Code No: R5210402

II B.Tech I Semester(R05) Supplementary Examinations, May/June 2010
ELECTRICAL ENGINEERING
(Mechanical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) State and explain Faraday's Law of electro magnetic induction. What are statically and dynamically induced EMFs.

   (b) Two magnetically coupled coils have a mutual inductance of 32mH. What is the average emf induced in one, if the current through the other changes from 3 to 15mA in 0.004 seconds? Given that one coil has twice the number of turns in the other, calculate the inductance of each coil. Neglect leakage. [6+10]

2. (a) Show that in a series RLC circuit, the resonant frequency is geometric mean of half power frequencies.

   (b) A balanced 3-phase, star connected load of (4+j3) Ω/phase is connected to a balanced 3-phase 400V supply. The phase current is 12A. Find total active power, reactive power and total apparent power. [8+8]

3. Explain the types of d.c. generators with the help of diagrams? [16]

4. (a) Why is starter is necessary for D.C.Motor

   (b) A 200V shunt motor has an armature resistance of 0.2Ω. The starting armature current must not exceed 50A. If the number of sections are 5, calculate the values of resistance steps to be used in the starter. [8+8]

5. (a) Draw the phasor diagram of a transformer on
        i. no-load
        ii. full-load
      with inductive load and explain

   (b) A Single phase transformer has 500 turns in the primary and 1200 turns in the secondary .The cross-sectional area of the core is 80 sq.cm. If the primary winding is connected to a 50 hz supply at 500V. Calculate
        i. peak flux density
        ii. voltage induced in the secondary. [8+8]

6. (a) State the effects of increasing rotor resistance on starting current, starting torque, maximum torque and full-load slip of an induction motor?

   (b) A 100KW, 3-Φ, 420V, 6-pole,50Hz wound rotor Induction motor, with its rotor winding short circuited, has a full-load slip of 0.04 and slip at maximum torque of 0.2 when operating at rated voltage and frequency.Find
        i. maximum torque
        ii. starting torque. If rotor resistance is doubled by adding external series resistance. Determine
        iii. slip at full-load output
        iv. full-load torque
        v. slip at maximum torque. [6+10]

7. (a) Compare salient pole and non salient pole type Synchronous machines

   (b) A 100-kVA, 3000-V, 50-Hz 3-phase star-connected alternator has effective armature resistance of 0.2 ohm. The field current of 40 A produces short-circuit current of 200 A and an open-circuits emf of 1040 V (lie value). Calculate the full-load voltage regulation at 0.8 p.f. lagging and 0.8 p.f. leading. Draw phasor diagrams. [6+10]

8. (a) Explain the Advantages & Disadvantages of MI Instruments

   (b) The deflecting torque of an ammeter varies as the square of the current passing through it . If a current of 5A produces a deflection of 90^0 .Find the value of current required for a deflection of 30^0 . if the instrument is
        i. Spring control
        ii. Gravity control. [8+8]

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