Code: EE5T1

III B.Tech - I Semester – Regular Examinations - November 2015

ELECTRICAL MACHINES-III
(ELECTRICAL & ELECTRONICS ENGINEERING)

Duration: 3 hours   Max. Marks: 70

Answer any FIVE questions.   All questions carry equal marks

1. a) Explain integral slot and fractional slot windings.   7 M

   b) Calculate the line emf generated by a 3-ϕ, 50Hz, 4 pole
      alternator if it has the following constructional details
      72 slots, 10 conductors per slot, winding is short chorded
      by 2 slots and flux per pole is 0.05Wb.   7 M

2. a) Explain the realistic model of synchronous generator which
      include winding resistance, leakage flux and armature
      reaction.   7 M

   b) Write in detail the experimental determination of
      synchronous impedance and justify on accuracy of your
      method.   7 M

3. a) Explain synchronous impedance method for determination
      of voltage regulation of an alternator justify why this
      method is often called pessimistic.   7 M

b) Determine voltage regulation of a 30KVA, 440V, 3-ϕ, 50Hz alternator at a lagging power factor of 0.8, through mmf method, if it gave the following open circuit and short circuit test data. Resistance between two phase terminals is being 3Ω.   7 M

Field Current (A)	2	4	6	7	8	10	12	14
Terminal Volage (V)	155	287	395	440	475	530	570	592
S.C Current (A)	11	22	34	40	46	57	69	80

4. a) Explain parallel operation of alternators in terms of load sharing.   7 M

   b) Explain sub-transient, transient and steady state reactance of an alternator.   7 M

5. a) Explain synchronous condenser.   7 M

   b) Draw the phasor diagram of synchronous motor at lagging power factor conditions.   7 M

6. a) Explain hunting phenomena in synchronous machines.

7 M

b) Write in detail how damper winding can reduce hunting in synchronous machine. 7 M

7. Explain principle of operation of AC series motor with neat sketch and write the applications. 14 M

8. Explain principle of operation of variable reluctance stepper motor with neat sketch and write the applications. 14 M