

II B.Tech I Semester(R07) Supplementary Examinations, May/June 2010
ELECTRICAL TECHNOLOGY

(Common to Electronics & Communication Engineering, Electronics & Instrumentation Engineering, Electronics & Control Engineering and Electronics & Computer Engineering)
 Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. The occ of dc generator at 1000 rpm is as given in Table.
 The machine is connected as shunt generator at 1000 rpm. The resistance of shunt field circuit is 60 ohms. Calculate:

Field current, I_f (A)	0.5	1.0	1.5	2.0	2.5	3.0	3.5
Voltage (E_g), Volts	60	120	138	145	149	151	152

- (a) the open circuit voltage
 - (b) The critical value of field resistance
 - (c) The terminal voltage when the load has a resistance of 4.0 ohms
 - (d) The load current when the terminal voltage is 100 V. Take $R_a = 0.1$ ohm and neglect armature reaction. [16]
2. (a) An 800kW, 500 V dc shunt generator has the following data:
- | | |
|--------------------------------------|--------------------------------------|
| Armature resistance = 0.005 Ω | Mechanical losses = 10kW |
| Iron losses = 11kW | Shunt field resistance = 50 Ω |
| Brush contact drop = 1v/brush | Stray losses = 1% of output |
- Find:
- i. efficiency at full load and
 - ii. efficiency at half - load.
- (b) Explain the field control method to control the speed of dc shunt motor. [8+8]
3. Discuss the constructional details of single - phase transformer and hence obtain the expression for induced emf of a transformer. [16]
4. (a) Explain different losses in a transformer. How these losses affect the efficiency of transformer.
- (b) The maximum efficiency of a 100kVA, 1 - phase transformer is 98% and occurs at 80% of full load at 0.8 p.f. If the leakage impedance of the transformer is 5%, find the voltage regulation at rated load of 0.8 p.f. lagging. [7+9]
5. (a) Explain slip and percentage slip.
- (b) A 6 pole, 50Hz induction motor runs on load at a shaft speed of 970 rpm calculate.
- i. Percentage slip
 - ii. the frequency of induced current in rotor.
- (c) An 8pole alternator runs at 750 rpm and supplies power to a 6pole induction motor which has a slip of 3% at full load . Find the full load speed of the induction motor and the frequency of its rotor emf? [8+8]
6. (a) Derive the expression for power developed by a synchronous generator.
- (b) A 3-phase alternator has a direct axis synchronous reactance of 0.7 p.u and a Quadrature axis synchronous reactance of 0.4 p.u. Draw the vector diagram for full load 0.8 p.f lagging and obtain the load angle. [8+8]
7. (a) Explain how the pulsating mmf of a 1-phase induction motor may be consider equivalent to two oppositely rotating fields .Develop an expression for the torque of the motor.
- (b) A 125watt, 4pole, 110V 60hz 1-phase induction motor has the no load rotational Losses of 25watt and the total rotor copper losses at rated load of 25 watt. At a slip of 0.06, what is the power input to the machine? (The rotor I^2R losses can be neglected). [8+8]
8. Discuss the source of errors in moving iron ammeters and voltmeters. [16]
