2005 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

I I B.TECH. I SEMESTER REGULAR EXAMINATIONS
PRINCIPALES OF ELECTRICAL ENGINEERING & NETWORKS
(COMPUTER SCIENCE ENGINEERING)

TIME: 3 HOURS
MARKS: 80

Answer any FIVE Questions
All Questions carry equal marks

1.. (a) Define RMS value, Average value and form factor of an alternating quantity and derive the values for full-wave rectified sine wave.

(b) State and explain Kirchhoff's wave.

(c) Find the total current delivered by the battery for the following circuit, using starldelta or delta star transformation.

2. (a) Derive the relationship between phase and line voltages for a balanced star connected system.

(b) Three similar coils, each having a resistance of 20 ohms and air inductance of 0.05H are connected in

i. star

ii. delta to a three phase, 50Hz, 400 v supply. Calculate the total power absorbed and the line current in each case.

3. (a) Derive the emf equation of a d.c. generator.

(b) Explain under what condition the d.c. generator will not be able to generate emf.

(c) In a 120 V compound generator, the resistances of armature shunt and series windings are 0.06ohms, 25 ohms. 0.04 ohms respectively. The load current is 100A at 120V. Find the induced emf and the armature current when the machine is connected as

i. long shunt

ii. short shunt.

4. (a) Derive the torque equations of a d.c. motor.

(b) Explain the characteristics of a d.c. shunt motor.

(c) Determine the developed torque and shaft torque of 220V, 4 pole series motor with 800 conductors wave connected supplying a load of 8.2 kW by taking 45A from the mains. The flux per pole is 25 mwb and its armature resistance is 0.6ohms.

5. (a) Explain the principle of working of a transformer as no-load.

(b) Derive the conditions for maximum efficiency of a transformer.

(c) Consider a 4 kvA, 200/400V, ring phase transformer supplying full-load current at 0.8 power factor. The O.C./S.C. tests results area as follows:O.C. Test : 200v, 0.8A, 70w (L.v.side) S.C. Test: 20v, 10A, 60w (h.v.side)determine:

i. The efficiency and regulation at 0.8 p.f. lag and lead

ii. Maximum efficiency.

6. (a) Explain the principle of working a three phase induction motor.

(b) Derive the emf equation of an alternator.

(c) A 4 pole, three phase, 50HZ star-connected alternator, has 60 slots, with 4 conductor per slot. Coils area short pitched by 3 slots. If the phase spread is 60o, find the line voltage induced for a flux per pole of 0.943 wb distributed sinusoidally. All the turns per phase are in series.

7. (a) State and explain superposition theorem.

(b) Find the Theverriu's voltage and impedance for the following circuit and hence find the load current through AB. Also find the maximum power transmitted to the load.

8. Write short notes on:

(a) Nortons theorem

(b) Duality

(c) 3-point starter.