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M.TECH
PSPC102

1st Semester Back Examination 2019-20

POWER APPARATUS & SYSTEMS
BRANCH : POWER AND ENERGY ENGG, POWER ENGG AND ENERGY SYSTEMS
Max Marks : 70
Time : 3 Hours
Q.CODE : HB582
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 properties of Pseudo-stationary coils?
b) Draw the basic diagram for Kron's primitive machine with two pole representation.
c) Define SCR of an alternator.
d) Write down the instantaneous applied torque expression for a primitive machine.
e) Draw the operating chart of a synchronous generator and identify each region.
f) Explain single phasing of a three phase induction motor.
g) Briefly explain the phenomenon of ferro resonant over voltage.
h) Enlist two basic characteristics of a good excitation system.
i) Explain the basic function of a power system stabilizer.
j) How a transformer is protected against an incipient fault?

Q2 **a)** What do you understand by Linear Transformation? Explain the significance of the Transformation Matrix. **(5)**
b) Explain various reference frames mentioning the importance of each of them. **(5)**

Q3 **a)** Draw the power angle characteristics of a synchronous machine explaining the various modes. Also explain the synchronizing coefficient. **(5)**
b) Discuss the significance transient and sub-transient impedance of a synchronous generator. **(5)**

Q4 **a)** What are the basic elements which are used to model excitation system? Explain. **(5)**
b) Draw and explain the block diagram of a brushless excitation system stating its advantages. **(5)**

Q5 **a)** Differentiate between symmetrical and unsymmetrical faults. Explain the transient behavior of a synchronous generator due to the above two fault types. **(5)**
b) Draw the electrical analogous circuit and explain the function of a hydraulic turbine. **(5)**

Q6 Explain the three phase to two phase Park transformation method for both voltages as well as currents. Write down the expression for power input in both the cases. What is the significance of frames of references? **(10)**

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Q7 Discuss about the general characteristics of over voltage and current inrush in transformers. Also state the need of the Insulation Coordination in transformers. **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**

a) Speed Governing System
b) Damper Windings of Synchronous Generators
c) Phenomenon of Ferro Resonant Over Voltage