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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech II Year II Semester Supplementary Examinations July-2021

ELECTRICAL MACHINES-II

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Discuss the constructional features of transformers. Draw neat diagrams. 8M
 b A 10KVA, 2200/400V transformer has $R_1=5 \Omega$, $X_1=12 \Omega$, $R_2=0.2 \Omega$ and $X_2=0.48 \Omega$. Determine the equivalent impedance of the transformer referred to 4M
 (i) primary side (ii) secondary side.

OR

- 2 a What are the various losses taking place in transformer? How these losses can be minimized? 6M
 b The No-Load current of a 4400/440 V, 1- Φ , 50 Hz transformer is 0.04 A. It consumes power 80 W at no-load when supply is given to LV side and HV side is kept open. Calculate the following: (i) Power factor of no-load current. 6M
 (ii) Iron loss component of current. (iii) Magnetizing component of current.

UNIT-II

- 3 Explain the procedure for conducting Separation of losses test along with all precautions to be taken while Conducting the test with neat diagram. 12M

OR

- 4 A 2 kVA, 115/230 V, 50HZ transformer gave the following test results:
 Short-circuit test: 13 V, 8.7 A, 100 W
 Open circuit test : 115 V, 1.1 A, 50 W
 Determine (i) the transformer equivalent circuit referred to primary and insert all the values in it. 12M
 (ii) Calculate the voltage regulation and efficiency at full load at 0.8 power factor lagging.
 (iii) Maximum efficiency at 0.8 power factor lagging.

UNIT-III

- 5 a Explain the principle of operation of Induction motor. 6M
 b A three phase induction motor is wound for 4 poles and is supplied from 50 HZ System. Calculate (i) synchronous speed (ii) speed of the motor when slip is 4% and 6M
 (iii) Rotor current frequency when the motor runs at 600rpm.

OR

- 6 a Draw and explain the Connection diagram of Y- Y & Δ - Δ connected three-phase transformer. 6M
 b A 6-pole, 3-phase 50HZ induction motor is running at full load with a slip of 4%. The rotor is Star connected and its resistance and standstill reactance are 0.25Ω and 1.5Ω per phase. The emf between slip rings is 100V. Find the rotor current per phase and power factor assuming the slip rings are Short circuited. 6M

UNIT-IV

- 7 a Develop the Equivalent circuit of a poly phase induction motor. 6M
b The input power to a 6-pole, 3-phase, 50HZ induction motor is 42KW and the speed is 970rpm. The Stator losses are 1.2KW and the friction and windage losses are 1.8KW. Find (i) rotor cu loss and (ii) the efficiency of the motor. 6M

OR

- 8 A 6-pole,50HZ,3-phase induction motor running on full load develops a useful torque of 160 N-m and the rotor e.m.f is absorbed to make 120 cycles/min . Calculate the net mechanical power developed . if the torque loss in windage and friction is 12N-m,Find the copper loss in the rotor windings ,the input to the motor and efficiency . Give Stator losses=200W(inclusive of core loss). 12M

UNIT-V

- 9 a Explain in detail about the working of rotor rheostat starter with a suitable diagram. 6M
b Calculate the value of resistance elements of 5 – step starter for 3-phase, 440V, wound rotor induction motor. The full load slip is 3%, rotor resistance / ph is 0.015. If (i) The starting current is limited to full load current. (ii) The starting current is limited to 1.5 times full load current. 6M

OR

- 10 a Explain about the speed control of induction motor by Tandem operation and derive the formula of speed. 6M
b Two 50 Hz, 3- Φ induction motor having 6 and 4-poles respectively are cumulatively cascaded. The 6- pole motor being connected to the main supply. Determine frequencies of rotor currents and the slips referred to each stator field. If the set has slip of 2%. 6M

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