

II B.Tech I Semester Supplementary Examinations, November 2006
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

1. Two coils having self inductances are 0.9H and 0.4H.their mutual Inductance is 0.3H. Find the Equivalent Inductance both are magnetized in
 - (a) same direction [6]
 - (b) opposite direction.Derive the formula used. [10]
2. (a) Give an expression of admittance when R, L and C are connected parallelly across a voltage source of V volts. [6]
(b) Two circuits, the impedances of which are give by $Z_1=(15+j12) \Omega$ and $Z_2=(8-j5) \Omega$ are connected in parallel. If the potential difference across one of the impedances is $(250+j0)$, calculate
 - i. total current and branch currents
 - ii. total power and power consumed in each branch and
 - iii. overall power factor and power factor of each branch. [10]
3. (a) Give a brief note on lap and wave windings. [6]
(b) A lap connected d.c. generator has 8 poles and 120 slots with 8 conductors in each slot. If the flux/pole is 0.035Wb
 - (i)find the emf generated when the speed is 600rpm
 - (ii) What should be the speed of rotation if the induced emf is to be 500V? [10]
4. (a) Give the voltag equation and power equation of a dc motor. [6]
(b) A 20KW, 250V dc shunt generator has armature and field resistances of 0.1Ω and 125Ω respectively. Calculate the total armature power developed when running
 - (i) as generator delivering 20 KW output.
 - (ii) as a motor taking 20 KW input [10]
5. (a) A 1-phase transformer working at 0.8 power factor has an efficiency of 94% at both three forth full load and at full load of 600 KW. Determine the efficiency at half full load [8]
(b) 10 KVA transformer has a turns ratio of 500/250V. The primary winding is connected to 1500V, 50Hz, supply. Calculate

- i. The secondary voltage on open circuit.
 - ii. Primary and secondary full load currents
 - iii. The maximum flux in the core. [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? [6]
- (b) The Stator impedance and equivalent rotor resistance of a 400V, 3-phase star - connected induction motor are $(0.05 + j0.2)$ ohms and $(0.05 + j0.24)$ ohms respectively. Neglecting exciting current determine the maximum gross power and the slip at which it occurs. [10]
- 7. (a) What is distribution factor? What are its effects? Derive an expression for distribution factor of an alternator? [8]
- (b) In a 60 KVA, 200V, 1-phase alternator, the effective armature resistance, and leakage reactance are 0.016 ohm, and 0.07 ohm respectively. Calculate the emf induced in the armature, when the alternator is delivering rated current at a p.f. of
 - i) unity;
 - ii) 0.7 lagging. [8]
- 8. (a) Sketch and describe the construction of a moving coil ammeter and give the principle of operation. [8]
- (b) A moving coil instrument gives full scale deflection with 15mA and has a resistance of 5Ω . Calculate the resistance of the necessary components in order that the instrument may be used as
 - i. a 2A - Ammeter
 - ii. a 100V voltmeter. [8]
