BACHELOR OF ENGINEERING (ELECTRICAL ENGINEERING) EXAMINATION, 2024
(3rd Year, 1st Semester, Supplementary)

ELECTRICAL MACHINES – II

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.
Two marks are for well organized answers.

1.(a) "A rotating magnetic field of constant amplitude can be produced by supplying a balanced three phase voltage source to a balanced three phase winding" -- Explain. Find out the speed of the rotating magnetic field produced. How can you change the direction of the rotating magnetic field? 12

(b) Explain the principle of operation of a three phase induction motor. Why this type of motor is known as asynchronous motor? 4

2.(a) Starting from basic principle develop the expression for torque produced in a three phase induction motor. Establish the condition for maximum torque developed. Draw torque vs. slip characteristic and also show how torque vs. slip characteristic changes with the variation of rotor resistance and rotor inductance. 10

(b) Develop equivalent circuit of a polyphase induction motor stating the assumption(s) taken and also develop its approximate equivalent circuit for the ease of calculation. 6

3.(a) Describe no-load and blocked rotor tests of an induction motor and calculate the equivalent circuit parameters from these test results. 8

(b) Describe the phenomenon of cogging and crawling. What measure can eliminate these effects? 8

4. Why starters are necessary for starting an induction motor? What are the various types of starters used for starting of squirrel cage induction motor? Describe with circuit diagram the working of any one type of starter for starting squirrel cage induction motor and hence derive an expression for starting torque in terms of full-load torque. 16

5.(a) Describe the construction of a double cage induction motor and explain how high starting torque is developed in double cage induction motor. Draw the equivalent circuit of double cage rotor induction motor. 10

(b) In a double cage induction motor if the outer cage has impedance at standstill of (2 + 1.2) ohm, determine the slip at which the two cages develop equal torques if the inner cage has an impedance of (0.5 + 3.5) ohm at standstill. 6

Ref No. : Ex//EE/5/T/313/2024(S)

Bachelor of Engineering (Electrical Engineering), 3rd Year 1st Sem.
Supplementary Exam, 2024

SUBJECT: ELECTRICAL MACHINES-II

Time: Three Hours Full Marks: 100 (50 each part)

Use a separate Answer-Script for each part

Question No.	PART - II	Marks

Answer any three; question no. 5 carries the maximum marks.

1. (i) Show that 3rd harmonics are always in a same phase. **4+6+6**

(ii) Why harmonics related problems are more in case of 3-phase transformers having independent magnetic circuits?

(iii) Oscillating neutral problem occurs in case of Y-y transformer without neutral – justify.

2. (i) Draw the connection diagram and phasor diagram of the following connections. **9+7**

a) Dy1 , b) Dz6, c) Yz11

(ii) How Yd1 and Yd11 transformer can be connected in parallel?

3. (i) If one winding on either side becomes faulty in a Delta/delta connected transformer, how it can be operated in open delta to give three phase output to give a three phase output equal to 0.577 of the total rated output. **5+6+5**

(ii) Explain the operation of a resistor type tap-changer.

Question No.	PART - II	Marks
(iii)	Write down the advantages of tertiary winding.	
4.	Write short notes on	8 + 8
(i)	Development of voltage stress along the winding of a three phase transformer for impulse and RMS voltages and the measure to be taken to withstand it.	
(ii)	Parallel operation of two three phase transformers	
5. i)	Draw the connections used for conversion of three phase to two phase.	6+12
ii)	In Scott-connected transformers, teaser transformer supplies 0.75 power factor load of 50 kW at 220 V and main transformer supplies 0.85 power factor lagging load of 40 kW at 220 V, from a three phase input line voltage of 3300V. Determine the input line currents. Neglect magnetizing currents and the leakage impedance drops. Draw voltage and current phasors computed.	