Reg. No. :

Question Paper Code: 44326

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Fourth Semester

Electronics and Instrumentation Engineering

14UEE426 - PRINCIPLES OF ELECTRICAL MACHINES

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The direction of rotation of the dc motor will be reversed when

    (a) Either field terminals are reversed or armature terminals are reversed
    (b) Only armature terminals are reversed
    (c) Only field terminals are reversed
    (d) None of the above

2. _____ is used in electric locomotives.

    (a) DC shunt motor   (b) DC series motor
    (c) DC compound motor   (d) Induction motor

3. The voltage regulation of a transformer will be zero when it operates at

    (a) Unity power factor   (b) Leading power factor
    (c) Lagging power factor   (d) Zero power factor

4. A step up transformer increases

    (a) Voltage   (b) Current   (c) Power   (d) Frequency

5. _____ is called Slip speed.

    (a) Difference of synchronous speed and rotor speed

    (b) Sum of synchronous and rotor speeds

    (c) Half of the sum of synchronous and rotor speeds

    (d) None of these

6. The frequency of the rotor current in a 3Φ, 4pole, $50Hz$ induction motor at full load speed is about

    (a) 50 Hz   (b) 20 Hz   (c) 2 Hz   (d) Zero

7. A synchronous motor has

    (a) High starting torque   (b) Low starting torque

    (c) No starting torque   (d) Low starting current

8. A synchronous machine is called as doubly excited machine because

    (a) It can be over excited

    (b) It has two sets of rotor poles

    (c) Both its rotor and stator are excited

    (d) It needs twice the normal exciting current

9. Salient poles are generally used on

    (a) high speed prime movers only

    (b) medium speed prime movers only

    (c) low speed prime movers only

    (d) low and medium speed prime movers

10. A hysteresis motor

    (a) Is not a self-starting motor   (b) Is a constant speed motor

    (c) Needs DC excitation   (d) Cannot be run in reverse speed

<div align="center">PART - B (5 x 2 = 10 Marks)</div>

11. What is back emf in DC motor?

12. The efficiency of a transformer is always higher than that of rotating electrical machines. Why?

13. Indicate the equation of induced emf in an alternator.

14. Define synchronous speed. How is it related to the frequency of generated emf?

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15. What is the function of centrifugal switch in a single phase induction motor?

PART - C (5 x 16 = 80 Marks)

16. (a) Illustrate the construction and principle of operation of DC generator with the aid of neat sketch. (16)

Or

(b) Explain briefly the working of three point starter and four point starters. (16)

17. (a) (i) From the first principle, derive the equation for induced emf in the transformer and obtain the expression for transformation ratio. (8)

(ii) Explain the principle of operation of a transformer and draw the phasor diagram under no load condition. (8)

Or

(b) Illustrate step by step procedure for development of equivalent circuit of transformer. (16)

18. (a) Explain about the method of production of rotating magnetic field in the stator of a 3Φ AC machines with the aid of mathematical derivation. (16)

Or

(b) (i) Discuss briefly about cogging and crawling. (8)

(ii) Compare squirrel cage induction motor with slip ring induction motor with reference to construction, performance and application. (8)

19. (a) Describe the construction and principle of slow speed operation generator with neat diagram. (16)

Or

(b) Enumerate the damper winding based starting method of a synchronous machine with necessary sketches. (16)

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20. (a) Explain the construction and working of a stepper motor with a neat sketch. (16)

Or

(b) Explain the construction and working principle of split phase and capacitor start induction motor with their torque-speed characteristics. (16)

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