

R09

Code: 9A02505

III B. Tech I Semester (R09) Supplementary Examinations, May 2012

ELECTRICAL MACHINES III
(Electrical & Electronics Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Explain the stationary armature and rotating armature. What are the advantages of rotating armature over stationary armature?
- 2 (a) Explain the sources of harmonics. What are the various effects of harmonics on generated emf in an alternator?
(b) Determine the breadth and pitch factors for a 3-phase winding with 2 slots per pole per phase. The coil span is 5 slot-pitches. If the flux density wave of the fundamental and a 24% third harmonic, calculate the percentage increase in the phase voltage due to the harmonic.
- 3 (a) Describe the slip test method for the measurement of X_d and X_q of synchronous machines.
(b) The no load excitation of an alternator required to give rated voltage is 1p.u. in a short circuit test with full current flowing in the armature, the field excitation was 0.75p.u. determine the approximate excitation that will be required to give full-load current at 0.866p.f. lagging at the rated terminal voltage.
- 4 (a) Discuss load sharing between two alternators.
(b) The speed regulation of two 500 kW alternators A and B running in parallel are 100% to 105% from full load to no load respectively. How will the two alternators share a load of 800 kW and also find the load at which one machine ceases to supply any portion of the load?
- 5 (a) A sub-station operating at full load of 1000kVA supplies a load at 0.75 power factor lagging. Calculate the permissible additional load at this power factor and the rating of synchronous condenser to raise the substation power to 0.9 lagging.
(b) Derive the expression for the maximum power developed by a synchronous motor.
- 6 (a) What is meant by power circle? Illustrate the locus of armature current variation with constant mechanical power developed.
(b) Explain the methods of starting the synchronous motor against the light loads and high load torques.
- 7 Compare the various types of single-phase induction motors in terms of construction and performance.
- 8 With neat diagram explain the construction and working of variable reluctance stepper motor. Also explain its static and dynamic characteristics.
