A   Reg. No. : ☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 53323

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Third Semester

Mechanical Engineering

15UEE323 - ELECTRICAL MACHINES

(Regulation 2015)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. D.C. motors are widely used in   CO1- R

   (a) Pumping sets   (b) Air compressors   (c) Electric traction   (d) Machine shops

2. Working Principle of Motor_____   CO1- R

   (a) Fleming Right Hand Rule   (b) Ohms Law

   (c) Fleming Left Hand Rule   (d) None of the Above

3. A transformer core is laminated to reduce   CO2- R

   (a) Hysteresis loss   (b) Copper loss   (c) Eddy current loss   (d) All the above losses

4. An ideal transformer has _____.   CO2- R

   (a) Core loss   (b) Magnetic leakage

   (c) No winding resistance   (d) None of the above

5. Star-delta starting of motors is not possible in case of   CO3- R

   (a) Single phase motors   (b) Variable speed motors

   (c) Low horse power motors   (d) High speed motors

6. A 50 Hz, three phase supply is given to a four pole induction motor.   CO3- R
    The synchronous speed of the machine is_____

   (a) 3000 rpm   (b) 1500 rpm   (c) 1000 rpm   (d) 750 rpm

7. Synchronous condensers are used to   CO4- R

   (a) Improve starting torque   (b) Improve the power factor

   (c) Reduce hunting   (d) All of the above

8. In a synchronous motor, damper windings are provided on   CO4- R

   (a) Rotor shaft   (b) Stator frame   (c) Pole faces   (d) None of the above

9. An universal motor is also called as _____   CO5- R

   (a) Induction motor   (b) Synchronous motor   (c) AC series motor   (d) Stepper motor

10. The electric motor used in portable drill is   CO5- R

    (a) Capacitor run motor   (b) Universal motor

    (c) Hysteresis motor   (d) Repulsion motor

PART – B (5 x 2= 10 Marks)

11. Define back emf and give its expression.   CO1 R

12. Classify different types of transformers.   CO2 R

13. Write the torque equation of three phase induction motor.   CO3 R

14. Define Hunting   CO4 R

15. List the applications of BLDC motor.   CO5 R

PART – C (5 x 16= 80 Marks)

16. (a) Sketch the construction of DC Motor and explain about various   CO1- U   (16)
         parts associated with it.

                                    Or

    (b) (i) Plot and explain various characteristics of DC Motor   CO1- U   (8)
         (ii) Develop the torque equation of a DC Motor   CO1- U   (8)

17. (a) Sketch the single phase transformer and explain about its   CO2- U   (16)
         construction and working principle

                                    Or

    (b) (i) Derive the expression for EMF equation of a Transformer.   CO2- U   (8)

         (ii) Obtain the equivalent circuit by using the open circuit test and   CO2- U   (8)
         short circuit test on transformer.

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18. (a) Explain the construction and working principle of three phase   CO3-U   (16)
        induction motor.

                                    Or

    (b) Discuss briefly about types of starting methods of three phase   CO3-U   (16)
        induction motor.

19. (a) Recognize the principle of operation of a synchronous motor with   CO4- U   (16)
        a neat sketch. Also demonstrate how it can be self started.

                                    Or

    (b) Explain the starting method and Torque equation of synchronous   CO4- U   (16)
        motor.

20. (a) Analyze briefly about any two types of single phase induction   CO5- U   (16)
        motor.
                                    Or
    (b) (i) Recognize the principle of operation of a universal motor with   CO5- U   (8)
        a neat sketch.

        (ii) Generalize with construction and circuit diagrams, the   (8)
        operation of a hysteresis motor.

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