Bachelor ofEngineering (Electrical Engineering) Examination, 2024

(4th Year, **1st** Semester, Supplementary)

ELECTRICAL MACHINES - III

Time: Three Hours | Full Marks: 100

(50 marks for each part)
Use a separate Answer-Script for each Part

PART - I

Answer ***any three*** questions from this part.
Two marks are for neat and well organised answer.

1.	a)	Explain the double revolving field theory for single phase induction motor and also prove that a single phase induction motor cannot produce starting torque. Show that this motor can be forced to run in either direction.	12
	b)	What are the various methods of starting of single phase induction motor?	4
2.	a)	Derive the equivalent circuit of a single phase induction motor with the help of double revolving field theory.	10
	b)	Explain how the equivalent circuit parameters of a single phase induction motor can be determined experimentally.	6
3.	a)	Develop an expression for the resultant torque of a single phase induction motor when running with slip s.	8
	b)	Explain the working principle of Capacitor split phase motor. For Capacitor Split Phase Motor find the value of total Cacacitance required for the starting winding to get maximum starting torque.	8
4.	a)	What is single phase series motor? Explain its working principle. Draw and explain the phasor diagram of a single phase series motor.	10
	b)	What is Compensated single phase series motor?	6
5.		Write a note on Construction, Principle of Operation and Applications of Shaded Pole Motor.	16

Ref. No. : **Ex/EE/5/T/411/2024(S)**

BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING)
FOURTH YEAR FIRST SEMESTER
SUPPLEMENTARY EXAM 2024

SUBJECT: - ELECTRICAL MACHINES-III

Time: ~~Two hours~~/Three hours/ ~~Four hours/ Six hours~~

Full Marks 100
(50 marks for each part)

Use a separate Answer-Script for each part

PART II

6. Justify any four: **4x2.5**

a) Mmf method to determine voltage regulation of an alternator is more accurate than emf method.
b) Hydro alternators are fitted with damper bars.
c) A cylindrical rotor synchronous machine has smaller D/L ratio compared to a salient pole synchronous machine of same rating.
d) Short circuit characteristic of an alternator is linear.
e) Slip test is performed at reduced voltage.

7. a) Develop the phasor diagram of a cylindrical rotor alternator both under lagging and leading load condition. **10**

or

b) Derive the power angle characteristics of a cylindrical rotor alternator and show the maximum power condition. **10**

8. Write short notes on: **10**

a) Excitation and power circle diagrams of alternator.

or

b) Operating chart of an alternator. **10**

a) Develop the power angle characteristics of a salient pole alternator. Also determine the maximum power condition for the same. **10**

or

a) Develop the phasor diagram of a salient pole synchronous motor both for under and overexcited condition. **10**

0. a) A 100 kVA, 440V, 3 phase, star connected, alternator has the following data: **10**
F&W Loss= 340W, Open circuit Core Loss=480W, Field winding resistance =180 ohm, Ra=0.02 ohm/phase and Xs=0.25 ohms/phase. The voltage applied to field winding is 220V. Calculate alternator input power at rated voltage, half load and 0.8 pf lag.

or

A 20 MVA, 3 phase, star connected, 11kV, 12 pole 50 Hz, salient pole synchronous motor has the following parameters. **10**
Xd= 4.5 ohm, Xq= 3 ohm per phase and ra=0.
At full load 0.8 power factor lag and rated voltage, compute the excitation voltage.