Total No. of Questions :5] *[Total No. of Printed Pages : 4*

EE - 501

B.E. V Semester

Examination, December 2015

Electrical Machine - II

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each questions are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Define the terms :

   i) Distribution factor

   ii) Pitch factor

   b) Draw phasor diagram of an alternator at lagging power factor.

   c) What are the causes of harmonics in voltage and current wave of electrical machinery and what means are taken in design to reduce them?

   d) Two similar 1500 kVA alternators operate in parallel. Their prime-mover characteristics are such that the frequency of alternator 1 drops uniformly from 50.5 Hz on no load to 49.0 Hz on full-load and that of alternator 2 from 50 Hz to 48 Hz. How will the two alternators share a load of 2250 kW?

OR

Explain the two-reaction theory pertaining to a salient pole synchronous machine and show how it can be used to predetermine the regulation of alternators.

Unit - II

2. a) State the characteristic features of a synchronous motor.

   b) Draw the V-curves for a synchronous motor.

   c) Draw and explain the phasor diagram of synchronous motor operating at -

      i) Lagging power factor

      ii) Unity power factor

   d) What are the factors which cause hunting in synchronous motor? Why is it undesirable? What is done to minimise hunting?

OR

Discuss briefly why synchronous motors are not inherently not self-starting. Explain the different methods for starting of synchronous motors.

Unit - III

3. a) What are the causes of disturbances in synchronous machines?

b) Define the following terms :

i) Transient reactance

ii) Synchronous reactance

iii) Sub transient reactance

c) Describe in brief how transient parameters can be determined from short circuit oscillogram.

d) A cylindrical-rotor synchronous motor, connected to an infinite bus, is working under full load condition with a load angle of 30°. If the shaft load is suddenly increased to 1.5 times the full load, determine whether or not the synchronism is maintained.

OR

Draw the sketches of 3-phase armature current showing their variation with time after a sudden 3-phase symmetrical short circuit is suddenly applied at the alternator terminals. How can the reactances X_{∂}'', X_{∂}', X_{∂} and time constants T_{∂}'', T_{∂}' can be determined from these oscillograms?

Unit - IV

4. a) What is Kron's primitive machine?

b) Draw the primitive machine diagram for synchronous machine with amortisseurs.

c) Explain the basic reason of using transformations in electrical machines.

d) Deduce Park's transformation relating the three phase currents of a synchronous machine to its corresponding ∂-q axes current.

OR

Obtain the voltage equations for the Kron's primitive machine.

Unit - V

5. a) State the difference between a SRM and a conventional motor.

b) Describe the slew range and microstepping of switched reluctance motor.

c) Discuss the principle of working of linear levitated machine. Give its typical application.

d) Explain the constructional features and principle of working of Permanent Magnet Brush Less DC motor. Discuss the advantages of PMBLDC over conventional DC machine.

OR

Explain the constructional features and principle of working of switch reluctance motor. Discuss how motoring and regeneration is achieved in SRM.

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