



B.E./B.Tech (FULL TIME) DEGREE EXAMINATION APRIL/MAY 2011

Electrical and Electronics Engineering

III Semester

EE 295 Electrical Machines

Time: 3 Hrs

Max.Marks:100

Answer All Questions

PART A (10 X 2 = 20)

1. How does the three phase system superior than single phase system.
2. List out the advantages and disadvantages of Two watt meter method.
3. How can the direction of DC shunt motor be reversed.
4. What is the role of commutator?
5. Define: All Day efficiency
6. Transformer rating is mentioned in kVA. Why?
7. State the application of Universal Motor.
8. Define: Skewing and Hunting
9. Mention the application of synchronous condensers.
10. Draw the V curve and inverted V curve for synchronous machine.

PART – B (5 X 16 = 80)

11. a.i. A balanced star connected load of $(4+j3)\Omega$ per phase is connected to a 400V, 3 phase 50Hz supply. Find i) line current ii) power factor iii) active power iv) reactive power. [8]

ii. The power input to a 2200V, 50Hz, 3 phase motor, running on full load at an efficiency of 90% is measured by two watt meters, which indicate 500kW and 200kW respectively. Calculate i) the total input power ii) the power factor iii) the line current iv) the horse power output. [8]
12. a.i. Discuss about the internal and external characteristics of DC shunt and series generators. [8]

ii. A 4 pole 240V wave connected shunt motor gives 11.19kW when running at 1000rpm and drawing armature and field currents of 50A and 1.5A respectively. The armature has 540 conductors and its resistance is 0.25Ω . Assuming a drop of 1 V per brush, find i) total torque ii) useful torque iii) efficiency. [8]

(OR)

12.b.i. Discuss about i) Armature voltage control and ii) Field current control methods. [6]

ii. A separately excited dc motor has following ratings and constants: 2.6HP, 120V, 1300rpm, $R_a=100\Omega$, $K_b=0.764\text{V}\cdot\text{s}/\text{rad}$, $L_a=0.03\text{H}$, $L_f=2.2\text{H}$. The dc supply is variable from 0 to 120V both to the field and armature independently. Draw the torque-speed characteristics of the dc motor if the armature and field currents are not allowed to exceed their rated values. The rated flux is obtained when the field voltage is 120V. Assume that the field voltage can be safely taken to a minimum of 12V only. [10]

13. a.i) A single phase 50kVA, 50 Hz 1100/110V single phase transformer has the following test results:

i. O.C. Test	: 110V, 1A,	100W on L.V. side
ii. S.C. Test	: 80V, Full Load Current	800W on H.V. side

Obtain the approximate equivalent circuit referred to LV side. [12]

ii) Derive the emf equation of single phase transformer. [4]

(OR)

13.b.i. A 3300V 50HZ transformer has a hysteresis loss of 1200W eddy current loss of 1800W and full load loss of 4000W. If the transformer is supplied at 5500V 75HZ, what will be the losses? Assume that the full load current remains the same. [8]

ii. Discuss about different types of 3 phase transformer connections. [8]

14. a. A 3 phase 440V, 50Hz star connected 4 pole squirrel cage induction motor has the following equivalent circuit parameters $R_s=0.3\Omega$, $R_r=0.2\Omega$, $X_s=X_r=0.4\Omega$ and $X_m=20\Omega$ constant no load loss=50W rotor speed = 1440 rpm. Compute the values of the following i) synchronous speed ii) slip iii) input current, power and power factor iv) rotor copper loss v) stator copper loss vi) developed torque vii) efficiency viii) starting stator current and torque ix) slip for maximum torque while motoring x) breakdown torque during motoring. [16]

(OR)

14.b.i. Describe about the double revolving field theory. [8]

ii. Explain various starting methods of induction motors. [8]

15.a.i. The input to an 11kV, 3 phase, star-connected synchronous motor is 50A. The effective resistance and synchronous reactance per phase are 1Ω and 25Ω respectively. Find i) the power supplied to the motor ii) the induced electromotive force for a power factor of 0.85 lagging and 0.85 leading. [10]

ii. Describe different starting methods of synchronous motor. [6]

(OR)

15.b.i. Derive the torque equation and emf equation of a synchronous machine. [8]

ii. Describe working principle of synchronous machine. [8]
