

Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(EE) (Sem.-1) TRANSFORMERS AND DIRECT CURRENT MACHINES Subject Code : BTEE-302 M.Code : 70972 Date of Examination : 21-01-23

Time : 3 Hrs.

Max. Marks : 60

INSTRUCTION TO CANDIDATES :

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION B & C have FOUR questions each.
- 3. Attempt any FIVE questions from SECTION B & C carrying EIGHT marks each.
- 4. Select atleast TWO questions from SECTION B & C.

SECTION-A

- 1. Answer briefly :
 - a. Explain the effect of saturation on excitation current in a transformer.
 - b. Why open circuit test is performed in a transformer? Discuss.
 - c. What do you mean by voltage regulation? Explain.
 - d. Discuss the significance of three phase transformer.
 - e. What do you mean by equivalent circuit? Discuss its significance.
 - f. List the causes of bad commutation.
 - g. Why field test is performed? Explain.
 - h. What do you mean by armature reaction? Discuss.
 - i. What happens when a d.c. motor is connected across an a.c. supply? Discuss.
 - j. What do you mean by efficiency? What did it indicate? Discuss.

SECTION-B

2. A 100 kVA transformer has primary and secondary turns 400 and 100 respectively. Its primary and secondary resistance and reactances are:

 $r_1 = 0.3\Omega$; $r_2 = 0.015\Omega$; $x_2 = 0.055 \Omega$; $x_1 = 1.1 \Omega$;

The supply voltage is 2400V. Calculate:

- a) Equivalent resistance and reactance on primary side
- b) Voltage regulation and secondary voltage at a power factor of 0.8 lagging
- c) The power factor for zero voltage regulation.
- 3. Explain the principle of operation, equivalent circuit and phasor diagram of an auto transformer.
- 4. Discuss the delta-delta connections of three phase transformers. Also write down its advantages and disadvantages.
- 5. Explain the construction and working principle of a D.C. machine.

SECTION-C

- 6. Explain the Swinburne's method for measuring the no load machine losses.
- 7. Discuss the construction and working principle of a single-phase transformer. Drive an expression for the *e.m.f.* induced in a transformer winding.
- 8. Two identical D.C. shunt machines were tested by Hopkinson's method, gave the following data:

Line voltage = 230V; Line current excluding both the field currents=30A; motor armature current = 230A, field currents 5 A and 4 A.

If the armature resistance of each machine (including brushes) is 0.025 ohm, calculate efficiency of both machines.

- 9. Discuss (any one) :
 - a) Starting of shunt motors
 - b) Commutation improvement method

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.