

26

Y.M.C.A. UNIVERSITY OF SCIENCE AND TECHNOLOGY, FARIDABAD
B.TECH. EL EXAMINATION (UNDER CBS), May 2018
ELECTRIC MACHINES-II (EL-210) Scheme 2010

Max Marks: - 60

Time: 3hrs

Note: - 1. Part-A is compulsory and attempt 4 Questions from Part-B.
2. Assume relevant data/figure if found missing.

PART-A

- Q.1.a State why the core of the transformer is laminated? (02)
- Q.1.b Define the voltage regulation. (02)
- Q.1.c What information is obtained from open circuit test of a transformer? (02)
- Q.1.d Write the name of speed methods of three phase induction motors. (02)
- Q.1.e How to improve the starting torque of three phase induction motor. (02)
- Q.1.f Write five applications of single phase induction motors. (02)
- Q.1.g What are cogging and crawling. (02)
- Q.1.h Draw the equivalent circuit of single phase induction motor. (02)
- Q.1.i Define all day efficiency of transformer. (02)
- Q.1.j Draw the V-V connection of three phase transformer. (02)

PART-B

- Q.2.a. Define transformer. Explain its working principle and derive the e.m.f. equation of a transformer. (05)
- Q.2.b. The maximum efficiency of a 500kVA, 3300/500V, 50Hz, 1-phase transformer is 0.97pu and occurs at 75% full load and unity power factor. If the leakage impedance is 10%, calculate the voltage regulation at full load, power factor 0.8 lagging. (05)
- Q.3.a. What is an autotransformer? Derive an expression for saving in conductor material in an autotransformer over a two-winding transformer of equal rating. (05)
- Q.3.b. A 10 kVA, single phase transformer for 2000/400V at no load, has $R_1=5.5\Omega, X_1=12\Omega, R_2=0.2\Omega, X_2=0.45\Omega$. Determine the approximate value of the secondary voltage at full load, 0.8 power factor (lagging), when the primary applied voltage is 2000V. (05)
- Q.4.a. Draw the Scott connection of transformers and mark the terminals and turn ratio. (05)
What are the applications of Scott connection?

Q.4.b. A 500V,6-pole,50Hz,three phase induction motor develops 20 kW inclusive of (05) mechanical losses when running at 995r.p.m., the p.f. being 0.87. Calculate (a) the slip (b) the rotor I^2R loss, (c) the total input if the stator loss is 1500W, (d) line current, (e) the rotor current frequency.

Q.5.a. State the necessary conditions for satisfactory operation of two transformers in (05) parallel. State briefly why all transformers cannot be operated in parallel.

Q.5.b. What is the necessity of starter in three phase induction motors? Explain the star- (05) delta starter with neat and clean circuit diagram.

Q.6.a. Derive the equation of torque for three phase induction motor. Explain torque – (05) slip and torque-speed characteristics of three phase induction motor.

Q.6.b. Explain double revolving field theory of single induction motor? (05)

Q.7. Write short note on: (10)

- a) Capacitor start and capacitor run single phase induction motor
- b) Shaded pole motor.