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**Reg. No. :**

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**Question Paper Code: 54326**

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

Fourth Semester

Electronics and Communication Engineering

15UEE426- PRINCIPLE OF ELECTRICAL MACHINES

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

- How the eddy current losses are reduced in a DC machine? CO1-R
  - using low hysteresis co-efficient material
  - using stalloys
  - using laminated core
  - using high electrical resistive material
- Select a relation between torque and armature current for a series motor, in case of prior to magnetic saturation. CO1-R
  - $T \propto KI_a$
  - $T \propto \Phi I_a^2$
  - $T \propto \Phi I_a$
  - $T \propto I_a^2$
- As  $I_o$  is very small, the no-load primary copper loss is negligibly small which means that no-load primary input is practically equal to the \_\_\_\_\_ in the transformer. CO2-U
  - iron loss
  - copper loss
  - hysteresis loss
  - eddy current loss
- Give the condition for maximum efficiency of a transformer. CO2-R
  - iron loss = copper loss
  - iron loss + copper loss = total loss
  - copper loss = (iron loss)<sup>2</sup>
  - total loss = copper loss + 2(iron loss)



Calculate the back EMF induced and speed, when loaded and drawing a current of 36 Amperes.

Or

- (b) Why Starters are necessary in a motor? Explain in detail the construction and working operation of 4-point starter. CO1-U (16)
17. (a) With the circuit explain how to obtain equivalent circuit by conducting Open Circuit and Short Circuit test in a single phase transformer. CO2-U (16)
- Or
- (b) (i) Derive the EMF equation of the single phase transformer. CO2-U (8)  
(ii) Discuss the constructional details of a single phase transformer with neat sketches and working principle. CO2-U (8)
18. (a) (i) Develop the approximate equivalent circuit of a 3-phase induction motor. CO3-U (8)  
(ii) Derive the expression for torque under running condition of a 3-phase induction motor and obtain the condition for maximum torque. CO3-U (8)
- Or
- (b) With neat diagrams, explain the working of CO3-U (16)  
(i) Stat-Delta Starter  
(ii) Auto Transformer Starter for 3 phase induction motor.
19. (a) (i) Describe with neat sketches, the constructional details of an Alternator. CO4-U (10)  
(ii) Derive the EMF equation of an Alternator. CO4-U (6)
- Or
- (b) Explain about the starting methods of Synchronous motor. CO4-U (16)
20. (a) (i) Explain in detail the operation of a capacitor start and run induction motor. CO5-U (8)  
(ii) Discuss in detail the operation of a hysteresis motor. CO5-U (8)
- Or
- (b) Explain the construction and principle of operation of a Permanent Magnet Brushless DC Motor. CO5-U (16)

