A **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 99304

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2024

Elective

Electrical and Electronics Engineering

19UEE904 – SPECIAL ELECTRICAL MACHINES

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Permanent magnet material used in PMBLDC motor is CO1- U

   (a) Alnico (b) Rare-earth magnet (c) Ceramic magnet (d) All the above

2. The speed of permanent magnet BLDC motor cannot be controlled by CO1- U

   (a) Rheostatic control method (b) Flux control method

   (c) Electronic circuits (d) None of the above

3. Pmsm working principle is CO2-U

   (a) Amphere circuital law (b) ohms law (c) magnetic locking (d) lenz law

4. EMF equation of the PMSM similar to CO2-U

   (a) Transformer (b)dc machine (c) stepper motor (d) None of the above

5. What is the angle between stator direct axis and quadrature axis? CO3-U

   (a) 90° (b)0° (c) 45° (d) 60°

6. Types of control techniques used in SRM CO3- U

   (a) Voltage control (b)Frequency control (c)v/f control (d) Hysteresis control

7. Operation of stepper motor at high speed is referred to as CO4- U

   (a) Fast forward (b)Slewing (c)Inching (d) Jogging

8. Torque constant of a stepper motor is also called as CO4- U

   (a) Détente torque (b)Torque sensitivity (c)Pull in torque (d) Pull out torque

9. Radial airgap motor has ---------- CO5- U

(a) axial laminations (b)radial laminations (c)both laminations (d) none of the above

10. In a hysteresis motor, the rotor CO5- U

(a) Has high hysteresis loss (b) Has high retentivity

(c)Is made of chrome steel (d) Should have all the above features

PART – B (5 x 2= 10 Marks)

11. Draw the magnetic equivalent circuit of 2 pole PMBLDC motor CO1- U

12. What are the assumptions made in the derivation of EMF equation for PMSM? CO2- U

13. What are the two types of current control techniques? CO3 -U

14. Define step angle. CO4 -U

15. List the applications of synchronous reluctance motors. CO5 -U

PART – C (5 x 16= 80 Marks)

16. (a) Explain the closed loop control scheme of Permanent magnet Brushless DC motor drive with the suitable schematic diagram. CO1- U (16)

Or

(b) A PMBLDC motor has no load speed of 6000 rpm when connected to 120V dc supply. The armature resistance is 2.5ohm.Rotational and iron losses may be neglected. Determine the speed when the supply voltage is 60 V and the torque is 0.5Nm CO1- E (16)

17. (a) Explain the construction and working principle of operation of PMSM CO2- U (16)

Or

(b) Discuss about various power controller used in PMSM motor CO2- Ana (16)

18. (a) Draw the cross sectional view of switched reluctance motor and explain the principle of Operation CO3- App (16)

Or

(b) Describe the following: CO3- U (16)
(i) Role of microprocessors in control of switched reluctance motor
(ii) Sensorless operation

19. (a) Describe in detail the construction and working of variable reluctance stepper motor. CO4- U (16)

Or

	(b)	Draw and explain drive circuits and their performance characteristics for stepper motor	CO4- U	(16)
20.	(a)	Explain the torque speed characteristics of synchronous reluctance motor in detail	CO5- U	(16)
		Or		
	(b)	Describe briefly about the repulsion motor.	CO5- U	(16)