

III B.Tech I Semester Supplementary Examinations, May 2005
ELECTRO MECHANICS-III
(Electrical & Electronic Engineering)

Time: 3 hours**Max Marks: 70**

Answer any FIVE Questions
All Questions carry equal marks

1. Derive an expression for an induced e.m.f in a synchronous generator. Also explain how the e.m.f is having sinusoidal wave form.
2. Explain the effect of armature reaction on terminal voltage of an alternator at
 - (a) u.p.f.
 - (b) zero p.f. load.Draw the relevant phasor diagrams. What is leakage reactance?
3. Explain the merits and demerits of EMF and MMF methods. Explain what are the assumptions made in each case.
4.
 - (a) Define the significance of transient and sub-transient reactances in an alternator.
 - (b) Two 15KVA, 400V, 3-phase alternators in parallel supply a total load of 25 KVA at 0.8 p.f. lagging. If one alternator shares half the power at unity power factor, determine the power factor and KVA shared by the other alternator.
5.
 - (a) Explain the principle of operation of a synchronous motor.
 - (b) A 3- ϕ , star connected synchronous motor has a synchronous reactance of a 4Ω / phase and is working on 1,100V bus-bar. Calculate the power factor of this machine when taking 90KW from the mains, the excitation being adjusted to a value corresponding to an induced emf of 1,200V. Neglect armature resistance.
6. A 350kVA, 60Hz, 1200rpm star connected salient pole, 2300V alternator is used as a synchronous motor and delivers 450HP. Calculate the per unit excitation necessary for the machine to operate
 - (a) at UPF with an efficiency of 95.6%.
 - (b) at 0.8 power factor lagging with an efficiency of 94%
 - (c) 0.8 power factor leading with an efficiency of 94%.Draw the phasor diagram and find the power angle
7.
 - (a) Using double revolving field theory explain the torque-slip characteristic of a single phase induction motor and prove that it cannot produce starting torque.
 - (b) Explain the constructional details and principle of operation of a split phase induction motor. Listout its industrial applications.

8. (a) Compare various types of single phase induction motors in terms of construction and performance
- (b) The resistance and inductive reactance of each winding of a 50Hz single phase capacitor induction motor are 80 ohms and 237.5 ohms respectively. Additional resistance “R” and a capacitor “C” are in series with one winding inorder to achieve a phase difference of 90 degrees while both windings carry equal current. Calculate the values of R and C.

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