Registration No : | | | | | | | | | | |

Total Number of Pages : 02 **B.Tech.**
BEEE2215

4th Semester Back Examination 2017-18
ENERGY CONVERSION TECHNIQUES
BRANCH : MARINE, MECH, METTA, MME
Time : 3 Hours
Max Marks : 70
Q.CODE : C995

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Q1 **Answer the following questions:** **(2 x 10)**

a) What is the need of a starter in DC motor ?

b) Between DC shunt and separately excited generators, whose terminal voltage is high? Justify.

c) Draw the phasor diagram of a single phase transformer on 0.8 p.f (lag) load ?

d) What is the advantage of slip ring induction motor over squirrel cage induction motor?

e) How does a dc motor adjust itself to match the mechanical load?

f) Why starting current of Induction motor is higher than the transformer?

g) Write down the torque expression for a DC machine Explain each term associated with it ?

h) A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50Hz; calculate the speed of rotor and rotor flux with respect to stator flux.

i) What is the basic difference between induction motor and synchronous motor?

j) Explain the reason for providing a capacitor in a single phase induction motor?

Q2 **a)** Compare DC shunt motor and DC series motor on the basis of Speed ~Armature Current characteristic, Torque ~Armature Current characteristic, Speed ~Torque Characteristic and their applications. **(5)**

b) A 4 pole, 32 conductors, lap-wound dc shunt generator with terminal voltage of 200volts delivering 12 amps to the load, has armature resistance 2 ohm and field resistance of 200ohms. It is driven at 1000rpm. Calculate the flux per pole in the machine. If the machine has to be run as a motor with the same terminal voltage and drawing 5A from the mains, find the speed of the motor. **(5)**

Q3 **a)** A 250/500V single phase transformer gave the following test results **(5)**
SC Test(HV side): 20V, 12A, 100W
OC Test(LV Side): 250V, 1A, 80W
Determine the circuit constants, insert these on the equivalent circuit diagram and calculate the efficiency when the output is 10A at 500V and 0.8 power factor lagging.

b) What do you mean by voltage regulation? Explain a test to find the voltage regulation of a transformer. **(5)**

Q4 **a)** A short shunt dc compound generator supplies 200A at 100V. The resistance of armature, series field and shunt field windings are 0.04, 0.03 and 60 ohms respectively. Find the emf generated if voltage drop per brush is 1V. Also find the emf generated if same machine is connected as a long shunt machine. **(5)**

b) Explain the process and condition of voltage build-up in a DC shunt generator **(5)**

Q5 **a)** What is the principle of operation of alternator? Explain synchronization of alternators. **(5)**

b) Explain the principle of operation of synchronous motor? Explain different methods to starting. **(5)**

Q6 **a)** A 200kVA transformer has an efficiency of 98% and upf. If the maximum efficiency occurs at three-quarters of full load. Calculate (i) iron loss(ii) copper loss at Full load (c) efficiency at half load. Ignore magnetizing current and assume a power factor of 0.8 lag at all loads. **(5)**

b) Draw and explain the torque slip characteristics of 3-phase induction motor. **(5)**

Q7 Explain the principle of single phase induction machine. Discuss various methods of starting. How it is different from three phase induction motor? **(10)**

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

a) Starting methods of three phase induction motor

b) Three point starter

c) DC shunt motor speed control