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17EE33

Model Question Paper
Third Semester B.E Degree(CBCS) Examination
Transformers and Generators

Time : 3hrs Max Marks:100

Note: *Answer* FIVE *full questions,choosing one full question from each module*

Module 1

1	a	Draw and explain the Full load Phasor Diagrams of Single Phase transformer for lagging, leading and Unity power factor loads	**8 Marks**
	b	A 4 KVA ,200/400V Single phase Transformer supplying full load current of 0.8pf lagging The OC & SC test results are : OC Test:200V,0.8A,70W SC Test 20V,10A,60W(LV Side) i) Calculate efficiency and secondary voltage ii) The load at upf corresponding to maximum efficiency	**8 Marks**
	c	What is all day efficiency of transformer? how to calculate it?	**4 Marks**

or

2	a	Show that open delta connection has a KVA rating of 58% of the rating of the normal delta delta connection.Also list the limitations of open delta connection	**8 Marks**
	b	It is desired to transform 2,400 V, 5000 KVA three phase power to 2-phase power at 600V by scott -connected transformers. Determine the voltage current and current ratings of both primary and secondary of each transformer. Neglect the transformer no load currents	**8 Marks**
	c	State the advantages of single 3- phase unit transformer over bank of single phase transformers	**4 Marks**

Module 2

3	a	With a neat circuit diagram explain in detail sumpner test for determining the efficiency and voltage regulation of transformer	**8 Marks**
	b	Derive an expression for the currents and load shared by two transformers connected in parallel supplying a common load when no load of these are equal	**6 Marks**
	c	Two single phase Transformers ,rated at 250KVA each are operated in parallel on both sides. Impedances of transformers are (1+j6)Ω and (1.2+j4.8) Ω respectively .Find the load shared by each when the total load is 500KVA at 0.8pf Lagging	**6 Marks**

or

4	a	What is an Auto Transformer ? Derive an expression for the saving of copper in an Auto transformer as compared to an equivalent two winding transformer . What are the advantages and limitations?	**8 Marks**
	b	With the help of sketches explain the working of on load tap changer	**8 Marks**
	c	A 10KVA 230/110V transformer is used to be as step up transformer to step up 230V to 340V.What will be the output rating of the transformer	**4 Marks**

Module 3

5	a	What is the necessity of tertiary winding and explain its operation in star/star transformers.	**8 Marks**
	b	What is armature reaction? With neat figures, explain the armature reaction in dc machines under normal working conditions	**8 Marks**
	c	A four pole lap wound armature running at 1400 rpm delivers a current of 100A and has 64 commutator segments.The brush width is equal to 1.4 segments and inductance of each coil is 0.05mH.Calculate the value of reactance voltage assuming i) linear commutation. ii) Sinusoidal commutation	**4 Marks**

or

6 a Derive EMF equation and expression for distribution factor and pitch factor of Synchronous generator **8 Marks**

b Explain Synchronous reactance of Synchronous generator **7 Marks**

c A 4 pole, 3phase, 50Hz star connected alternator has 60 slots with 4 conductors/slot. The coils are short pitched by 3 slots. If the phase spread is 60^0, find the phase voltage induced for a flux/pole of 0.943wb.sinusoidally distributed in space. All the turns/phase are in series **5 Marks**

Module 4

7 a Discuss the effect of change of excitation at constant load **8 Marks**

b Two identical 2000KVA alternators operate in parallel. The governer of the prime move of first machine is such that frequency drops uniformly from 50Hz on no load to 48 Hz on full load. The corresponding uniform speed drop of the second machine is 50Hz to 47.5H.Find how will the two machines share a load of 3000KW **6 Marks**

c Derive the expression for synchronizing power **6 Marks**

or

8 a A 3 phase star connected synchronous generator supplies current of 10A having phase angle of 20 degree lagging at 400V.Find the load angle and components of armature current Id & Iq.If Xd=10Ω and Xq=6.5 Ω.Armature resistance to be negligible **6 Marks**

b Write a note on V Curves of synchronous Generator **6 Marks**

c With a neat circuit diagram ,explain the slip test on salient pole synchronous machine and indicate how Xd and Xq can be determined from slip test. **8 Marks**

Module 5

9 a Name the various methods for determining the voltage regulation for 3 phase alternator and describe any one method in detail **7 Marks**

b A 2300V ,50Hz,3-phase star connected alternator has an armature resistance of 0.2Ω.A field current of 35A produces a current of 150A on short circuit and an open circuit emf 780V(line).Calculate the voltage regulation at 0.8pf lagging and 0.8pf leading for the full load current of 25A **8 Marks**

c With a neat sketch explain OCC & SCC characteristics of an alternator **5 Marks**

or

10 a Write a note on capability curve of synchronous generator **6 Marks**

b The following test results are obtained on a 6600V alternator: **8 Marks**

Open circuit voltage	3100	5000	6600	7500	8300
Field current(amps)	16	25	37.5	50	70

A field current of 20A is found necessary to circulate full load current on short circuit of the armature. Using ampere-turn method, find the full load regulation at 0.8 pf lagging

c What is hunting in synchronous machines? Explain the role of damper winding. **6 Marks**