

510605

Roll No. \_\_\_\_\_

Total No. of Pages: 3

510605

B. Tech. V - Sem. (Main / Back) Exam., May - 2023

Electrical Engineering

SEE4 - 05 Electrical Machine Design

Time: 3 Hours

Maximum Marks: 120

Min. Passing Marks:

*Instructions to Candidates:*

*Part - A: Short answer questions (up to 25 words)  $10 \times 2$  marks = 20 marks.  
All ten questions are compulsory.*

*Part - B: Analytical/Problem solving questions  $5 \times 8$  marks = 40 marks.  
Candidates have to answer five questions out of seven.*

*Part - C: Descriptive/Analytical/Problem Solving questions  $4 \times 15$  marks = 60 marks. Candidates have to answer four questions out of five.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

*Use of following supporting material is permitted during examination.  
(Mentioned in form No. 205)*

1. NIL

2. NIL

### PART - A

Q.1 What are the advantages of using open slots?

Q.2 How core loss is reduced in the transformers?

Q.3 What are the various cooling methods used for oil type transformer?

Q.4 What are the factors that affect the size of rotating machines?

~~Q.5~~ What do you understand by cogging?

Q.6 Define short circuit current of induction motor.

~~Q.7~~ What are the commonly used conducting materials used for electrical machines?

~~Q.8~~ Define specific electric loading.

Q.9 Mention various types of duty cycles of motor.

~~Q.10~~ Give the advantages of synthesis method of CAD.

### PART – B

~~Q.1~~ Derive the expression for output equation of induction motor.

~~Q.2~~ State and derive the KVA output equation of three phase transformer.

~~Q.3~~ Explain the hybrid method of computer aided design with neat flow chart.

~~Q.4~~ State and explain the specific magnetic loading and the choice of magnetic loading.

Q.5 A 3 – Phase, 4 – Pole, 50 Hz induction motor has 24 stator slots and 28 rotor slots. Prove that it has a tendency to run as a synchronous motor at 214.3 rpm.

~~Q.6~~ Define the short circuit ratio (SCR) in connection with 3 – Phase synchronous generator. Explain the factors affecting by SCR.

Q.7 Explain the various operating characteristics of induction motor.

## PART – C

Q.1 Explain about the shape of Pole face of a synchronous machine. Also explain the design of turbo – alternators with design of damper winding.

Q.2 What are the various steps of determination of main dimensions for core, yoke and window of a transformer? Explain design of low-voltage and high-voltage winding of transformer.

Q.3 Determine the main dimension of a 12 MVA, 13.8 KV, 50 Hz, 1500 rpm, three – phase star connected alternator. The following data are provided -

Average gap density = 0.60 tesla

Ampere conductor per meter = 42000

Peripheral speed = 80 m/second

Also find the maximum flux, the number of stator slots, if one conductor per slot is used.

Q.4

Derive the expressions for design of rotor and end rings of squirrel cage induction motor.

Q.5 Write short notes on (Any three) -

(a) Claw – Pole machines

(b) Need of CAD analysis

(c) Design of turbo–alternators

(d) Design of cooling tanks in transformers

-----