17415

14115

3 Hours / 100 Marks Seat No. | | | | | | | | |

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 <u>TEN</u> of the following: **20**

a) State the functions of armature core in D.C. Machine and name the material used for armature core.

b) Draw the connection diagram of long shunt differential D.C. compound generator?

c) State atleast four applications of D.C. series Motor?

d) State the working principle of D.C. Motor?

e) A 400V D.C. motor takes an armature current of 100 Amp. When its speed is 1000 rpm. If the armature resistance is 0.25Ω, calculate torque produced in N.M.

f) State any two applications of Brushless D.C. Motor?

Marks

g) State any four properties of an ideal transformer?

h) Enlist the various losses take place in transformer?

i) The no load ratio of a 50Hz; single phase transformer is 6000/250 V. Find the number of turns in each winding if the maximum flux is 0.06 wb in core.

j) Define all day efficiency of transformer?

k) Give the specification of three phase transformer as per IS1180(Part-I)-1989.

l) State the different types of cooling system used for three phase transformer?

2. Attempt any <u>FOUR</u> of the following: **16**

a) Derive the E.M.F. equation of D.C. Generator?

b) A 4 pole 1250 rpm D.C. generator has 72 slots and 12 conductors per slot on its armature. The flux per pole is 0.02 w.b. Calculate the e.m.f. induced when the armature is -

(i) Lap wound

(ii) Wave wound

c) Explain the necessity of starter for D.C. Motor? State various types of D.C. Motor starter.

d) Explain with suitable diagrams flux control method and armature control method for speed control of D.C. series motor?

e) Draw torque verses armature current and speed verses torque characteristics of D.C. series motor.

f) A 250V D.C. shunt motor takes 4A at no load. The armature and field resistance are 0.8 ohm and 250 ohm respectively. Calculate full load efficiency when the current is 22A.

Marks

3. Attempt any <u>FOUR</u> of the following: **16**

a) Explain with neat sketch the polarity test of single phase transformer? Which type of polarity marking is preferred in case of transformer?

b) Two transformers P and Q of 150 KVA and 100 KVA capacities respectively, are connected in parallel. $\%Z_P = 1.2\ (\%Z_Q)$; what maximum load can be transformed without over loading either of the transformers?

c) Compare distribution transformer and power transformer on any four points.

d) Draw the equivalent circuit of transformer referred to primary. State the meaning of each term related to equivalent circuit.

e) A single phase transformer of 100 KVA; 11000/2200 V 50Hz gave the following results :-

(i) O.C. test (Input to LV side) :- 2200 V; 1.59A; 980 watt.

(ii) S.C. test (with LV shorted) :- 580V; 9.1; 1100 watt.

Calculate the efficiency and regulation of transformer at full load 0.8 P.F. lagging.

f) A 20 KVA transformer on domestic load; which can be taken as of unity power factor; has full load efficiency of 95.3%. The copper loss is twice the iron loss. Calculate its all day efficiency on following duty cycle :-

No load $\rightarrow$ 10 Hrs.

Half load $\rightarrow$ 08 Hrs.

Full load $\rightarrow$ 06 Hrs.

Marks

4. Attempt any <u>FOUR</u> of the following: **16**

a) A 500 KVA transformer has 2500 watt iron loss and 7500 watts copper loss at full load. Calculate its efficiency at full load at unity p.f. and 0.8 p.f. lagging.

b) Draw the complete phasor diagram of transformer for lagging p.f. load condition and leading p.f. load condition.

c) Explain with circuit diagram; the direct loading tests on single phase transformer. How the efficiency and regulation at given load condition is determined?

d) State any two advantages of parallel operation of transformer. State the conditions for connecting single phase transformers in parallel.

e) Two transformers A of 40 KVA with % $Z_A = (3 + j4)$ and B of 25 KVA; share equally a load of 50 KVA; while working in parallel. Find how they will share a load of 40 KVA. Comment on your answer.

f) Derive the condition for maximum efficiency of transformer.

5. Attempt any <u>FOUR</u> of the following: **16**

a) Explain why the rating of transformer is always in KVA and not in KW.

b) State the advantages of amorphous core type distribution transformer.

c) Explain why all day efficiency of distribution transformer is a more reasonable basis for comparison than ordinary efficiency.

d) What is the aim of conducting phasing out test on 3 phase transformer? Explain with neat sketch the procedure of conducting phasing out test.

e) Explain with neat sketch the construction of three phase auto transformer.

f) Explain with neat diagram; three phase to two phase conversion (scott connection) of 3ϕ transformer.

Marks

6. Attempt any FOUR of the following: **16**

a) State the criteria for selection of distribution transformer and power transformer.

b) Compare single phase autotransformer with conventional two winding transformer on any four points.

c) Explain with circuit diagram the use of CT and PT for measurement of high current and high voltage.

d) Explain construction and working of isolation transformer.

e) State any two applications of :-

i) Single phase autotransformer

ii) Isolation transformer

f) Compare single phase welding transformer with single phase two winding transformer on the basis winding sizes; cooling; working and construction.