

**II B.Tech I Semester Supplementary Examinations, November 2006**  
**ELECTRICAL TECHNOLOGY**

**( Common to Electronics & Instrumentation Engineering, Bio-Medical  
Engineering and Electronics & Control Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions**  
**All Questions carry equal marks**

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1. (a) What is the difference between the short-shunt and long-shunt Compound Generators?  
(b) What is the function of an armature in a D.C. Generator.  
(c) Enumerate the conditions necessary for self excitation of a D.C. Generator.  
(d) 20 kw, 200V shunt generator has an armature resistance of  $0.05\Omega$  and a shunt field resistance of  $200\Omega$ . Calculate the power developed in the armature when it delivers rated output. [3+3+4+6]
2. (a) Explain the various methods of speed control of a D.C. Shunt Motor.  
(b) A 460V d.c. series motor runs at 1000rpm taking a current of 40A. Calculate the speed and percentage change in torque if the load is reduced so that the motor is taking 30A. Total resistance of the armature and field circuits is  $0.8\Omega$ . Assume flux is proportional to the field current. [8+8]
3. (a) Discuss the constructional features of transformers. Draw neat diagrams.  
(b) Calculate the flux in the core of a single-phase transformer having a primary voltage of 230 V, at 50 Hz and 50 turns. If the flux density in the core is 1Tesla, calculate the net cross-sectional area of the core. [8+8]
4. (a) Write short notes on open circuit and short circuit tests on 1-phase transformers.  
(b) Calculate the effective resistance and leakage reactance of a transformer, in terms of primary which gave the following data on test with the secondary terminals, short-circuited: Applied voltage, 60V; current, 100A; Power input, 1.2kW. [10+6]
5. (a) Explain the Autotransformer starters used in induction motors. What are its advantages?  
(b) A 200 kW, 3300 V, 6-pole, 50 Hz star-connected slip-ring induction motor has a star connected rotor. Stator to rotor turns ratio is 3.2. Rotor resistance and leakage reactance are  $0.1\Omega$  and  $1\Omega$  respectively. Neglect stator impedance. Find [8+8]
  - i. current and torque at starting on rated voltage and with slip rings short circuited and

- ii. the external resistance required to reduce the starting current to 50 A with across-the-line starting.

Compute also the starting torque under these conditions.

6. (a) Define voltage regulation of an alternator. Explain synchronous impedance method of determining the regulation of an alternator.
- (b) Calculate the voltage induced per phase in a 3phase 50 Hz, alternator having a flux per pole of 0.1515 wb. The no. of conductors in series are 360. Assume full pitch coil with a distribution factor of 0.96. [8+8]
7. (a) A 500V, 50 Hz, Single-phase synchronous motor takes 50A current at a power factor of 0.8 lagging. The motor has a synchronous reactance of 2ohm and negligible resistance. The armature has 120 full pitch coils in series, with a distribution factor of 0.95. Assuming a sinusoidal variation of flux in the air gap. Calculate the flux per pole.
- (b) Derive expressions for distribution factor and pitch factor. [8+8]
8. (a) Discuss the differences between capacitor start. Capacitor run and permanent split capacitor motors. [10]
- (b) A small motor has an output torque of 0.25 N.m and a speed of 100 rad/sec. If the input current is 0.6 A at 230 V and 0.6 lagging p.f find
- i. output power in watts [3]
- ii. efficiency. [3]

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