

**II B.Tech I Semester Supplementary Examinations, May 2005**  
**ELECTRICAL ENGINEERING**  
( Common to Mechanical Engineering, Chemical Engineering, Mechatronics,  
Metallurgy & Material Technology, Production Engineering and  
Aeronautical Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

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1. (a) Explain “Self and mutual Inductance”.  
(b) If a coil of 150 turns is linked with a flux of 0.01 wb when carrying of 10A, calculate the inductance of the coil.
2. (a) Deduce the relation between line voltages, line current and phase voltages, phase currents in a delta connected network.  
(b) A three phase 400V, 50Hz a.c. supply is feeding a three phase delta connected load with each phase having a resistance of 25.0. an inductance of 0.15H and a capacitance of 120F in series. Determine the line current, volt-amp, active power and reactive volt-amp.
3. (a) With neat sketches, explain the construction and functions of the various parts of a d.c. machine.  
(b) Calculate the emf generated by a 6 pole lap wound armature with 65 slots and 12 conductors per slot, when driven at 1000 rpm. The flux/pole is 0.02 Wb.
4. (a) Explain DC motor principle and its working  
(b) A 250V shunt motor on no-load runs at 1000rpm and takes 5A the total armature and shunt field resistances are  $0.2\ \Omega$  and  $250\ \Omega$  respectively calculate the speed when loaded and taking current of 50A if armature reaction weakens the field by 3%.
5. (a) Derive the EMF equation of a transformer.  
(b) In no load test on a 1-phase transformer the following test data were obtained.
  - i. Primary voltage 220V
  - ii. Secondary voltage 110 V
  - iii. Primary current 0.5A
  - iv. Power input 30Watts
  - v. Resistance of primary winding =  $0.6\ \Omega$Calculate
  - i. Turns ratio
  - ii. Magnetizing component of no load current.
  - iii. Working component of no load current.

- iv. Iron loss.
6. (a) What are no-load and blocked rotor tests? What sort of losses can be measured by these tests?
- (b) A 50 Hp, 6-pole, 50 Hz, slip ring induction motor runs at 960 rpm on full load with a rotor current of 40 A allowing 300 W for copper loss in the short-circuiting gear and 1200 W for mechanical losses, find the resistance  $R_2$  per phase of the 3-phase rotor winding.
7. (a) Explain the calculation part of %regulation after conducting OC and SC tests using EMF method.
- (b) 100KVA, 3KV, 50Hz, 3-phase star connected alternator has effective armature resistance of 0.2 Ohms. The field current of 30Amps produces SC current of 180 Amps and an OC volts of 1060V (line value). Calculate the full load voltage regulation at 0.707 PF lag and 0.8PF leading. Draw the phaser diagram.
8. (a) Give a summary of four different types of voltmeters commonly used in practice. State whether they can be used for AC or DC circuits. In one case, give a sketch showing the construction. With the method of control and damping employed.
- (b) A DC voltmeter has a resistance of  $28600\Omega$ . When connected in series with an external resistor across a 480V DC supply, the instrument needs 220V. What is the value of the external resistance?

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