p ***R18 Regulation*** ***Subject code:*** 2E5BA

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech V Semester Supplementary Examinations, July 2022

Electrical Machine Design

(EEE)

Maximum Marks: 70 Date:06.07.2022 Duration: 3 hours

Note: 1.This question paper contains two parts A and B.
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 What are the important limitations in design of electrical machines?
2 What are the basic structural parts of electromagnetic rotating machines?
3 What is Window Space factor of a transformer?
4 State the methods of cooling transformer.
5 What is dispersion coefficient?
6 What is the function of stator in Induction Motor?
7 What is the function of damper windings in Synchronous machines?
8 Discuss the importance of short circuit ratio.
9 State the need of CAD Analysis in brief.
10 What is FEM based design.

Part-B

Answer All the following questions. (10M X 5=50Marks)

11 a) Explain in detail about Material selection in the design of electrical machines. (5M)
b) What are the basic principles useful in the design of electrical machines? (5M)

OR

12 List and explain various conducting materials used in electrical machines (10M)

13 a) Compare the performances of single and three phase transformers in detail. (5M)
b) Discuss in detail about different methods of cooling of transformers. (5M)

OR

14 a) Explain the term "cross-fluxing" in transformers. (5M)
b) Explain the functions of conservator and breather in transformer (5M)

15 a) Explain in detail about the design of the stator slots of wound rotor induction machines. (5M)
b) Find the main dimensions of a 12 kW, 3 phase, 400 V, 50 Hz, 2810 rpm, squirrel cage induction motor having efficiency of 0.95 and a full load power factor of 0.89.
Assume: Specific magnetic loading = 0.3 Wb/m2; specific electric loading = 24000 A/m. Take the rotor peripheral speed as approximately 30 m/s at synchronous speed (5M)

OR

16 a) Explain the functions of stator frame in Induction motor (5M)
b) What is dispersion coefficient? and explain its effect on power factor in three phase induction motor (5M)

17 a) Why are damper windings used in synchronous machine. (2M)
b) Determine the main dimensions of a 75 MVA,10 kV, 50 Hz, 150 rpm, three phase water wheel generator. The average gap density is 0.6Wb/m2 and ampere conductors per meter are 30000. The peripheral speed should not exceed 60m/sec at normal running speed in order to limit the runaway peripheral speed. (8M)

OR

18 a) What are the factors that will get affected while choosing specific electric and specific magnetic loadings in synchronous machines? (6M)
b) Write short notes on short circuit ratio(4M)

19 a) What are the limitations of conventional Design (5M)
b) Explain the need for CAD design for Electrical Machines. (5M)

OR

20 a) Discuss FEM based design (5M)
b) Discuss BLDC machine design (5M).