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

Total Number of Pages : 02 **B.Tech.**
BEEC2214

4th Semester Back Examination 2017-18
ENERGY CONVERSION DEVICES
BRANCH : AEIE, ECE, EIE, ETC, IEE
Time : 3 Hours
Max Marks : 70
Q.CODE : C1103

Answer Part-A which is compulsory and any five from Part-B.
The figures in the right hand margin indicate marks.
Answer all parts of a question at a place.

Part – A (Answer all the questions)

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

a) What type of DC motor is suitable for locomotive & why?
b) Explainthesignificance of Critical resistancein the voltage build up process?
c) A dc series motor is driving full load through a belt arrangement. What will happen if the belt breaks accidentally?
d) *In the equivalent circuit of transformer, $R_0$and $X_0$are connected in shunt where as $R_1$and X_1 are in series*. Justify.
e) A single-phase transformer has a maximum efficiency of 90% at full loadand unity power factor. What will be its efficiency at half load at the same power factor?
f) A field excitation of 20 A in a certain alternator results in anarmature current of 400A in short circuit and a terminal voltage of 3464Von opencircuit. What will be the magnitude of the internal voltage drop within themachine at a load current of 200A?
g) On what factors the maximum emf induced in a synchronous motor depends.
h) Differentiate between a single 3-phase transformer and a transformer bank.
i) Why the air gap length of induction motor is much smaller than synchronous motor.
j) Mention two applications of AC series motor.

Part – B (Answer any FIVE questions)

Q2 **a)** Discuss various losses and power stages of DC Generator and hence derivethe condition for maximum efficiency. **(5)**

b) A 230V DC shunt motor has field resistance of 115 Ω and armature circuit resistance of 0.5 Ω. At no load, the motor runs at 1000 rpm, with armature current of 4A and rated field flux. For a developed torque of 80Nm. compute armature current and speed. **(5)**

Q3 **a)** How no load characteristics of shunt generator can be drawn and explain how to determine critical resistance and critical speed from it. **(5)**

b) A 250V Dc shunt motor has an armature and field resistance of 0.5Ω & 250Ω respectively. When delivering a load at constant torque at 600 rpm, the armature current is 20A .It is desire to raise the speed to 800 rpm. What resistance should be inserted in the shunt field circuit? **(5)**

Q4 **a)** A 600kVA, single phase transformer has an efficiency of 92% both at full load and half load at unity power factor .Determine its efficiency at 60% full load at 0.8 p.f lag ? **(5)**

b) 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 and calculate the efficiency when the output is 10A at 500V and 0.8 power factor lagging.

Q5 **a)** A 3-phase, 20kVA, 415V, star connected alternator is delivering rated load at rated voltage and at pf 0.8 lagging. Its synchronous impedance is 0.1+j5Ω per phase. Find the load angle of operation and voltage regulation. **(5)**

b) Derive the expression of power in a cylindrical rotor alternator, and explain the power-angle curve with suitable diagram. **(5)**

Q6 **a)** A 3-phase induction motor having a 4pole, star connected stator runs from415V, 50Hz supply .The rotor resistance and standstill reactance are 0.12Ω and 0.85Ω per phase .The ratio of stator to rotor turns is 1.8 and full load slip is 4%. Calculate the developed torque at full load and maximum torque. **(5)**

b) What are the different methods available for controlling speed of 3-phase induction motor? Explain rotor resistance control method for controlling speed for slip ring induction motor? **(5)**

Q7 **a)** Explain the working of a Shaded Pole motor. **(5)**

b) Explain the torque slip characteristics of a single-phase induction motor. Explain how it can be started with the help of an auxiliary winding. **(5)**

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

a) Characteristics of Dc shunt generator.

b) O.C. and S.C. test of single-phase transformer.

c) Principle of operation and starting of a synchronous motor.

d) Star delta starting of 3 phase induction motor