Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 60524

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Third Semester

Electronics and Instrumentation Engineering

EI 2201/EI 33/EE 1202/10133 EI 303/080300001 — 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. State the conditions which determines if a DC machine is generating or motoring.
2. Write the voltage equation of DC motor.
3. Enumerate the losses in a transformer.
4. What are the different types of transformers?
5. What is synchronous speed?
6. What is the purpose of damper winding?
7. Name the various starters used for starting a 3 phase Induction motor.
8. What is synchronous speed of an induction motor running at 2900 r.p.m. with 50 Hz supply?
9. State double revolving field theory.
10. Why single phase induction motor is not self starting?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw and explain the construction and principal of operation of a DC generator. (10)

(ii) A 10kW, 220 V, DC 6 pole shunt motor runs at 1000 rpm. Delivering full load. The armature has 534 lap connected conductors. Full load copper loss is 0.64 kW. The total brush drop is 1 volt. Determine the flux per pole neglecting shunt current. (6)

Or

(b) (i) Draw and explain the characteristic of a DC shunt motor and DC series motor. Compare the DC shunt and series motor characteristics and applications. (10)

(ii) Write the speed equation and explain how to control the speed of a shunt motor by flux control method. (6)

12. (a) (i) Explain the construction and working principle of a transformer. (8)

(ii) Draw and explain the phasor diagram of a single-phase transformer supplying

(1) a lagging load

(2) a leading load and

(3) a Upf load. (8)

Or

(b) (i) Define the term 'voltage regulation' of a transformer and derive the expression for voltage regulation. (6)

(ii) Explain how equivalent circuit of single phase transformer can be obtained from open circuit and short circuit test. (10)

13. (a) Draw a family of V curve for different loading of a synchronous machine. Explain the procedure to obtain the same experimentally in a lab.

Or

(b) A 3.3 kV star connected synchronous motor has a synchronous reactance of 5.5 Ohms, it operates at rated terminal voltage and draws 750 kW from the supply at 0.8 leading p.f. Find its p.f. when the motor shaft load is 1000 kW with same excitation.

14. (a) (i) Explain the concept of rotating magnetic field production. (8)

(ii) Derive the torque-slip equation for a 3 phase induction motor and also the equation for slip at which maximum torque occurs. (8)

Or

(b) Explain any one method of starting employed in 3-phase cage induction motor. (16)

15. (a) (i) Using double revolving field theory, explain why a single phase induction motor is not self-starting. (10)

(ii) Explain the construction and working of shaded pole induction motor. (6)

Or

(b) (i) Explain the working principle of repulsion type motor. (8)

(ii) Describe the construction and its working of switched reluctance motor. (8)