2008 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

II B.TECH II SEMESTER SUPPLIMENTARY EXAMINATIONS
ELECTRO MECHANICS-II
(ELECTRICAL AND ELECTRONIC ENGINEERING)

AUG/SEP 2008

TIME:3HOUR
MARK:80

ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS.

MARK [16*5=80]

1. (a) Prove that the EMF induced in the windings of the transformer will lag behind the flux by 900.

(b) Explain how equivalent circuit of transformer can be obtained?

2. (a) Sketch the percentage voltage regulation of single phase transformer as a function of power factor from zero leading to zero power factor lagging at rated current and 50% of rated current.

(b) In a 25 KVA 2000/200 volts transformer iron and copper losses are 350 and 400 watts respectively. Calculate the efficiency on UPF at

i. Full load

ii. Half full load

Determine the load for maximum efficiency and, iron and copper losses in this case.

3. A 20KVA, 2300/230V, two winding transformer is to be used as an auto trans- former, with constant source voltage of 2300V. At full load of unity power factor, calculate the power output, power transformed and conducted. If the efficiency of the two winding transformer at 0.6p.f.is 96%, find the auto transformer efficiency at the same power factor.

4. (a) What are the conditions required for the parallel operation of two transformers.

(b) Derive the equations for the currents supplied by each transformer when two transformers are operating in parallel with equal voltage ratios.

5. (a) Explain why the rotor of polyphase induction motor can never attain synchronous speed

(b) The rotor of a slip ring induction motor is connected to an AC source, where as its stator winding is short circuited. If rotating magnetic field produced by rotor winding' rotates clock wise, Explain the direction in which rotor must revolve.

6. (a) Derive the expression for torque in an induction motor.

(b) Derive the condition for maximum torque.

7. A 4KW, 400V, 3-phase, delta connected slip ring induction motor gave the following test results.
No load test : 210V, 16A, power factor = 0.45
Blocked rotor test :400V, 3.3A, power factor =0.174
Draw circle diagram and final maximum torque and corresponding efficiency and line current. At stand still rotor and stator resistances are equal.

8. The rotor of 3-phase slip ring induction motor has an induced voltage of 100V and impedance of 0.2 + j1 ohm at stand still. The induction motor has full load slip of 0.04 driving constant torque load and running at 1440 rpm. Calculate the voltage to be injected if the motor is to be driven at

(a) 800 rpm
(b) 1000 rpm