PSNA COLLEGE OF ENGINEERING AND TECHNOLOGY, DINDIGUL
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
SERIAL TEST – II

Subject Name : Special Electrical Machines   **Year/ Semester** : II / III
Course/Branch : B.E / EEE(A &B)   **Subject Code** : EE 1001

PART- A

Answer any nine of the following   **(9*2 = 18)**

1. What is PMBLDC motor?
2. What is electronic commutator?
3. Draw the block diagram of Hall IC.
4. Write the emf and torque equation of square wave brushless motor.
5. List any four advantages of PMBLDC.
6. Draw the torque speed characteristics of PMBLDC.
7. Differentiate the PM synchronous motor and PMBLDC.
8. Give the two disadvantages of PM synchronous motor.
9. List any four applications of sine wave motor.
10. Write the equations for inductance of the phase winding and the synchronous reactance for ideal sine wave motor.

PART – B

Answer all the questions   **(16*2 = 32)**

11. a) Sketch the structure of the controller for PMBLDC motor and explain the function of various blocks. (10)
    b) A PMBLDC motor has a torque constant of 0.12 Nm/A referred to the dc supply. Estimate the no load speed in rpm when connected to a 48 V dc supply. If the armature resistance is 0.15Ohms/ phase and the total voltage drop in the controller transistor is 2 V, find the stall current and the stall torque. (6)

(OR)

12. a) Distinguish between mechanical and electronic commutator (6)
    b) A PMDC commutator motor has a stall torque of 1 Nm with a stall current of 5A. Estimate its no load speed in rpm when fed from a 28 V dc voltage supply. (4)
         During on over load the motor temperature becomes excessive and the magnets lose 12% of their remanent flux density. If the armature resistance is 0.8 Ohms, determine the speed at which the motor will run when the load torque is 0.3 Nm. Assume a total brush voltage drop of 2 V and a supply voltage of 28 V dc. Ignore friction and other losses. (6)

13. Derive the torque and emf equation of the ideal sine wave motor. (8+8)

(OR)

14. a) Derive the practical emf and torque equation for sine wave motor. (8)
    b) A three phase 4 pole brushless PM synchronous motor has 36 stator slots. Each phase winding is made up of 3 coils per pole with 20 turns per coils. The coil span is seven slots. If the fundamental component of magnet flux is 1.8 wb calculate the open circuit phase emf at 3000 rpm. (8)

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