Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 18

B.Tech. (Electrical & Electronics)/(Electrical Engineering)/
(Electronics & Electrical) (Sem.–5)

ELECTRICAL MACHINE DESIGN

Subject Code : BTEE-504C-18

M.Code : 78705

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

Answer briefly :

1) Write down the classification of magnetic materials.

2) What are the factors that affect the size of rotating machines?

3) What are the advantages of stepped core in transformers?

4) How is iron loss reduced in transformers?

5) How induction motor can be designed for best power factor?

6) List the advantages of using open slots in induction motor.

7) Define runaway speed of an alternator.

8) Distinguish between salient pole and non-salient pole rotor alternators.

9) Expand the terms: PMSM and SRM.

10) What are the various limitations of traditional design of machines?

SECTION-B

11) Discuss in detail the desirable properties and classification of insulating materials used in rotating machines.

12) Calculate the core and window area required for a 1000 kVA, 6600/400 V, 50 Hz single phase core type transformer. Assume a maximum flux density of 1.25 Wb/m^2 and a current density of 2.5 A/mm^2. Voltage per turn is 30 V. Window space factor 0.32.

13) Derive an expression for the output equation and output coefficient of induction motor.

14) Derive the output equation of a synchronous machine.

15) Describe the salient features of computer aided design of electrical machines. What are the advantages of computer aided design?

SECTION-C

16) Explain the various cooling methods of dry type transformer and oil immersed transformer.

17) Determine the approximate diameter and the length of stator core, the number of stator slots, and the number of stator conductors for a 11 kW, 400 V, three-phase, 4-pole, 1425 rpm, delta connected induction motor. Bav=0.45 Wb/m ^{2}, ac=23000 ac/m, full-load efficiency is 0.85, power factor=0.88, L/Z=1. The stator employs a double layer winding.

18) Find the main dimensions of a 100 MVA, 11 kV, 50 Hz, 150 rpm, three phase water wheel generator. The average gap density is 0.65 Wb/m^2 and ampere conductors per metre are 40,000. The peripheral speed should not exceed 65 m/sec at normal running speed in order to limit the runaway peripheral speed.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.