full load copper losses are 400watts & 550 watts respectively. Find the efficiency at unity power factor at full load and half load (6) CO4

**Question No. 2 Attempt following Question**

- a) a) Draw the connection diagram following 3 phase transformers (4) CO1  
1. star delta 2. V V connection

**OR**

- b) Draw the connection diagram following 3 phase transformers (4) CO1  
1. delta delta 2. Scott connection

- c) Draw the diagram of welding transformer & explain its features. (5) CO1

**OR**

- d) Draw the diagram and explain working of converter transformer (5) CO1

- e) A 3 phase step down transformer is connected to 6.6kv mains and takes 10 A. Calculate the secondary line voltage, line current and out put for the following connection (6) CO3  
1. delta delta 2. star star

**OR**

- f) A 3 phase transformer rated at 1000 kVA, 11/3.3 kV has star connected primary and delta connected secondary winding. The resistance per phase of primary winding is 0.375 ohm & that of secondary is 0.095 ohm. The leakage reactance per phase of primary winding is 9.5 ohm & that of secondary is 2 ohm. Calculate the voltage required to apply to primary so that full load current flows in the winding when secondary is short circuited. Also, calculate power input at these conditions. (6) CO3