# JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY-2008

## II B.TECH SUPPLIMENTARY EXAMINATIONS
## ELECTRICAL TECHNOLOGY
## (COMMON ALL BRANCHS)

AUG/SEP 2008

TIME:3HOUR
MARK:80

### ANSWER ANY FIVE QUESTIONS ALL QUESTIONS CARRY EQUAL MARKS.

### MARK [16*5=80]

1. (a) Explain how a.c. voltage generated is converted to D.C. voltage in a generator?

(b) What is the main purpose of laminating the armature core of a D.C. Generator.

(c) A 4-pole, long shunt, lap wound generator supplies 25kw at a terminal voltage of 500 V. The armature resistance is 0.03 , series field resistance is 0.04 and shunt field resistance is 200 . The brush drop may be taken as 1 V. Determine the e m f generated.

2. (a) With a neat sketch, explain the working of a 3-point starter for d.c. shunt motor

(b) A 6-pole, 250V series motor is wave-connected. There are 240 slots and each slot has 4 conductors. The flux per pole is $1.75 \times 10^{-2}$Wb when the motor is taking 80A. The filed resistance is 0.05 , the armature resistance is 0.1 and the iron and frictional loss is 0.1kw. Calculate

i. Speed

ii. bhp and

iii. shaft torque.

3. (a) Derive the e. m. f. equation of a single-phase transformer and draw the no-load phaser diagram.

(b) A 40 kVA transformer with ratio of 2000 / 250 V has a primary resistance of 1.15 and a secondary resistance of 0.0155 . Calculate

i. the total resistance interms of secondary winding,

ii. the total resistance drop on full load, and

iii. the total copper loss on full load.

4. (a) Obtain the equivalent circuit of a single-phase transformer. Explain how to evaluate the equivalent circuit of a transformer from open circuit & short circuit tests.

(b) A 5 kVA, 220 / 110 volts, 1-phase transformer has a maximum efficiency of 96.97% at 0.8 p.f. lagging. It has a core loss of 50 watts and the full load regulation at 0.8 p.f. lagging is 5%. Find the efficiency and regulation at full load 0.9 p.f. lagging.

5. (a) Explain various power stages of a 3-phase induction motor.

(b) A 3-phase induction motor with r2 / x2 = 0.5, has a starting torque of 25.0 Nm. For negligible stator impedance and no-load current, determine the starting torque in case the rotor-circuit resistance per phase is

i. doubled

ii. halved.

6. (a) Derive e.m.f equation for an alternator and explain distribution factor and pitch factor used in e.m.f. Equation.

(b) Write the expression showing the relationship between speed frequency and no. of poles of a synchronous machine. The speed of rotation of the turbine driving an alternator is 166.7 r.p.m. What should be the no. of poles of the alternator if it is to generate voltage 50HZ.

7. (a) Compare 3 - f induction motor with 3 - f synchronous motor if any four aspects.

(b) The input to an 1100 V, 3 phase star connected synchronous motor is 60 A. The effective resistance and synchronous reactance per phase is 1 ohm and 30 ohm respectively. Find the power supplied to the motor and the induced e.m.f for a power factor of 0.95 leading.

8. (a) What is a stepper motor? Enumerate its advantages and applications.

(b) With neat sketch, explain the working principle of shaded-pole single-phase induction motor.