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Total Number of Pages: 2

M.TECH
PEPC102

1st Sem Mtech Examination – 2016
POWER APPARATUS & SYSTEMS
BRANCH(S): POWER ELECTRONICS AND DRIVE

Time: 3 Hours

Max marks: 70

Q.CODE: T1074

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)
- What are the different types of windings used in electrical machines? Explain the significance of damper windings.
 - Which coils are called 'pseudo-stationary'? Give examples.
 - Explain the term 'complete self inductance of a coil'. Take one single phase two winding transformer as an example.
 - Draw the operating characteristic of a DC machine. Also draw the load characteristic of a DC machine.
 - Draw a neat cross sectional sketch showing the common features of all electrical machines.
 - Draw the equivalent circuit and phasor diagrams of a polyphase induction motor.
 - Why there is the requirement of earthing of surge diverters for transformer protection?
 - What are the considerations are taken into account in the selection of governor settings?
 - What are the guidelines for the selection of appropriate models of Hydraulic Turbines?
 - Name the two methods commonly adopted for surge protection of transformer.
- Q2 Write down the expression for electrical power ' P_d ' supplied to the D coil of the Kron's primitive machine in terms of its voltage and current inputs that includes terms involving ohmic losses, rate of change of stored magnetic energy and output power corresponding to the electrical torque. Using this, write down the expression for power ' P_e ' corresponding to the torque developed in Kron's primitive machine by the interaction between fluxes and currents in F, D, Q and G coils. Explain the sign convention for the instantaneous electrical torque. (10)
- 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. (5)

- b) Explain, in brief, how the stability assessment of a non-linear system can be done using Liapunov's direct method without solving the differential equations. (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 briefly explain the oscillograms of the armature during a sudden three phase short circuit. (5)
b) Explain how the transformers can be protected against 'surges'. (5)
- Q6 a) Draw a detailed Hydraulic System model and write down its wave equation. (5)
b) What are the main methods are used for calculating the response of a linear system? (5)
- Q7 a) Explain the modeling of excitation system and what are the basic elements used. (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) Insulation co-ordination in transformers
b) Synchronous generator Phasor diagram and equivalent circuit
c) Sudden short circuit studies of a DC generator
d) Surge Arrestors