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Question Paper Code : 31417

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Third Semester

Electronics and Instrumentation Engineering

EI 2201/EI 33/EE 1202/10133 EI 303/080300001 — ELECTRICAL MACHINES

(Common to Instrumentation and Control Engineering)

(Regulation 2008/2010)

(Also common to PTEI 2201 – Electrical Machines for B.E. (Part-Time) Second Semester Electronics and Instrumentation Engineering – Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is armature reaction?
2. Write the induced emf equation when the machine acts as a DC motor and DC generator.
3. Define transformation ratio.
4. Why is transformer rating in kVA?
5. What is synchronous speed?
6. What is the purpose of damper winding?
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. Why is single phase induction motor not self starting?
10. How is the construction of linear induction motor different from induction motor?

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) Draw an ideal single phase transformer and explain the principle of operation, the concept of step up and step down transformer. (8)
- (ii) Derive the EMF equation of a transformer. What is regulation and efficiency of transformer? (8)

Or

- (b) (i) Draw the equivalent circuit of a single phase transformer and explain. (8)
- (ii) Draw and explain the operation of an autotransformer. What are the applications of autotransformer? (8)
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) Draw and explain the construction and principle of operation of three phase slip ring induction motor. How is the construction different in squirrel cage induction motor? (16)

Or

- (b) Derive the torque equation and also the condition for maximum torque under starting and running conditions. (16)
15. (a) Explain double revolving and cross field revolving theory for single phase induction motor. (16)

Or

- (b) What are the constructional features of universal motors? Explain the operation with neat diagrams. What are its applications? (16)