USN | | | | | | | | | | |

COURSE CODEBEE304

III Semester B.E. / B. Arch. / MCA / M.Tech. Semester End Examination, MAR/APR. 2023-24

Transformers and Generators (Model Question Paper)

Time: 3 Hours **Max. Marks: 100**

Instructions:	*1.*	*Answer any Five full questions choosing ONE from each unit.*

		UNIT - I	L	CO	PO	M
1	a.	Explain briefly the construction and working principle of transformer.				
			(L2)	(1)	(1)	(08)
	b.	Analyze the operation of a single phase transformer ON Load with phasor diagrams for Inductive load.				
			(L4)	(1)	(1)	(06)
	c.	Determine the efficiency at 75% full load and the maximum efficiency of a single phase transformer working at unity power factor has an efficiency of 90% at both half load and at the full load of 500W.				
			(L3)	(1)	(2)	(06)
2	a.	Explain the Equivalent circuit diagram of a single phase transformer referred to both primary and secondary.				
			(L2)	(1)	(1)	(06)
	b.	Classify the losses of a transformer and show that the maximum efficiency in a transformer occurs when its variable loss equal to constant loss.				
			(L4)	(1)	(1)	(06)
	c.	Describe the performance of transformers by conducting Sumpner's test with relevant circuit diagram.				
			(L4)	(1)	(4)	(08)
		UNIT – II	**L**	**CO**	**PO**	**M**
3	a.	Explain the features of delta/delta and star/delta three phase connections. List out their advantages and disadvantages.				
			(L2)	(2)	(1)	(08)
	b.	Explain the essential and desirable conditions to be fulfilled for operating two single phase and three phase transformers in parallel.				
			(L2)	(2)	(1)	(06)
	c.	A 500KVA transformer with 0.01pu resistance and 0.05pu reactance is connected in parallel with a 250KVA transformer with 0.015pu resistance and 0.04pu reactance. The secondary voltage of each transformer is 400V on no load. Find how they share a load of 750KVA at power factor 0.8 lagging.				
			(L3)	(2)	(2)	(06)
4	a.	Define Autotransformer? Give the constructional features and the working principle of single phase autotransformer. State its merits and demerits.				
			(L1)	(2)	(1)	(06)
	b.	Derive an expression for saving in conductor material in an autotransformer of equal rating.				
			(L3)	(2)	(1)	(08)
	c.	With the help of neat sketch, explain the working of ON-load tap changing transformer.				
			(L2)	(2)	(3)	(06)
		UNIT - III	**L**	**CO**	**PO**	**M**
5	a.	Explain pitch and distribution factors and obtain the Expression for EMF equation of a synchronous generator.				
			(L2)	(2)	(1)	(08)
	b.	Apply the phenomena of armature reaction when an alternator is delivering load current at (a) purely lagging power factor and (b) unity power factor.				

Note: L (Level), CO (Course Outcome), PO (Programme Outcome), M (Marks)

			(L3)	**(3)**	**(2)**	**(06)**
	c.	Determine phase and line voltages of a three phase, 50 Hz, 8 pole alternator has a star connected winding with 120 slots and 8 conductors per slots. The flux per pole is 0.05 Wb, sinusoidally distributed.				
			(L3)	**(3)**	**(2)**	**(06)**
6	a.	With a neat circuit diagram Explain the open circuit and short circuit characteristics of synchronous generator.				
			(L2)	**(3)**	**(1)**	**(10)**
	b.	Explain the voltage regulation of an alternator by applying synchronous impedance method and Comments on the merits and limitations of this method.				
			(L3)	**(3)**	**(1)**	**(10)**
		UNIT - IV	**L**	**CO**	**PO**	**M**
7	a.	Analyze the concept of two reaction theory applicable to salient pole synchronous machine.				
			(L4)	**(3)**	**(1)**	**(10)**
	b.	What are the requirements for an alternator to be properly synchronized? Describe any one method of synchronizing the alternators.				
			(L1)	**(3)**	**(1)**	**(10)**
8	a.	Define capability curves of a synchronous generator? What information available from these curves.				
			(L1)	**(3)**	**(1)**	**(08)**
	b.	Calculate the synchronizing power and the synchronizing torque per mechanical degree of rotor displacement at no load of a 2 MVA, 3 phase, 4 pole alternator is connected to 6000 V, 50Hz bus bars and has a synchronous reactance of 4ohm per phase. Assume normal excitation.				
			(L3)	**(3)**	**(2)**	**(06)**
	c.	Define Hunting and Damper windings of an alternator.				
			(L1)	**(3)**	**(1)**	**(06)**
		UNIT -V	**L**	**CO**	**PO**	**M**
9	a.	Define the basic components of wind energy conversion system with a neat block diagram.				
			(L1)	**(4)**	**(1)**	**(10)**
	b.	With a neat constructional diagram, Explain the horizontal axis wind mill.				
			(L3)	**(4)**	**(1)**	**(06)**
	c	Compare horizontal axis wind mill and Vertical axis wind mill				
			(L4)	**(4)**	**(1)**	**(04)**
10	a.	Explain the Function of solar cell with a neat schematic diagram.				
			(L2)	**(4)**	**(1)**	**(08)**
	b.	With a neat constructional diagram, Explain Basic photovoltaic system integrated with power grid.				
			(L3)	**(4)**	**(1)**	**(06)**
	c.	List out advantages and disadvantages of solar photovoltaic cell				
			(L4)	**(4)**	**(1)**	**(06)**