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Question Paper Code: 41347

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

Third Semester

Electronics and Communication Engineering

14UEE323 - ELECTRICAL MACHINES

(Common to Instrumentation and Control Engineering and Mechanical Engineering)

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Commutators in DC machines have a role of which converts

   (a) AC to DC (b) both AC to DC and DC to AC

   (c) high voltage DC to low voltage DC (d) none of these

2. For a DC series motor

   (a) $T \alpha I_a^2$ (b) $T \alpha I_a$ (c) $T \alpha 1/I_a$ (d) $T \alpha 1/I_a^2$

3. If $V_1=E_1$ and $V_2=E_2$ then the transformer is said to be

   (a) a step up transformer (b) an Ideal transformer

   (c) an auto transformer (d) a step down transformer

4. While transferring primary resistance and reactance of a transformer to secondary, it is

   (a) multiplied with k^2 (b) divided by k^2

   (c) divided by k (d) multiplied by k

5. Slip speed is the

(a) difference of synchronous speed and actual rotor speed

(b) difference of actual rotor speed and synchronous speed

(c) sum of synchronous and rotor speeds

(d) half of the sum of synchronous and rotor speeds

6. What happens when DC supply is given to rotor in induction motor?

(a) it acts as DC motor (b) it acts as synchronous motor

(c) both are correct (d) none of the above

7. A synchronous machine

(a) can operate at unity power factor (b) can operate at leading power factor

(c) can operate at lagging power factor (d) can operate at any power factor

8. What is the distribution factor for a 108 slot, 12 pole, 3-Φ winding?

(a) 0.88 (b) 0.96 (c) 0.92 (d) 1

9. Type of single phase motor having highest power factor at full load is

(a) shaded pole type (b) capacitor start

(c) capacitor run (d) split phase

10. Which special type of motor has rotor movements in discrete steps?

(a) stepper motor (b) reluctance motor

(c) servo motors (d) hysteresis motor

PART - B (5 x 2 = 10 Marks)

11. Why dc series motor should never be started on no load?

12. Define voltage regulation of transformer.

13. Define slip of a three phase induction motor.

14. Compare salient pole rotor and cylindrical rotor of a synchronous generator.

15. Is single phase induction motor self starting? Why?

PART - C (5 x 16 = 80 Marks)

16. (a) Draw the performance characteristics of different types of dc generators and explain them briefly. (16)

Or

(b) (i) In a particular dc machine, if P = 8, Z = 400, N = 300 *rpm* and Φ = 100 *mWb*, calculate generated EMF if winding is connected in lap and wave fashion. (8)

(ii) Derive the torque equation of a D.C. motor. (8)

17. (a) (i) Derive the EMF equation of a transformer. (8)

(ii) Explain with a neat diagram the O.C and S.C test of transformer. (8)

Or

(b) Draw the equivalent circuit of a transformer and derive the components with respect to primary and secondary side. (16)

18. (a) Discuss the various starting methods of 3 phase induction motors. (16)

Or

(b) (i) With neat sketch, explain the principle and construction of 3 phase induction motors. (10)

(ii) Derive the equation for torque under running condition and also determine the condition which is sufficient to produce the maximum torque in a three phase induction motor. (6)

19. (a) (i) Explain the procedure to calculate the voltage regulation of an alternator by EMF method. (8)

(ii) Explain the constructional details of three phase alternator with neat sketch. (8)

Or

(b) (i) Discuss about the various starting methods of synchronous motor. (8)

(ii) Explain the procedure to obtain the V and inverted V curves of a synchronous motor. (8)

20. (a) Write short notes on:

(i) Universal motor (8)

(ii) Hysteresis motor (8)

Or

(b) (i) Describe the construction and principle of operation of capacitor start and run single phase induction motor. (8)

(ii) Explain the construction and working principle of switched reluctance motor with diagrams. (8)

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