CBCS SCHEME

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BEE304

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Transformers and Generators

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Explain an exact equivalent circuit diagrams of a single phase transformer referred to primary side. Indicate all the parameters in each development stage.	10	L2	CO1
	b.	Find the all day efficiency of single phase transformer having maximum efficiency of 98% at 15 KVA at UPF and loaded as follows : 12 hours – 2 KW at 0.5 p.f lagging 6 hours – 12 KW at 0.8 p.f lagging 6 hours – No load.	10	L3	CO1
		OR			
Q.2	a.	Explain the open circuit and short circuit test of a single phase transformer with neat circuit diagram. Show the calculation of efficiency at any load.	10	L2	CO1
	b.	Draw the load phasor diagram of a single phase transformer supplying load with lagging, leading and unity power factor.	10	L4	CO1
		Module – 2			
Q.3	a.	Explain with the help of connection and phasor diagram how SCOTT connections are used to obtain two phase from three phase supply.	10	L2	CO2
	b.	A 400 KVA load at 0.7 pf lagging is supplied by three phase transformers connected in Δ–Δ. Each of Δ–Δ transformer is rated at 200 KVA, 2300V/230V. If one defective transformer is removed from service, calculate for V–V connection. i) The KVA load carried by each transformer ii) Percent rated load carried by each transformer iii) Total KVA ratings of two transformer bank in V–V iv) Ratio of V–V bank to Δ–Δ bank transformer ratings.	10	L3	CO2
		OR			
Q.4	a.	Analyze the parallel operation if a transformer with unequal voltage ratio. And obtain the expression fro current shared by two transformers.	10	L4	CO2
	b.	Analyze the current distribution in step up and step down auto transformer with the help of neat diagram. And derive the expression for saving of copper in an auto transformer.	10	L4	CO
		Module – 3			
Q.5	a.	Derive an EMF equation of an alternator. Also give the expression for pitch factor and distribution factor.	10	L3	CO3
	b.	A 3 phase star connected alternator is rated at 1600 KVA, 13500 volts. The armature resistance and synchronous reactance are 1.5 Ω and 30 Ω respectively/phase calculate the percentage regulation for a load of 1280 KW at a pf 0.8 lag, UPF 0.8 load.	10	L3	CO3

OR

Q.6	a.	Derive the expression for EMF induced (E_{ph}) interns of terminal voltage, load current armature resistance, synchronous reactance along with phasor diagram for lagging, leading and unity power factor load.	10	L4	CO3
	b.	The open and short circuit test reading for a 3-ϕ star commented 1000 KVA, 2000 V, 50 Hz synchronous generator are :	10	L4	CO3

Field amps	10	20	25	30	40	50
OC terminal voltage	800	1500	1760	2000	2350	2600
SC armature current in amps	–	200	250	300	–	–

The armature effective resistance is 0.2 Ω/phase. Draw the characteristics curves and estimate the full load percentage regulation for 0.8 p.f leading.

Module – 4

Q.7	a.	Explain the lamp dark and lamp bright method of synchronization of alternators. Also mention the necessary conditions.	10	L2	CO4
	b.	Discuss the concept of two reaction theory in a salient pole synchronous machine with the help of phasor diagram.	10	L2	CO4

OR

Q.8	a.	Analyze the electrical load diagram of a synchronous generator connected to infinite bus bar and draw the electrical load diagram.	10	L4	CO4
	b.	A 400 V, 50 Hz delta connected alternator has a direct axis reactance of 0.1Ω and a quadrate axis reactance of 0.07Ω/phase. The armature resistance is negligible the alternate is supplying 1000 A at 0.8 pf lagging. i) Find the excitation emf neglecting saliency and assuming $X_S = X_d$ ii) Find the excitation emf, by taking saliency into account.	10	L4	CO4

Module – 5

Q.9	a.	Sketch basic components block diagram of a wind electric system. Discuss all the components in wind electric system.	10	L3	CO5
	b.	Sketch basic elements of a photo voltaic cell and explain the working of PV cell.	10	L3	CO5

OR

Q.10	a.	Sketch horizontal and vertical axis wind power generation. Explain both in detail.	10	L3	CO5
	b.	List : i) Advantages and disadvantages of WECS. ii) Advantages and disadvantages of solar power system.	10	L1	CO5

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