TED (15) 5031 Reg. No. .....

(REVISION 2015) Signature .....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

INDUCTION MACHINES

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer all questions in one or two sentences. Each question carries 2 marks.

1. Write the classification of transformers based on construction.
2. Write an expression for eddy current loss in a tranformer.
3. State the applications of Current Transformer.
4. What is an induction motor ?
5. Write the method of starting of a slip-ring induction motor. (5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Explain an ideal transformer.
2. Describe the construction of core type transformer.
3. Explain transformer losses.
4. Draw and explain the equivalent circuit of a transformer.
5. Describe the working principle of 3-phase induction motor.
6. What is 'slip' ? Find the slip and number of poles of an induction motor running at 290 r.p.m at full load, when supplied by 50 Hz.
7. Explain with figure rheostatic starting method of squirrel cage induction motor.

(5×6 = 30)

Marks

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

III (a) Derive the E M F equation of a single phase transformer. 6

(b) A single phase transformer has primary turns 400 and secondary turns 1000. The net cross-sectional area of the core is 60 cm^2. If the primary winding is connected to 50 Hz supply at 520 V, calculate (i) the peak value of flux density in the core (ii) voltage induced in the secondary windings. 9

OR

IV (a) Justify the statement that 'core flux of a transformer is constant at only load condition' with the help of necessary figures and vector diagram. 7

(b) (i) A 2200/200 V transformer draws a no-load primary current of 0.6 A and absorbs 400 W. Find the magnetizing and iron loss current.

(ii) A 2200/250 V transformer takes 0.5 A at a p. f of 0.3 on open circuit. Find the magnetizing and working component of no load primary current. 8

UNIT — II

V (a) Explain with diagram S. C and O. C test of transformer. 7

(b) The primary and secondary windings of a 30 kVA, 76000/230 V, single phase transformer has resistance of 10Ω and 0.016Ω respectively. The reactance of the transformer referred to the primary is 34 Ω. Calculate the primary voltage required to circulate the full load current, when the secondary is short circuited. Also find the pf on short circuit. 8

OR

VI (a) Explain with vector diagram, the regulation of a transformer. 6

(b) A 100 kVA transformer has 400 turns on the primary and 80 turns on the secondary. The primary and secondary resistances are 0.3Ω and 0.01Ω respectively and the corresponding leakage reactance are 1.1 and 0.035 respectively. The supply voltage is 2200V. Calculate :

(i) Equivalent impedance referred to primary.

(ii) Voltage regulation and the secondary terminal voltage for full load having a power factor of 0.8 leading. 9

Marks

UNIT -- III

VII (a) Write the advantages and disadvantages of poly phase induction motors. 7

(b) With neat sketch, prove that a rotating field of constant magnitude and speed is produced around the statôr of a 3-phasse induction motor, when it is fed with 3- phase supply. 8

OR

VIII (a) Differentiate full load torque and maximum torque of an induction motor. 7

(b) Explain the torque-slip and torque-speed characteristics of induction motor. 8

UNIT — IV

IX (a) With neat sketches explain the operation of a Star-Delta starter. 7

(b) Describe with diagram, the Kramer system of speed control. 8

OR

X (a) What is high torque cage motors ? Explain. 7

(b) Explain with figure the starting of slip-ring induction motor. 8