END TERM EXAMINATION

SEVENTH SEMESTER [B.TECH.] DECEMBER 2019

Paper Code: ETEL-405	**Subject: Electrical Machines Design**
Time: 3 Hours	**Maximum Marks: 75**

**Note: Attempt any five questions including Q. No. 1 which is compulsory.
Select on question from each unit. Assume missing data if any.**

Q1 a) Discuss the major design consideration in electrical machine design. **(5)**
    b) Explain why hysterics pass and eddy current loss occur in a transformer. **(5)**
    c) Give the important difference in the design between power transformer and distribution transformer. **(5)**
    d) Why stator and rotor core of an induction motor are made of magnetic material. **(5)**
    e) Give application of synchronous motor with reasons. **(5)**

UNIT-I

Q2 a) Describe the basic principle of generator and motor. Why in electrical machine no. of stator poles showed be equal to number of rotor poles? **(6)**
    b) Explain the principle of working of DC machine for generating and motoring action. **(6.5)**

Q3 a) A shunt generator delivers 50KW at 250V and 400rpm. The armature resistance is 0.02Ω and field resistance is 50Ω. Calculate the speed of the machine when running as shunt motor and taking 50kw input to 250v. **(6)**
    b) Deduce the equation for e.m.f induced in DC machine. **(6.5)**

UNIT-II

Q4 a) Deduce the e.m.f equation of transformer. **(6)**
    b) The maximum efficiency of a 500KVA, 3300/500V, 50Hz single phase transformer is 97% and occurs at 75% of full load, unity power factor. If the impedance is 10%, Calculate the regulation at full-load power factor 0.8 lagging. **(6.5)**

Q5 a) Give the constructional differences between a core type and shell type transformer. **(6)**
    b) Derive the expression for efficiency of a transformer and find the condition for maximum efficiency. **(6.5)**

UNIT-III

Q6 a) Explain how the direction of rotation of split phase type single phase induction motor be reversed. **(6)**
    b) Explain the principle of working of three phase induction motor. **(6.5)**

Q7 a) Derive the condition for maximum torque and hence obtain the value of maximum torque of a poly phase induction motor. **(12.5)**

UNIT-IV

Q8 a) Draw the neat sketch showing the various parts of synchronous machines. **(6)**
    b) Explain the advantages of having a rotating field system rather than a rotating armature system in a synchronous machine. **(6.5)**

Q9 a) Explain the effect of change of excitation of a synchronous motor on its Armature Current. **(6)**
    b) Why synchronous machine are designed to have high ratio of armature reactance to resistance? **(6.5)**

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