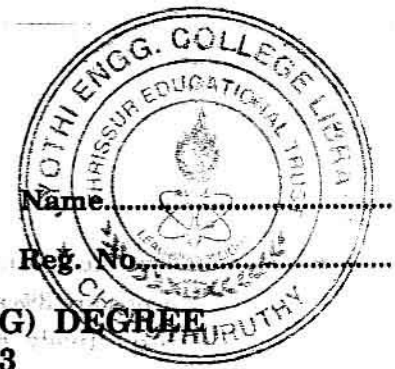


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**THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, NOVEMBER 2013**

AI 09 304—ELECTRICAL ENGINEERING

Time : Three Hours

Maximum : 70 Marks

Part A

Answer all questions.

1. What are the desirable conditions for D.C. generators to be connected in parallel ?
2. Why is the HV side of a single-phase transformer left open and the open circuit test is performed by energising the LV side ?
3. Why is a single-phase transformer rated in kVA ?
4. Give the relationship between the gross mechanical power output and the air gap power in a three-phase Induction motor.
5. What is meant by creep in an Induction type energy meter ?

(5 × 2 = 10 marks)

Part B

Answer any four questions.

6. Classify the d.c. generators and draw the external characteristics of each type of d.c. generator.
7. Explain the principle of operation of a single-phase transformer and hence derive an expression for induced e.m.f. from its first principles.
8. Discuss the phenomenon of armature reaction in a three-phase alternator for pure inductive load at the armature terminals.
9. Derive the condition for maximum torque at running condition for a three-phase induction motor.
10. Explain the possible errors that can occur in a Moving Iron instrument when both a.c. and d.c. quantities are measured.
11. Demonstrate how reactive power can be measured in a three-phase circuit by using two wattmeters.

(4 × 5 = 20 marks)

Part C

Answer Section (a) or Section (b) of each question.

12. (a) (i) Differentiate Lap and wave windings in a d.c. machine. (2 marks)

Turn over

- (ii) Two d.c. shunt generators are rated 230 kW and 150 kW, 400 V. Their full load voltage drops are 3% and 6% respectively. They are excited to no-load voltages of 410 V and 420 V respectively. How will they share a load of 1000 Amps and the corresponding bus voltage ?
(8 marks)

Or

- (b) (i) Compare the advantages of four point starter over three-point starter. (2 marks)
- (ii) A 10 kW, 250 V shunt motor has an armature resistance of 0.5Ω and a field resistance of 200 Ω . At no-load and rated voltage, the speed is 1200 r.p.m. and the armature current is 3 Amps. At full load 8 rated voltage, the line current is 47 Amps and because of armature reaction, the flux is 4% less than its no-load value. What is the full-load speed ? What is the developed torque at full load ?
(8 marks)
13. (a) Explain the different methods of cooling adopted in a single-phase transformer. (10 marks)

Or

- (b) (i) What is all day efficiency ? (2 marks)
- (ii) Draw and explain the phasor diagram respecting the relationship between different voltages and current of a single-phase transformer if the secondary is loaded with pure resistive and pure capacitive load.
(8 marks)
14. (a) Explain in detail the construction of a three-phase Induction motor. Also explain the different types of rotor construction ?
(10 marks)

Or

- (b) Explain how does a synchronous motor perform when the excitation current is increased from zero to rated value with the help of phasor diagram relating the induced voltage and the field currents.
(10 marks)
15. (a) Explain the kelvins double bridge method of measurement of Low resistance. (10 marks)

Or

- (b) Explain how dissipation factor can be determined accurately with the help of schering Bridge.
(10 marks)

[4 × 10 = 40 marks]