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PRESIDENCY UNIVERSITY BENGALURU

 **SET-A**

SCHOOL OF ENGINEERING

**END TERM EXAMINATION – MAY/JUNE 2024**

**Semester :** Semester IV - 2022

**Course Code :** EEE2017

**Course Name :**  Electrical Machines-II

**Program :** B. Tech. Electrical and Electronics Engineering

**Date :** June 14, 2024

**Time :** 9:30 AM - 12:30 PM

# Max Marks : 100

**Weightage :** 50%

# Instructions:

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

**Part - A**

**Answer any 5 questions 5 x 4M= 20M**

1. State the consequences If 3 phase Induction motor runs at its synchronous speed.

(CO1) [Knowledge]

1. No load test and short circuit test on 3-Ph Induction Motor is conducted to determine many parameters. List at least 4 parameters that cab be determined from these tests, Write relevant point.

(CO2) [Knowledge]

1. Sometimes an alternator will not operate satisfactorily with others due to hunting. Explain this action of hunting briefly

 (CO3) [Knowledge]

1. In practice, a very large number of 3-phase alternators operate in parallel because the various power stations are interconnected through the national grid. List the conditions that are required in order to connect an alternator safely to the infinite busbars
2. Draw power flow diagram of the synchronous motor and mention the terms used
3. Write a short note on Pull-Out Torque of a synchronous motor

(CO3) [Knowledge] (CO4) [Knowledge]

(CO4) [Knowledge]

1. What do you mean by torque angle with regard to Synchronous Motor? What is the max value?

(CO4) [Knowledge]

**Part - B**

**Answer any 4 questions 4 x 10M = 40M**

1. Explain the characteristics given in Fig below. This Fig corresponds to which motor and justify your answer



(CO1) [Comprehension]

1. By using the data obtained from the no load test and the blocked rotor test, we can study the performance of 3 Ph Induction Motor. How these data can be used to predetermined the performance of the motor? List step by step to explain the procedure to obtain the necessary diagram and draw the relevant diagrams.

(CO2) [Comprehension]

1. Draw the short circuit characteristics of AC Generator. Write the procedure to obtain the same.

Explain in what way this characteristic is useful to determine the voltage regulation

(CO3) [Comprehension]

1. When the alternator is loaded, the armature flux modifies the air-gap flux. Its angle in electrical with respect to main flux depends on the load power factor. Illustrate this concept with suitable diagram and briefly explain

(CO3) [Comprehension]

1. Choose the situation in terms of diagrams in which there exists a pair of revolving armature poles and a pair of stationary rotor poles and describe the fact that a synchronous motor has no starting torque

(CO4) [Comprehension]

1. One of the most important features of a synchronous motor is that by changing the field excitation, it can be made to operate from lagging to leading power factor. Describe the Effect of Changing field excitation at constant load of a synchronous motor with appropriate phasor diagram

(CO4) [Comprehension]

**Part - C**

**Answer any 2 questions 2 x 20M = 40M**

1. The power input to a 3 phase IM is 60kW, the stator losses is 1kW. Name the different losses that can be computed from the given data if the motor is running with a slip of 3%.Compute the mechanical power developed

(CO2) [Application]

1. A 6 pole, 3 phase, 50 Hz alternator has 12 slots per pole and 4 conductors per slot. The winding is 5/6 full pitched. A flux of 25 mWb is sinusoidally distributed along the air gap. Determine the necessary data to verify if the emf generated is sinusoidally distributed. Hence find the line emf if the alternator is star connected .Write the necessary equations and explain each parameter with units.

(CO3) [Application]

1. A 75-kW, 4 pole 3-phase, Y-connected, 50-Hz, 440-V cylindrical rotor synchronous motor

Operates at rated condition with 0.8 p.f. leading. The motor efficiency excluding field and stator losses, is 95% and XS = 2.5 Ω. Calculate **(i)** mechanical power developed **(ii)** armature current **(iii)** back e.m.f. **(iv)** power angle and **(v)** maximum or pull-out torque of the motor.

(CO4) [Application]