B.E.(Electrical Engineering (Electronics & Power)) Semester Fifth (C.B.S.)

Electrical Machines - II

P. Pages : 2 **KNT/KW/16/7337**

Time : Three Hours *0652* Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. a) Why are the coils of alternators stator winding short pitched also state the advantage & disadvantage of short pitched distributed armature wdg over full pitched concentrated wdg. **6**

b) A 3-ph, 8-pole, 750 rpm, Y-connected alternator has 72 slots on armature. Each slot has 12 conductor & single layer armature wdg is short corded by 2 slots. Find : **7**
i) Pitch factor & distributed factor
ii) emf induced per phase if the flux per pole is 0.06 wb sinusoidally distributed along pole pitch (at rated speed)

OR

2. a) Explain the synchronous impedance method to find regulation of alternator. **6**

b) A 100 kVA, 11 kv, 50 Hz, 3-Ph, Y-connected alternator has $r_a = 0.5\Omega/\text{Ph}$ & $x_s = 6\Omega/\text{Ph}$. Calculate the regulation of this alternator at full load 0.8 p.f lagging & half load 0.8 p.f. leading. Draw the phasor diagram. **7**

3. a) Explain the effect of armature reaction in 3-ph synchronous generator at lagging, leading & unity p.f. **7**

b) Explain the potier reactance method to find the regulation of 3-ph alternator. **7**

OR

4. a) Why two reaction theory is considered in salient pole synchronous gen^r ? Explain it in brief and draw the phasor diagram of salient pole machine as a generator. **7**

b) A 100 kvA, 3000V, 50Hz, Y-connected alternator has armature resistance of 0.2Ω & field current of 40A produces short circuit of 215A & O.C. voltage of 1100 V (line to line). Calculate the full load voltage regulation at 0.8 p.f. lagging & 0.8 p.f. leading. **7**

5. a) Derive the steady state power - angle characteristics for salient pole synchronous generator. What is reluctance power. Assume armature resistance negligible. **7**

b) What are the importance of short circuit ratio for synchronous machine. **6**

OR

6. a) A salient pole synchronous generator has $R_a = 0.01$ P.U. $X_d = 1PU$ & $X_q = 0.8PU$. **7**
Calculate the voltage regulation of the alternator at rated current & voltage at 0.8 p.f. lagging. Also calculate the regulation if the same alternator is loaded to rated current at 0.8 leading p.f. keeping the excitation same in earlier case. Draw the phasor diagram.

b) Write the condition for parallel operation of synchronous generator. Also explain any one method for synchronization. **6**

7. a) How negative and zero sequence reactance's are measured in laboratory. **6**

b) A 2300 V, 3 phase, star connected synchronous motor has a resistance of 0.2 ohm per phase and a synchronous reactance of 2.2 ohm/phase. The motor is operating at 0.5 power factor leading with a line current of 200 A. Determine the value of generated emf per phase. **7**

OR

8. a) A 3-ph Y connected 6600V, 1500 kw synchronous has synchronous impedance of $2 + j20\Omega/ph$. The motor works at constant excitation. The mechanical & core losses in the machine are 10 kw when the output of the motor is 750 kw. The p.f. is 0.8 leading. **7**

b) Explain the effect of increased excitation on constant load. **6**

9. a) Draw the nature of short circuit current on time axis when 3-ph synchronous generator is suddenly short circuited show various reactance acting in the phenomenon. **7**

b) Explain V & inverted V curve of a synchronous motor with the effect of load & no. load. **6**

OR

10. a) Explain the hunting in detail. **6**

b) Compare synchronous motor & induction motor write the application of synchronous motor. **7**

11. a) Explain the construction details & working of BLDC motor. **7**

b) Explain the construction & working of universal motor. **7**

OR

12. Write short notes on : **14**

i) Repulsion motor

ii) Hysteresis motor

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