CBCS SCHEME

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17EE33

Third Semester B.E. Degree Examination, July/August 2021
Transformers and Generators

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 a. With the help of a Phasor diagram, explain the operation of practical transformer feeding inductive load. **(06 Marks)**

b. A 10KVA 200/400V 50Hz single phase transformer gave the following test results :

OC test : 200V 1.3A 120W On Low Voltage side
SC test : 22V 30A 200W On High Voltage side

Calculate i) the magnetizing current and component corresponding to core loss.
ii) the magnetizing branch impedances.
iii) percentage voltage regulation when supplying full load at 0.8 power factor leading. **(08 Marks)**

c. Show that open delta connection of three phase transformer has KVA rating 58% of that of delta connection. **(06 Marks)**

2 a. With the help of phasor diagram, explain how two phase supply can be obtained from three phase supply using Scott connection. **(07 Marks)**

b. Define All day efficiency of distribution transformer. What is the significance of it? **(06 Marks)**

c. A three phase 1000KVA 6600/1100V transformer is delta connected on the primary and star connected on the secondary. The primary resistance per phase is 1.8Ω and secondary resistance per phase is 0.025Ω. Determine the efficiency when the secondary is supplying full load at 0.8 pf and the iron loss is 15KW. **(07 Marks)**

3 a. Explain the Sumpner's test conducted on two similar transformers. Mention its advantages. **(08 Marks)**

b. Two single phase transformer share a load of 400KVA at power factor of 0.8 lagging. Their equivalent impedances referred to secondary winding are (1 + j2.5) Ω and (1.5 + j3) Ω respectively. Calculate load shared by each transformer. **(06 Marks)**

c. What is Tap Changer? Describe the operation of NO load tap changer. **(06 Marks)**

4 a. What is the necessity of tertiary winding? How stabilization is achieved in Star – Star transformer by tertiary winding? **(08 Marks)**

b. Derive an expression for copper saving in an auto transformer as compared to an equivalent two winding transformer. **(08 Marks)**

c. Discuss the necessary conditions for the due parallel operation of two transformers. **(04 Marks)**

5 a. What is Armature reaction in DC machines? Explain the methods to reduce the effects of armature reaction. **(07 Marks)**

b. A 4 pole Lap wound armature running at 1500rpm delivers a current of 150A and has 64 commutator segments. The brush spans 1.2 segments and inductance of each armature coil is 0.05mH. Calculate the value of reactance voltage using
i) Linear commutation ii) Sinusoidal commutation. **(06 Marks)**

c. A 4 pole 3 phase 50Hz star connected alternator has 60 slots with 4 conductors per slot. Coils are short pitched by 3 slots. If the phase spread is 60^0, find the line voltage induced for a flux per pole of 0.943 wb distributed sinusoidally. All the turns per phase are in series. **(07 Marks)**

6 a. With neat diagram, explain the process of commutation in DC machines and explain any one method of improving commutation. **(08 Marks)**

b. Derive the emf equation of a synchronous generator. **(06 Marks)**

c. The stator of a 3 phase alternator has 9 slots per pole and carries a balanced 3 phase double layer winding. The coils are short pitched and the coil pitch is 7 slots. Find the distribution factor and pitch factor. **(06 Marks)**

7 a. Describe the slip test conducted on salient pole synchronous generator and indicate how X_d and X_q can be determined from slip test. **(07 Marks)**

b. What is Synchronization? Explain the need for parallel operation of alternators. **(06 Marks)**

c. Discuss the effect of change of excitation of constant load in Synchronous generator. **(07 Marks)**

8 a. Derive an expression for synchronizing power. **(07 Marks)**

b. Write a technical note on V curves. **(05 Marks)**

c. With phasor diagram, explain the concept of two reaction theory in a salient pole alternator. **(08 Marks)**

9 a. Describe the procedure of ZPF method of obtaining voltage regulation of an alternator. **(10 Marks)**

b. The open and short circuit test readings of a 3 phase star connected 1000 KVA, 2000V 50Hz synchronous generator are.

Field current (A)	10	20	25	30	40	50
OC terminal voltage (V)	800	1500	1760	2000	2350	2600
SC armature current (A)	-	200	250	300		

The armature effective resistance is 0.2 Ohms/phase. Draw the characteristic curves and estimate the full load voltage regulation for i) 0.8 pf lag and ii) 0.8 pf leading. **(10 Marks)**

10 a. Write a note on Capability curve of synchronous generator. **(07 Marks)**

b. What is Hunting in synchronous machine? How it can be avoided? **(07 Marks)**

c. Define Short circuit ratio and explain its significance. **(06 Marks)**

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