



- 6 a. Define voltage regulation of an alternator. Describe synchronous impedance method to determine regulation of an alternator for lagging, upf and leading power factors. Compare its merits over mmf method. (12 Marks)
- b. A 3300V, 200 kVA, 3 phase star connected alternator has an armature resistance of  $0.6\Omega/\text{ph}$  and synchronous reactance of  $6\Omega/\text{ph}$ . Calculate the percentage regulation when the rated output at 0.8 lagging pf is switched off. (08 Marks)
- 7 a. If two synchronous machine having different impedances and different induced emfs are connected in parallel, explain with equations, how they share a common load and what will be its common terminal voltage? (10 Marks)
- b. Two three phase 6.6 KV star connected alternators supply a load of 3000 KW at 0.8 pf lagging. The synchronous impedance per phase of these machines are respectively  $(0.5 + j10)\Omega$  and  $(0.4 + j12)\Omega$ . The excitation of one machine is adjusted so that it delivers 150A at lagging pf and the governors are set so that the load is shared equally between the machines. Determine: (i) The current (ii) Power factor (iii) Induced emfs (iv) Load angle of each machine. (10 Marks)
- 8 a. Obtain an expression for the power-angle equation of a salient pole alternator connected to infinite bus. Sketch the characteristics and comment on its shape. (10 Marks)
- b. A 1800 KVA, star connected, 6.6 KV salient pole synchronous motor has  $X_d = 23.25\Omega$  and  $X_q = 14.5\Omega$  per phase. Its effective resistance is zero. Calculate the excitation emf and when the motor is supplying rated load of 0.8 pf leading. If the excitation is cut off, find the maximum load that the motor can supply. (10 Marks)

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