B.Tech Degree III Semester Examination November 2002

IT/CS/EC/ME/EB/EI -302
ELECTRICAL TECHNOLOGY
(1999 admissions onwards)

Time: 3 Hours   Max. Marks: 100

(All questions carry *Equal* marks.)

I.   (a)   Draw phasor diagram of a single phase transformer on a leading p.f load and explain it.

    (b)   The core of a 100 KVA, 11000 V/550V, 50 Hz, single phase core type transformer has a cross section of 20 cm x 20 cm. Find -
        (i) the no. of H.V. and L.V. turns
        (ii)e.m.f. per turn.
    The maximum core density is not to exceed 1.3 Tesla.

OR

II.   (a)   The secondary of a current transformer should never be open circuited at load. Why ?

    (b)   In a 50 KVA transformer, the iron loss is 500 W and full load copper loss is 800 watts. Find -
        (i)   the efficiency at full load 0.8 p.f lagging.
        (ii)   the efficiency at half full load 0.8 p.f leading.

III.   (a)   Explain the conditions for build up of voltage in a shunt generator.

    (b)   The armature of a 12 pole d.c. shunt generator has 50 slots and is wave wound with 12 conductors per slot. The generator is running at a speed of 625 rpm and supplies to a resistive load of 15 ohms at a terminal voltage of 300V. The armature resistance is 0.5 ohm and field resistance is 60 ohms. Find the armature current, the generated e.m.f. and flux per pole.

OR

IV.   (a)   Explain the term Armature reaction as applied to a d.c. machine. How its effect can be reduced ?

    (b)   Compare the characteristics and applications of d.c. series and shunt motors.

V.   (a)   Explain the terms distribution factor and coil span factor of an alternator.

    (b)   A 3 phase, 4 pole, star connected alternator has 60 slots with 2 conductors per slot. The pitch of the coil is 3 slots less than pole pitch. The flux per pole is 0.125 Wb. Calculate the no load terminal voltage if the speed of the alternator is 1500 r.p.m.

OR

VI.   (a)   Explain what happens when the field of a synchronous motor is -
        (i)   under excited ?
        (ii)   over excited ?

    (b)   "Synchronous motor never runs at sub synchronous speed and Induction motor never runs at synchronous speed". Explain.

VII.   (a)   Define slip and synchronous speed of an Induction motor. What do you understand by negative slip, slip = 0, slip = 1 and slip above 1 ?

    (b)   A 4 pole, 50 Hz, slip ring Induction motor runs at 1440 rpm. At stand still the resistance and reactance of each motor phase are 4 and 3 ohms respectively. Find rotor power factor, slip and synchronous speed.

OR

VIII.   (a)   Explain any two starting methods of single phase induction motor.

    (b)   With a circuit schematic explain the working of a star delta starter.

IX.   (a)   Draw a neat schematic diagram of a nuclear power station and explain the functions of various components.

    (b)   Compare AC and DC transmission systems.

OR

X.   Write short notes on
        (i)   Overhead and underground systems.
        (ii)   Corona.
        (iii)   Importance of sub stations in maintaining steady voltage in the system.

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