

## 2006 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

III B.TECH I SEMESTER SUPPLEMENTARY EXAMINATIONS  
**ELECTRO MECHANICS II**  
 (ELECTRICAL & ELECTRONIC ENGINEERING)

NOVEMBER 2006

TIME - 3 HOUR  
 MARK - 80

**Answer any FIVE Questions**  
**All Questions carry equal marks**

1. Derive an expression for an induced e.m.f in a synchronous generator. Also explain how the e.m.f is having sinusoidal wave form. [16]
2. A 3 - Phase, 50 Hz cylindrical - rotor synchronous machine has the following parameters. Self inductance per phase = 3.15M.H Armature leakage inductance = 0.35 m.h. For this machine, Calculate the mutual inductance between armature phases and its synchronous reactance. [16]
3. Explain how the Potier triangle can be drawn with the help of O.C.C and any two points on the Z.P.f curve and also explain the Potier reactance method of determining regulation of an alternator. [16]
4. (a) Two identical 2 MVA alternators operate in parallel. The governor of the first machine is such that frequency drops uniformly from 50 Hz on no load to 48 Hz on full load. The corresponding uniform speed drop of the second machine is 50Hz to 47.5 Hz.
  - i. How will the two machines share a load of 3 MW
  - ii. What is the maximum load at UPF that can be delivered without overloading either machine. [16]
5. A synchronous motor has an equivalent armature reactance of 3.3 The exciting current is adjusted to such a value that the open circuit emf is 950V. Find the pf at which the motor would operate when it takes 80kW from 800V supply line. [8+8]
6. (a) What are the advantages of synchronous motor over induction motors?  
 (b) Why at any load, the power factor decreases and the armature current increases if the field current is varied above and below the normal excitation. [8+8]
7. (a) Draw the equivalent circuit of a single phase induction motor and discuss the experimental procedure to determine the parameters  
 (b) Find the mechanical power out put of a 185Watts, 4pole 110volts, 50Hz single phase induction motor whose constants are given below at a slip of 0.05  
 $R1 = 1.86 \text{ ohms}$   $X1 = 2.56 \text{ ohms}$  [8+8]

$x_m = 53.5 \text{ ohms}$   $R_2 = 3.56 \text{ ohms}$

$x_2 = 2.56 \text{ ohms}$  Core loss = 4.0 Watts

Friction and windage losses = 13.0 Watts

8. (a) Compare the performance characteristics of a.c. series motor when it is connected across

i. a.c. supply and

ii. D.C. supply.

(b) Describe the construction and principle of operation of a single phase shaded pole motor with a neat diagram. Give its industrial applications

[4+4+8]

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