BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING

(EVENING) EXAMINATION, 2018

(3rd Year, 1st Semester, Supplementary)

ELECTRICAL MACHINES – II

Time : Three hours Full Marks : 100

(50 marks for each part)

(Use separate Answer Script for each part)

PART – I

Answer any three questions.

Two marks are for neatness and well organized answer.

1.(a) Show that a rotating magnetic field of constant amplitude can be produced by supplying a balanced three phase voltage source to a balanced three phase winding. What happens if the phase sequence is changed? 10

(b) Explain the principle of operation of a three phase induction motor. What is slip? Derive the expression for the frequency of rotor current in terms of supply frequency and slip. 6

2.(a) Starting from basic principle derive an expression for torque produced in a three phase induction motor. Draw a typical torque—slip characteristic and deduce the condition for maximum torque. 8

(b) A 746 kW, 3 phase, 50 Hz, 16 pole induction motor has a rotor resistance of (0.02 + j 0.15) ohm at standstill. Full load torque is obtained at 360 rpm. Calculate (i) the ratio of maximum to full load torque (ii) the speed at maximum torque and (iii) the rotor resistance to be added to get maximum starting torque. 8

3.(a) Derive relation between output power of rotor, input power to rotor and slip of a three phase induction motor. 8

(b) Develop the equivalent circuit of a three phase induction motor and explain how the mechanical power developed is taken care in the equivalent circuit. 8

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

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

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/313/2018(S)

Bachelor Engineering (Electrical Engineering), 3rd Year 1st Semester
Supplementary Examination, 2018

SUBJECT: ELECTRICAL MACHINES-II

Time: Three Hours

Full Marks: 100 (50 each part)

Use a separate Answer-Script for each part
PART - II

Answer any three. Question no. 3 carries the maximum marks

1. (i)	What is the origin of harmonics in three phase transformers?	**5+5+6**
(ii)	What type of problem may arise for Y-y connected three phase transformer?	
(iii)	How Delta winding is used to overcome the problems of harmonics in a three phase transformers?	
2. (i)	Draw the connection diagram and phasor diagram of the following connections. a) Yz11 , b) Dz6	**6+4+6**
(ii)	Why Yy0 transformer cannot be connected to a Dd6 transformer?	
(iii)	Discuss about the difficulties to incorporate tapings for tap-changing in the transformer windings.	
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.	**6+6+6**
(ii)	Explain the single phasing of three phase transformers.	

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

Use a separate Answer-Script for each part

PART - II

(iii) Write down the advantages of tertiary winding.

4. (i) Draw and explain the phasor diagram of AC series motor. **8 + 8**

(ii) Why Speed of a AC series motor is less than that of a equivalent DC series motor?

5. i) How single phase supply can be obtained from a three phase supply using a **Scott**-connected transformer? **4+12**

ii) Resistive load of 5Ω and 10Ω are connected respectively across the teaser and main transformer secondaries of a Scott-connected arrangement of transformer, fed from3-phase, 230V supply mains. If the main transformer primary to secondary turns ratio is 2 then determine the supply line currents. The magnetizing current and the internal impedance drops are neglected. Draw the phasor diagram computed.