A

Question Paper Code: 93303

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Third Semester

Electrical and Electronics Engineering

19UEE303 - Electrical Machines - I

(Regulation 2019)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. According to Fleming's left-hand rule if the forefinger points in the   CO2- R
    direction of the field than the middle finger will point in the direction of.

    (a) Current in the conductor   (b) Resultant force on the conductor

    (c) Movement of the conductor   (d) None of the above

2. Laminated core in electrical machines are used to reduce   CO2- R

    (a) Copper loss   (b) Eddy current loss   (c) Hysteresis loss   (d) Mechanical loss

3. If the number of conductors and speed of a lap wound generator is doubled   CO1- R
    then the generated emf will be

    (a) Remains same   (b) Twice of the former

    (c) Four times of former emf   (d) Half of the former emf

4. The armature reaction in d.c. machine causes distortion in the main field   CO1- U
    flux. This effect of armature reaction can be reduced by

    (a) Increasing the length of air gap   (b) Decreasing the length of air gap

    (c) Increasing the number of poles   (d) Decreasing the number of poles

5. Which of the following type of d.c. motor is used for electric traction?   CO4- U

    (a) Series motor   (b) Compound motor   (c) Shunt motor   (d) None of the above.

6. Which starter is suitable for controlling the speed of DC motor in field side   CO4- U

    (a) two point   (b) three point   (c) four point   (d) any of the above

7. The condition for the maximum efficiency of the transformer is that   CO6- R

   (a) Copper losses are half of the iron losses

   (b) Copper losses are equal to iron losses

   (c) Copper losses are negligible in comparison to iron losses

   (d) Iron losses are zero

8. A transformer has 500 turns in the primary and 1,000 turns in the secondary   CO5- App
   windings. The transformation ratio is

   (a) 2   (b) 4   (c) 5   (d) 6

9. Iron loss in transformer is measured by   CO5- R

   (a) OC Test   (b) SC Test   (c) Swinburne's test   (d) BDV test

10. Copper loss in transformer is measured by   CO6- R

    (a) OC Test   (b) SC Test   (c) Swinburne's test   (d) BDV test

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

11. State Faraday's law of electromagnetic induction   CO2-R

12. Define armature reaction. What are the effects of armature reaction?   CO1-R

13. DC series motor is used to start heavy loads - Identify?   CO4-U

14. Why transformer rating is expressed in terms of KVA? (OR) Why don't use   CO5-U
    transformer ratings in KW?

15. Define all day efficiency. Explain why all day efficiency is lower than commercial   CO6-U
    efficiency

<div align="center">PART – C (5 x 16= 80Marks)</div>

16. (a) Use the electro mechanical energy conversion principle to develop   CO2-App   (16)
         the expression for mechanical force developed by magnetic field
         with neat diagram.

<div align="center">Or</div>

    (b) Develop expression for co-energy density assumes the i–λ   CO2-App   (16)
         relationship of the magnetic circuit is linear.   .

17. (a) With neat sketch explain the following constructional components   CO1- U   (16)
         of DC Machine and its principle (i) Magnetic Frame or Yoke (ii)
         Pole Core (iii) Field Coils (iv) Armature (v) Armature Winding (vi)
         Commutator (vii) Brushes and Bearings.

<div align="center">2</div>

<div align="right">**93303**</div>

(b) Explain the different methods of excitation and characteristics of DC Generators with suitable diagram.　　CO3- U　　(16)

18. (a) Analyze the operation of different types of starters and Select suitable starter for the motor used in high starting torque and constant speed applications. Discuss why starting current is high at the moment of starting a DC Motor?　　CO4- Ana　　(16)

Or

(b) A 500V dc shunt motor running at 700 rpm takes an armature current of 50A. Its effective resistance is 0.4 Ω. What resistance must be placed in series with the armature to reduce the speed to 600rpm, the torque remains constant?　　CO4- Ana　　(16)

19. (a) Explain the constructional details and working of core type and shell type transformers with neat sketches.　　CO5- U　　(16)

Or

(b) A 40 KVA transformer has iron loss of 450W and full load copper loss of 850W. If the power factor of the load is 0.8 lagging, Calculate (i) full load efficiency (ii) the load at which maximum efficiency occurs and (iii) the maximum efficiency.　　CO6- App　　(16)

20. (a) Interpret in detail about the autotransformer, their principle. Arrive at the expression for saving of copper.　　CO5- U　　(16)

Or

(b) Obtain the equivalent circuit of a 200/400V 50 Hz single phase transformer from the following test data.　　CO6- App　　(16)

O.C. test: 1100V, 0.5A, 55W – on primary Side, secondary being open circuited

S.C. test: 10V, 80A, 400 W – on LV side, high voltage side being short circuited.

Calculate the voltage regulation and efficiency for the above transformer when supplying 100A at 0.8 p.f. lagging.

93303

93303

93303