RN-6129

B. E. - II (Sem. III) (Chemical) Examination
May / June – 2010
Electrical Technology

Time : **3** Hours]   [Total Marks : **100**

Instructions :

(1)

Fillup strictly the details of ☞ signs on your answer book.

Name of the Examination :

B. E. - 2 (Sem. 3) (Chemical)

Name of the Subject :

Electrical Technology

Subject Code No. : **6 1 2 9** ☞ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Attempt **all** questions.

(3) Figures to the right indicate full marks.

(4) Draw figures wherever necessary.

SECTION - I

1 (a) Answer in short : (each 2 marks)   **10**

    (i) What are the advantages of slip ring induction motor w.r.t squirrel cage induction motor.

    (ii) How can we change the direction of rotation of induction motor?

    (iii) On which side of Transformer are OC and SC tests performed? Why?

    (iv) What is the function of Conservator and Airbreather for a transformer?

    (v) Why does induction motor not rotate at synchronous speed?

    (b) Explain the construction and principle of induction motor in detail.   **6**

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2 (a) Derive the equivalent circuit of induction motor. **8**
How can the parameters of the equivalent circuit
be found out? Explain the tests in detail.

(b) Calculate the values of approximate equivalent
circuit referred to LV side of a single phase 5 kVA
220 / 440 V 60 Hz transformer of which following are
the test results. Also draw the equivalent ckt.

Open Circuit : 220 V, 0.8 A, 90 W on the L.V.

Short Circuit : 18 V, 8A, 80W on the H.V.

OR

2 (a) Draw the complete vector diagram of a transformer **6**
for (i) Unity and (ii) Lagging power factor.

(b) Draw the circle diagram for a 11 kW 400 V, 50 Hz **10**
3 phase star connected induction motor from the
following data :

No load test : 400 V, 8A, 1000 W

Short circuit test : 100 V, 25 A, 1750 kW

From the circle diagram find the current and p.f. at
full load.

3 Attempt any **three** : **18**

(a) Draw the speed torque characteristics of Induction
Motor and explain it in detail.

(b) Differentiate between Shell Type and Core Type
transformers.

(c) Describe various losses taking place in a transformer
and what are the methods to reduce the losses.

(d) Derive the equation of efficiency and maximum efficiency
of a transformer.

(e) Write a short note on : Methods of Starting of 3 phase
induction motor.

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SECTION - II

4 **(a)** Answer the following questions : **10**

(i) What are the different types of armature windings commonly used in dc machines?

(ii) What is the function of armature in the dc generator?

(iii) What is meant by eddy current losses?

(iv) What is voltage regulation of dc generator.

(v) In which type of generator field and armature voltages are same?

(vi) How can the direction of rotation of dc motor be determined?

(vii) What is the necessity for chording in the armature winding of a synchronous machine?

(viii) What is the other name for distribution factor?

(ix) What is the maximum speed of 50 Hz alternator?

(x) What is the function of metal frame in dc machine?

(b) Explain different parts of dc machine. **5**

(c) A dynamo has a rated armature current at 250 A. **5**
What is the current per path of the armature if armature winding is simplex wave wound or simplex lap wound? The machine has 12 poles.

OR

(b) Calculate the voltage induced in the armature **5**
winding of a 4-pole lap wound dc machine having 728 active conductors and running at 1800 rpm. The flux per pole is 30 mWb.

(c) Derive the equation of torque for dc motor. **5**

5 **(a)** Explain the principle of operation of motor. **7**

(b) The power input to a 230 V dc shunt motor is **8**
8.477 kW. The field resistance is $230\,\Omega$ and armature resistance is $0.28\,\Omega$. Find the input current, armature current and back emf.

OR

3

5   (a)   A 4-pole, 220 V shunt motor has 540 lap wound   **7**
conductors. It takes 32 A from the supply mains
and develops output power of 5.595 kW. The field
winding takes 1 A. The armature resistance is $0.9\,\Omega$
and the flux per pole is 30 mWb. Calculate (i) speed
(ii) the torque developed in N-m.

     (b)   Explain Ampere-Turn method of regulation of   **8**
alternator.

6   Attempt any **three** :   **15**

     (i)   Derive the equation of distribution factor K_d.

    (ii)   Power stages of alternator.

   (iii)   Effects of varying excitation on armature current and
power factor of syn. motor.

   (iv)   Explain

         (a)   Starting torque

         (b)   Running torque

         (c)   Pull in torque

         (d)   Pull out torque.

    (v)   V and inverted-V curves of synchronous motor.

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