22418

21222

3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following: **10**

a) Classify the different types of motors.

b) State the rule used for calculating direction of e.m.f. induced in armature winding of D.C Generator.

c) Define voltage transformation ratio of transformer.

d) Classify various losses of transformer.

e) State any two conditions of parallel operation of three phase transformer.

f) State the importance of "K" factor of transformer.

g) State any two application of pulse transformer.

Marks

2. Attempt any THREE of the following: **12**

a) Suggest the material for the following part of motor

i) Armature winding

ii) Commutator

iii) Brushes

iv) Frame

b) Explain the principle of working of an induction motor.

c) Explain construction and working of Brushless D.C motor.

d) Draw labelled diagram of three point starter.

3. Attempt any THREE of the following: **12**

a) Describe with sketches, speed control method used for getting speed below normal speed in case of D.C shunt motor.

b) Derive the EMF equation for the single phase transformer.

c) Draw the labelled phasor diagram of single phase transformer supplying load at lagging power factor.

d) Compare shell type and core type single phase transformer (any four points)

4. Attempt any THREE of the following: **12**

a) Compare the distribution and power transformer on any four points.

b) Explain the effects of harmonics on the operation of transformer.

c) Describe with neat relevant diagram, the test carried out on three phase transformer to identify the windings corresponding to same phase.

d) In a 25 KVA, 2000/200V single phase transformer, the iron and full load copper losses are 350 watt and 400 watt respectively. Calculate the efficiency at unity power factor on full load.

e) List any four features of isolation transformer with any four applications.

Marks

5. Attempt any TWO of the following: **12**

a) A dc series motor runs at 600 rpm taking 100 Amp from 230 V supply. Armature and series field winding resistances 0.12 Ω and 0.03 Ω respectively. Calculate the speed when current has fallen to 50 amp. Assume flux to be directly proportional to field current.

b) Give the criteria for selection of distribution transformer and power transformer as per IS : 10028 (part - I)

c) Two single phase transformer with equal turns have impedance of (0.5 + j3) Ω and (0.6 + j10) Ω respect with secondary. If they operate in parallel. Determine how they will share a load of total 100 kW p.f. of 0.8 lagging?

6. Attempt any TWO of the following: **12**

a) A 10 KVA, 1 phase, 50 Hz 500/250 V transformer have following result.

OC test - (LV side) - 250 V, 3 A, 200 W

SC test - (HV side) - 15 V, 30 A, 300 W.

calculate efficiency and regulation at full load 0.8 p.f. lagging.

b) Explain with neat sketch the Scott connection scheme for conversion of three phase to two phase supply.

c) A 50 KVA, 4400/200 V transformer has $R_1 = 3.45\,\Omega$, $R_2 = 0.009\,\Omega$. The value of reactances are $X_1 = 5.2\,\Omega$ and $X_2 = 0.015\,\Omega$

Calculate for the transformer

i) Equivalent resistance and reactance as referred to HV side.

ii) Equivalent resistance and reactance as referred to LV side.