



R20 Regulation

**TKR COLLEGE OF ENGINEERING AND TECHNOLOGY**

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

Subject code: 3E5BA

**B.Tech V Semester Regular Examinations, January 2023**

**ELECTRICAL MACHINE DESIGN**

(Professional Elective-I)

(Electrical and Electronics Engineering)

**Maximum Marks: 70**

Date: 11.01.2023 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 which carries 10M.
  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 factors that decide the choice of specific magnetic loading?
- 2 Define specific electric loading.
- 3 What is meant by window space factor?
- 4 List the factors to be considered for choosing the method of cooling.
- 5 What are the factors to be considered for selecting number of slots in Induction machine stator?
- 6 Why the air gap of an induction motor is made as small as possible?
- 7 What is meant by short circuit ratio?
- 8 Mention the factors that govern the design of field system of the alternator.
- 9 What are the advantages of Computer Aided Design of Electrical machines?
- 10 Write any two limitations of conventional design approach.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 A. Discuss briefly on any five limitations imposed during Electrical Machine Design. 5M  
B. Explain about different causes for the temperature rise in the Electrical Machines. 5M  
OR
- 12 A. Explain about material selection in the design of Electrical Machines. 5M  
B. Describe different ways of heat dissipation in Electrical Machines. 5M
13. A. Compare single phase and three phase Transformers. 5M  
B. List and briefly discuss any two cooling schemes for Transformers. 5M  
OR
- 14 A. Describe the design of Transformer winding and coils. 5M  
B. Define voltage regulation in Transformer. List the various factors causes the temperature rise in Transformers. 5M
- 15 A. Explain briefly different factors that should be considered while designing the rotor slots of squirrel cage rotor. 5M  
B. Describe the procedure of calculating short circuit (blocked rotor) current in Induction machines. 5M

OR

- 16 A. Explain about the design of number of turns and area of rotor conductors in wound rotor induction motor. 5M  
B. Draw and briefly explain the operating characteristics of an Induction motor. 5M

- 17 A. Illustrate the design of salient pole field coil. 5M  
B. Describe the design of armature in Synchronous machine. 5M

OR

- 18 A. What is the use of damper winding in Synchronous motors? Explain briefly the design of damper winding. 6M  
B. List the various factors to be considered for the design of Turbo generators. 4M

- 19 A. Describe in detail the analysis and synthesis methods of design. 5M  
B. Discuss any two optimization techniques employed for the design of Electrical Machine. 5M

OR

- 20 Describe the following  
A. Claw-pole machines. 5M  
B. Complex structure of BLDC motor. 5M