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Question Paper Code: 31456

B.E. / B.Tech. DEGREE EXAMINATION, NOVEMBER 2015

Fourth Semester

Electrical and Instrumentation Engineering

01UEE426 – PRINCIPLES OF ELECTRICAL MACHINES

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. The armature of a DC machine is laminated. Why?
2. Write the emf equation for (i) DC motor (ii) DC generator.
3. What is meant by turns ratio of a transformer
4. Define all day efficiency of a transformer.
5. State the condition for maximum starting torque produced in an induction motor.
6. What is meant by slip of an induction motor?
7. What is hunting in synchronous machines and how it is suppressed?
8. List the starting methods of a synchronous motor.
9. A single phase induction motor is not self starting. Justify.
10. What is an universal motor? Mention few applications.

PART - B (5 x 16 = 80 Marks)

11. (a) (i) Draw and explain the load characteristics of shunt generator. (8)
(ii) Describe with suitable diagrams the construction of a DC generator. (8)

Or

- (b) (i) With neat sketch explain the electrical and mechanical characteristics of DC shunt motors. (8)

- (ii) Brief the (1) armature voltage control and (2) field current control methods of speed control of DC shunt motor. (8)
12. (a) (i) Draw and explain the working of a transformer on load with phasor diagram. How it affects the power factor of the loaded transformer? (10)
- (ii) Derive the emf equation of a transformer (6)

Or

- (b) Briefly explain how the regulation may be estimated using the results of the short circuit tests on a given transformer. (16)
13. (a) (i) Derive an expression for the torque equation 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 principle of operation of a three phase induction motor. (8)
- (ii) Starting from the first principles develop the equivalent circuit of a three phase induction motor. (8)
14. (a) Draw the phasor diagram of a loaded alternator for the following conditions. (i) unity power factor (ii) power factor lag and (iii) power factor lead and then explain the diagram. (16)

Or

- (b) (i) Explain the principle of operation of a synchronous motor. (8)
- (ii) Explain the variation in excitation on the armature current of a synchronous motor. (8)
15. (a) (i) Explain the principle of operation of a capacitor start and run single phase induction motor and mention its advantages. (8)
- (ii) Discuss the construction and principle of operation of a Hystersis motor. What are the common applications of hysteresis motor? (8)

Or

- (b) (i) Explain the construction and performance of a permanent magnet synchronous motor. (8)
- (ii) Describe the working of a switched reluctance motor and mention its advantages and disadvantages. (8)