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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL – 2024

INDUCTION MACHINES

[Maximum Marks: **75**] [Time: **3** Hours]

PART-A

I. Answer '*all*' the following questions in one word or one sentence. Each question carries '*one*' mark.

(9 x 1 = 9 Marks)

		Module Outcome	Cognitive level
1.	Define transformation ratio of the transformer.	M1.01	R
2.	No -load primary input is practically equal to ....in the transformer	M2.01	R
3.	Transformer cores are laminated in order to (a) simplify its construction (b) minimise eddy current loss (c) reduce cost (d) reduce hysteresis loss	M1.01	R
4.	Define cogging in three phase induction motor.	M3.02	R
5.	In a 3-φ induction motor, the rotor field rotates at synchronous speed with respect to (a) stator (b) rotor (c) stator flux	M3.01	R
6.	Name two instrument transformers.	M2.03	R
7.	List any two applications of single phase induction motors.	M4.04	R
8.	For which induction motor, rotor resistance speed control method is not applicable.	M4.03	R
9.	The advantage of the double squirrel cage induction motor over a single cage rotor is	M4.04	R

PART-B

II. Answer any '*eight*' questions from the following. Each question carries '*three*' marks.

(8 x 3 = 24 Marks)

		Module Outcome	Cognitive level
1.	A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000-V, 50-Hz supply. Find the full-load primary and secondary currents.	M1.02	A
2.	List any three differences between core type and shell type transformers.	M1.01	U
3.	Define starting torque and pull out torque of an induction motor.	M3.02	U
4.	Explain the load test on single phase transformer.	M2.02	U
5.	Draw the equivalent circuit of three phase induction motor.	M3.04	U
6.	Derive the expression for starting torque of an induction motor.	M3.02	U
7.	Explain any one braking method of three phase induction motor.	M4.03	U
8.	Draw the equivalent circuit of double cage induction motor.	M4.04	U
9.	Outline operation of autotransformers.	M2.03	U
10.	Draw the phasor diagram of an ideal transformer.	M1.03	U

PART-C

Answer '*all*' questions from the following. Each question carries '*seven*' marks.

(6 x 7 = 42 Marks)

		Module Outcome	Cognitive level
III.	Draw the phasor diagram of a transformer under load condition with winding resistance and leakage reactance operating with capacitive load.	M1.03	U
	OR		
IV.	Derive the EMF equation of a transformer.	M1.02	U
V.	A 20-kVA, 2200/220-V, 50-Hz distribution transformer gives the following test data: O.C. test: 220 V 4.2 A, 148 W -LV side. S.C. test : 86 V 9 A, 270 W - HV side Determine efficiency at full-load and half the full-load at 0.8 p.f. lagging current.	M2.01	A
	OR		
VI.	A 230/230 V, 3 kVA transformer gave the following results : O.C. Test: Voc=230 V, Ioc = 2 amp, Woc= 100 W S.C. Test: Vsc = 15 V, Isc = 13 amp, Wsc = 120 W Determine the regulation and efficiency at full load 0.80 p.f. lagging.	M2.01	A
VII.	A 4-pole, 3-phase induction motor operates from a supply whose frequency is 50 Hz. Calculate: (i) the speed at which the magnetic field of the stator is rotating. (ii) the speed of the rotor when the slip is 0.04. (iii) the frequency of the rotor currents when the slip is 0.03. (iv) the frequency of the rotor currents at standstill.	M3.01	A
	OR		
VIII.	A 3-φ induction motor is wound for 4 poles and is supplied from 50-Hz system. Calculate (i) the synchronous speed (ii) the rotor speed, when slip is 4% and (iii) rotor frequency when rotor runs at 600 rpm.	M3.01	A
IX.	Explain any one speed control method of induction motor with the help of neat diagram.	M4.03	U
	OR		
X.	Explain steps for the construction of circle diagram. Also show the output line.	M4.01	U
XI.	Draw and explain connection diagram required to conduct no - load and blocked rotor test on a three phase Squirrel cage induction motor.	M4.01	U
	OR		
XII.	Explain the DOL starting of three phase induction motors with the help of neat diagram.	M4.02	U
XIII.	Explain the inter-connections of three phase transformers.	M2.04	U
	OR		
XIV.	Explain the operation of potential transformers.	M2.03	U

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