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RN-6205

B. E. II (Sem. III) (Electrical) Examination

May / June – 2010

Electrical Machines - I

Time : Hours] [Total Marks :

Instruction :

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 2 (Sem. 3) (Electrical)**

Name of the Subject :

☛ **Elecrical Machines - 1**

☛Subject Code No. : **6 2 0 5** ☛Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

SECTION - I

Q1: (a) Fill in the blanks 05

1. The commutator brushes are generally made up of _____.
2. The AC voltage produced in the armature of the DC generator is converted to DC voltage at the outer terminals with the help of _____.
3. By flux control method we can get speeds _____ than the rated speed.
4. Magnetizing characteristic is graph between _____&_____.

Q1: (b). state true or false 05

1. D.C series motor can be run on NO Load condition.
2. Starters are used to start D.C motors.
3. DC shunt motor is preferred when constant speed is required.
4. Voltage of D.C shunt generator is practically constant.
5. In D.C motor starting current is high because of absence of back emf.

Q1: (c)

1. An 8 pole D.C shunt generator with 778 wave connected armature conductor & running at 500 rpm supplies a load of 12.5 ohm resistance at terminal vltage of 50 V. The field resistance is 250Ω & armature resistance is 0.24Ω. Find armature current, induced emf & flux per pole. 05
2. State & explain methods of speed control for D.C series motor. 05

Q2: (a) explain working principle of DC motor & derive condition for maximum power. 08

Q2: (b) Explain various types of losses occurring in a DC generator. 07

OR

Q2. (a) A shunt generator has a F.L. current of 196 A at 220V. The stray losses are 720 W and the shunt field coil resistance is 55 Ω. If it has a F.L. efficiency of 88%, find the armature resistance. Also find the load current corresponding to maximum efficiency. 08

(b) What is commutation? Discuss methods for improving commutation 07

Q 3. Attempt any three. 15

1 Explain losses in D.C machines.
2. Explain 3 point starter for D.C motor.
3. A 250 V D.C shunt motor having an armature resistance of 0.25Ω carries an armature current of 50A & runs at 750 r.p.m. If the flux is reduced by 10%, find the speed assuming load torque remains the same.
4. Explain armature reaction & give remedies for it.
5. A 220 V d.c. shunt motor runs at 500 r.p.m. For an armature current of 50Afind the speed if torque is doubled. Given that armature resistance is 0.2 ohms.

Section II

4 a Answer in short (Each 2 marks) 10

1 What are the various types of insulations used in transformers ?

2 Where do you use Core type transformer and Shell type transformer ?

3 Can you operate a transformer at a frequency other than it is designed for ? What are the consequencies ?

4 What happens if the voltage ratio of two transformers to be connected in parallel is not same ?

5 What is the function of conservator and Airbreather for a transformer ?

4 b Draw a figure showing various parts of a Transformer. Explain the function of each part in short. 6

5 a Explain the no load and short circuit test of a single phase transformer and show that from the test results, how constants of equivilant circuit can be determined. 8

b Calculate the values of Ro, Xo, Re,Xe in the equivilant circuit referred to low voltage side of a single phase 5 KVA, 220/440V 60 Hz. Transformer of which following are the test results ;

Open Circuit : 220 V, 0.8 Amp., 90 W on primary.

Short Circuit : 18 V, 8 A, 80 W on secondary. Draw the equivalent circuit.

OR

5 a Define voltage regulation of a single phase transformer and derive the equation of voltage regulation of single phase transformer. 8

b A 100 KVA transformer has its maximum efficiency of 0.98 at unity power factor. During the day it is loaded as follows. Maximum efficiency occurs at full load. 8

12 hours - 20 KW at 0.5 pf
6 hours - 45 KW at 0.9 pf
6 hours - 80 KW at 0.8 pf
Calculate all day efficiency of the transformer.

6 Attempt any three : 18

a Describe the conditions to be satisfied for the parallel operation of two 3-phase transfoemers.

b Sumpner's test on two identical 1 - phase transformer

c Explain the working of a transformer on full load. If the load increases from no load to full load what will happen to the value of flux flowing in the core ? Give justification for your answer. Draw relevant figures.

d Write a note on diferent types of Transformers from application point of view.

e Write a short note on scott-connection of transformers.