Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

EEPC102/PEPC102/PPPC103

1st Semester Regular / Back Examination – 2016-17

POWER APPARATUS SYSTEMS

BRANCH(S): PED,PEED,PEPS

Time: 3 Hours

Max Marks: 70

Q.CODE:Y948

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) Which coils are called 'pseudo-stationary'? Give examples.
c) Explain the terms 'mutual inductance' & 'complete self-inductance' of a coil of one single phase two winding transformer.
d) Draw the equivalent circuit & phasor diagram of a uniform air gap synchronous machine.
e) Draw the operating chart of a synchronous generator and identify each region.
f) Write down the voltage equations for a single phase capacitor type induction motor.
g) What is the requirement of fictitious axis coil in the primitive synchronous machine?
h) Write down the instantaneous applied torque expression for a primitive machine.
i) What are the consideration are taken into account in the selection of governor settings?
j) Name the two methods commonly adopted for surge protection of transformer.

Q2 a) Draw and explain an idealized two pole synchronous machine and cross field DC machine. Also draw and explain a four coils primitive machine. Identify each winding. (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 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)

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 an external supply. (5)

b) Draw and briefly explain the oscillograms of the armature during a sudden three phase short circuit. (5)

Q6 a) 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)

b) What are the main methods are used for calculating the response of a linear system? (5)

Q7 a) 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)

b) What is the short circuit test carried out to determine the transient parameters in case of induction motor? Explain. (5)

Q8 Write short notes on any (5 x 2)

a) Complete turbine model
b) Sudden short circuit studies of a DC generator
c) Liapunov's direct method
d) Zinc oxide surge arrestors
e) Insulation co-ordination in transformers