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Total Number of Pages: 2

M.TECH
EEPC102

1st Sem M.Tech / Exregular Examination 2015-16
POWER APPARATUS & SYSTEMS
BRANCH(S): POWER SYSTEM ENGG

Time: 3 Hours

Max marks: 70

Q.CODE: T914

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

- Q1 Answer the following questions: (2 x 10)
- a) What are the different types of windings used in electrical machines? Also write down based on types of machine which combination of these windings are used.
 - b) What are the properties of Pseudo-stationary coils?
 - c) Draw the structure of a detailed excitation system model.
 - d) Write down the voltage equations for a single phase capacitor type induction motor.
 - e) Draw the operating chart of a synchronous generator and identify each region.
 - f) What is the requirement of fictitious axis coil in the primitive synchronous machine?
 - g) Write down the instantaneous applied torque expression for a primitive machine.
 - h) Draw the phasor diagram of a uniform air gap synchronous machine. Also draw the equivalent circuit of it.
 - i) Draw the operating characteristic of a DC machine. Also draw the load characteristic of DC machine.
 - j) What are the consideration are taken into account in the selection of governor settings?
- Q2 a) Draw and explain an idealized two pole machine for synchronous machine and cross field DC machine. Also draw and explain a four coils primitive machine. (5)
- b) Explain the sign convention & per unit system of a two winding transformer. Explain complete self inductance, leakage inductance and mutual inductance. What is the advantages of the per unit system? (5)
- Q3 a) What are the general equations of the induction motor in terms of park's equation and kron's equation? Differentiate between these two equations. Also write down the d-axis and q-axis voltage equation of a double cage induction machine. (5)

- b) Write down the equations for small changes & small oscillation of a simple DC machine. Also write down the sudden short circuit condition of a DC generator. (5)
- Q4 Explain the three phase to two phase transformation due to park. Write down the expression for both voltage as well as current transformation. Write down the expression for power input in both the cases. Explain why the power input is non-invariant in nature. (10)
- Q5 a) Draw and explain the power angle relation and synchronizing torque coefficient of a synchronous machine while connected to a external supply. (5)
- b) What are the two methods are commonly adapted to obtained surge protection? What are the factors on which installation of arrestor depends? Draw and explain the typical diverter connections. (5)
- Q6 a) What are the basic elements which are used to model excitation system? Explain. (5)
- b) What are the main methods are used for calculating the response of a linear system? (5)
- Q7 a) What is the short circuit condition of a loaded synchronous generator and what is the unsymmetrical condition of a synchronous generator? (5)
- b) What is the short circuit test carried out to determine the transient parameters incase of induction motor? Explain. (5)
- Q8 Write short notes(Any Two) (5 x 2)
- a) Zinc oxide surge arrestors
- b) Complete turbine model
- c) Short circuit oscillograms
- d) Liapunov's direct method