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**Question Paper Code : 51524**

**B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016**

**Third Semester**

**Electronics and Instrumentation Engineering**

**EI 2201/EI 33/EE 1202/080300001/10133 EI 303 – ELECTRICAL MACHINES**

**(Common to Instrumentation and Control Engineering)**

**(Regulations 2008/2010)**

**Time : Three Hours**

**Maximum : 100 Marks**

**Answer ALL questions.**

**PART – A (10 × 2 = 20 Marks)**

1. What is meant by armature reaction ?
2. What is the function of commutator in a DC generator ?
3. Draw a single phase shell type transformer and name the parts.
4. What is regulation ? Name the tests to be conducted to find it in the lab.
5. Why almost all large size synchronous machines are constructed with rotating field system type ?
6. What are V and inverted V curves of synchronous motor ?
7. What is the importance of slip in a three phase induction motor ?
8. Draw the slip-torque characteristics of a three phase induction motor.
9. Brief the working principle of universal motor.
10. What are the advantages of brushless DC motor ?

**PART – B (5 × 16 = 80 Marks)**

11. (a) (i) What are the different types of DC motors ? Sketch their mechanical characteristics. (6)
- (ii) Explain the principle and theory of operation of DC generator. (10)

**OR**

- (b) (i) Describe any two methods of speed control of DC motors. (10)
- (ii) Derive the torque equation of a DC motor. (6)

12. (a) Draw an equivalent circuit of a transformer. Explain the test procedure to obtain the equivalent circuit parameters.

**OR**

- (b) The test results obtained on a 1 phase 20 kVA, 2200/220 volts transformer are :  
OC test : 220 V, 1.1 A, 125 W; SC test: 52.7 V, 8.4 A, 287 W

The transformer is fully loaded. Find the load p.f. for zero voltage regulation.

13. (a) Draw and explain the construction details and operating principle of an alternator. Derive the emf equation and draw the vector diagram. (16)

**OR**

- (b) Draw and explain the principle of operation of a synchronous motor. Explain the methods of starting with illustration. What is hunting ? (16)

14. (a) (i) Explain the principle of working of a 3-phase induction motor. (8)
- (ii) Explain the speed-torque characteristic of a 3-phase induction motor, clearly indicating the starting torque, operating region and maximum torque. (8)

**OR**

- (b) (i) Explain the various methods of starting employed in 3-phase squirrel cage induction motors. (10)
- (ii) Explain the principle of cascade connection of Induction machines. (6)

15. (a) (i) Explain the principle of working of a single-phase induction motor with the help of cross field theory. (8)
- (ii) Explain why no rotational torque is developed by a repulsion motor when the brushes are placed along the axis of the stator poles. (8)

**OR**

- (b) Describe the construction and operation of a switched reluctance motor. Write the advantages of switched reluctance motor. (16)