



**GENERAL INSTRUCTIONS TO THE CANDIDATES**

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level ( $K_1$  to  $K_6$ )
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

**B.E DEGREE EXAMINATIONS: DEC 2015**

(Regulation 2014)

Third Semester

**MECHATRONICS ENGINEERING**

U14MCT303: Electrical Machines And Drives

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. Assertion (A): Hysteresis and eddy currents occurs when a magnetic material undergoes cyclic magnetisation CO1 [K<sub>2</sub>]  
Reason (R): It depends upon resistivity, lamination thickness, Magnetic flux density
 

a) Both ( A ) and (R) true, R is the correct explanation of A	b) Both A and R true but R is not correct explanation of A
c) A is true but R is false	d) A is false but R is true.
2. To find the torque equation of Round Rotor Machine ----- factors are to be considered CO1 [K<sub>2</sub>]

a) Peak Value of sinusoidal mmf of stator wave only	b) Peak value of sinusoidal mmf of rotor wave only
c) Angle between stator and rotor wave	d) All of these

3. If the back emf in dc motor is absent then CO2 [K<sub>2</sub>]
- a) Motor will run at very high speed                      b) Motor will run at very low speed
- c) Motor will not run at all                                      d) Motor will burn
4. The following controls are considered for DC motors CO2 [K<sub>3</sub>]  
 ( I)Controls of flux (II) Armature resistance control (III) Supply voltage control  
 Which of the following controls plays significant role in the speed control of DC motors ?
- a) I only    b) I and II only
- c) II and III only    d) I , II and III
5. In three phase induction machine, consider the following statements CO3 [K<sub>1</sub>]
1. Stator core is laminated but rotor core is not laminated.
2. The type of magnetic field present in stator core is rotating field.
3. Slip rings are made up of phosper bronze.
4. The direction of rotation is changed by changing the frequency
- Which of the above statements are correct?
- a) 1 , 2 and 3 Only    b) 1,2,3 and 4.
- c) 1 and 2 only    d) 3 and 4 only
6. Slip speed is the CO3 [K<sub>1</sub>]
- a) Difference of synchronous speed and actual rotor speed                      b) Difference of actual rotor speed and synchronous speed
- c) Sum of Synchronous and rotor speed                      d) Half the sum of synchronous and rotor speed
7. ----- motor has rotor movements in discrete steps. CO4 [K<sub>2</sub>]
- a) Stepper Motor    b) Reluctance Motor
- c) Servo Motor    d) Hysteresis Motor
8. Which of the following motor would suit in the applications, where constant speed is absolutely essential to ensure a consistent product? CO4 [K<sub>3</sub>]
- a) Permanent Magnet DC Motor                                      b) Stepper Motor
- c) Switched Reluctance Motor    d) Permanent Magnet Synchronous Motor
9. Linear Induction Motor is used in ----- CO5 [K<sub>3</sub>]
- a) Traction    b) Textile Mill
- c) Mechanical Workshop    d) Magnetic Attraction

10. Match the following list

CO5 [K<sub>2</sub>]

List I (Motors)	List II (Advantages)
A. Linear Synchronous Motors	i. Respond direct digital control
B. Stepper Motor	ii.No Permanent Magnet in the rotor
C. Switched Reluctance Motor	iii. Very low inertia
D. Linear Induction Motor	iv. Rectilinear motion

A                  B                  C                  D

- a)      i                  ii                  iv                  iii  
b)      iii                  i                  ii                  iv  
c)      iii                  ii                  i                  iv  
d)      iv                  iii                  i                  ii

**PART B (10 x 2 = 20 Marks)**  
**(Answer not more than 40 words)**

11. Define permeability. CO1 [K<sub>1</sub>]
12. How to reduce the eddy current loss. CO1 [K<sub>2</sub>]
13. Define armature reaction. CO2 [K<sub>1</sub>]
14. State the expression of back emf in dc motor. CO2 [K<sub>2</sub>]
15. A 3 phase, 4 pole, 50 Hz induction motor runs at a speed of 1425 rpm. Calculate its slip. CO3 [K<sub>2</sub>]
16. Justify How logging can be eliminated in induction motor? CO3 [K<sub>3</sub>]
17. Differentiate switched Reluctance motor and stepper motor. CO4 [K<sub>2</sub>]
18. Define step angle and give its formula. CO4 [K<sub>1</sub>]
19. How can the speed of a linear induction motor be controlled? CO5 [K<sub>4</sub>]
20. List two applications of linear synchronous motors. CO5 [K<sub>1</sub>]

**Answer any FIVE Questions:-  
PART C (5 x 14 = 70 Marks)  
(Answer not more than 300 words)**

**Q.No. 21 is Compulsory**

21. Elucidate the construction and working principle of Brushless Permanent Magnet DC Motor with neat diagram CO4 [K<sub>2</sub>]
22. (i) Draw the circuit diagrams of DC separately and self excited generator and discuss the working principle. (10) CO2 [K<sub>3</sub>]
- (ii) Mention two advantages and disadvantages of Ward-Leonard speed control of a DC machine. (4) CO2 [K<sub>2</sub>]
23. (i)Explicate working principle of three-phase induction motor. (10) CO3 [K<sub>2</sub>]
- (ii)Explain any one starting method of Induction Motor. (4) CO3 [K<sub>1</sub>]
24. Illustrate the construction and working principle of Permanent Magnet Synchronous Motor. CO4 [K<sub>2</sub>]
25. Explain the construction and working principle of switched reluctance motor. CO4 [K<sub>2</sub>]
26. Illustrate the principle operation of Linear Induction Motor and draw its characteristics. CO5 [K<sub>5</sub>]

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