*R20 Regulation* *Subject code: 3E5BA*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

**B.Tech V Semester Supplementary Examinations, November 2025**

## ELECTRICAL MACHINE DESIGN

***(EEE)***

***Maximum Marks: 70*** Date: 22.11.2025 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) | | Marks | CO | BTL |
|---|---|---|---|---|
| 1 | Define the linear magnetic circuits. | 2M | 1 | L1 |
| 2 | What is meant by cooling? | 2M | 1 | L1 |
| 3 | Define transformation ratio. | 2M | 2 | L1 |
| 4 | Define iron space factor. | 2M | 2 | L1 |
| 5 | Why fractional slot winding is not used for induction motor? | 2M | 3 | L1 |
| 6 | What are the methods used for reducing harmonic torques in induction moter? | 2M | 3 | L1 |
| 7 | Name the two types of synchronous machines. | 2M | 4 | L1 |
| 8 | What are the different methods available for the elimination of harmonics in synchronous machine? | 2M | 4 | L1 |
| 9 | Write are the advantage of CAD. | 2M | 5 | L1 |
| 10 | List the advantage of BLDCs motor. | 2M | 5 | L1 |

Part-B

| Answer All the following questions. (5X10M=50Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 11 | Write a note on classification of insulating materials and also derive an expression for the thermal resistivity of winding | 10M | 1 | L2 |
| | OR | | | |
| 12 | Write the types of magnetic circuits and explain the difference between linear and nonlinear magnetic circuits. | 10M | 1 | L2 |
| 13 | a) Explain the design steps for Low voltage (LV) w indings.<br>b) Explain the design steps for High voltage (HV) windings. | 5M<br>5M | 2 | L2 |
| | OR | | | |
| 14 | Derive the condition for getting maximum efficiency in a transformer. | 10M | 2 | L2 |
| 15 | Derive the output equation of a a.c machine (three phase induction motor). | 10M | 3 | L2 |
| | OR | | | |
| 16 | Explain the design of stator slot for an induction motor. | 10M | 3 | L2 |

| | | | | |
|---|---|---|---|---|
| 17 | Explain the factors influence that choice of specific magnetic and electric loadings for a synchronous machine. | 10M | 4 | L2 |
| | OR | | | |
| 18 | Discuss the cooling methods of turbo alternators. | 10M | 4 | L2 |
| 19 | Explain the complex structures of modern machines-PMSMs. | 10M | 5 | L2 |
| | OR | | | |
| 20 | Explain the complex structures of modern machines-BLDCs. | 10M | 5 | L2 |