B.E/B.TECH, M.E/M.TECH, MBA, MCA, POLYTECHNIC & SCHOOLS

Notes   *Available @*
Syllabus
Question Papers   www.binils.com
Results and Many more…

Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 20489

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2022.

Sixth Semester

Electrical and Electronics Engineering

EE 8005 — SPECIAL ELECTRICAL MACHINES

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How does digital control of stepper motor change its rotation speed?

2. How can direction of rotation of stepper motor be reversed?

3. What is a 'phase' in case of a switched reluctance motor?

4. Discuss on the inductance of the phase windings in a switched reluctance motor.

5. Explain the location of field winding in a permanent magnet brushless DC motor.

6. To which type of DC motor, does the speed-torque characteristic of brushless DC motor resemble? Explain.

7. What is a permanent magnet synchronous motor?

8. Why are permanent magnet synchronous motor, used in wind energy power plants?

9. Comment on the area of hysteresis loop for the magnetic material used in hysteresis motor.

10. Give four major applications of reluctance motors.

PART B — (5 × 13 = 65 marks)

11. (a) What are the three major types of stepper motors? Explain the principle of each one of them. (3+10)

Or

(b) Discuss the principle of operation of a stepper motor under the closed loop mode. Explain the driver circuit that is used. (8+5)

12. (a) What is co-energy in a switched reluctance motor? Explain the flux linkage ψ vs excitation current i characteristics of this machine. (4+9)

Or

(b) Why sensors are needed in switched reluctance motors? Explain the operation of the machine under sensor less mode. (4+9)

13. (a) Explain the fundamental operation of a PMBLDC motor drive. Bring out the need of Hall sensors for this machine. (7+6)

Or

(b) Bring out the operation of PMBLDCM with microprocessor controller. Explain the circuit operation. (8+5)

14. (a) Write a brief theory about PM synchronous motors. Derive the EMF equation and torque equation of PM synchronous motors. (5+4+4)

Or

(b) How are digital controller implemented for PM synchronous motors? Discuss also the applications of this machine. (8+5)

15. (a) Explain with suitable sketches the theory of operation and performance characteristics of linear induction motor. List out their applications. (5+5+3)

Or

(b) What is hysteresis motor and how does it function? Explain its characteristics. Where is it widely used? (4+4+5)

PART C — (1 × 15 = 15 marks)

16. (a) The arrangement of SR machines with feedback system is shown in figure 1. Explain clearly the need of each block. Also justify the three feedbacks shown in the figure 1. (15)
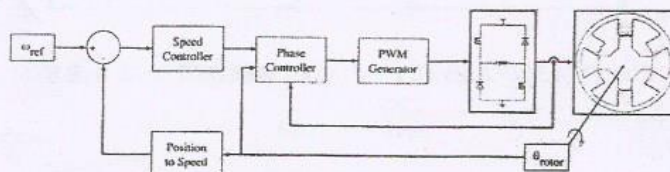

Figure 1 (for Qn.16a)

Or

(b) Explain the application of repulsion motor in electric trains. Analyze the characteristic of this machine for loco applications. (8+7)

———————

3   20489