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RN-8085

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

May / June – 2010

Electrical Machines - I

(As per New GTU Syllabus)

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

Instructions :

(1)

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 :

☛ **Electrical Machines-1**

☛ Subject Code No. : **8 0 8 5** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) Please write answers in point wise and try to avoid essay type answers.

(3) Due weightage will be given to neat and clean answer-sheets.

(4) Write both sections in separate answer sheets.

(5) Make assumptions wherever you feel required.

SECTION – I

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

(1) Can we use gold as core material of a transformer if it is cheaper than iron ? Justify your answer.

(2) On which side of transformer are OC and SC tests performed ? Why ?

(3) What are the various types of insulations used in transformers ?

(4) What is "Soft Starting" with respect to induction motor ?

(5) What is "Slip" with reference to induction motor ?

(b) Develop an equivalant circuit of single phase transfomer and show how the constants of primary and secondary windings may be combined to give a simplified equivalant circuit with the values of constants given in terms of secondary windings. **6**

2 (a) Explain the construction and principal of induction motor in detail. 8

(b) The following readings were obtained from O.C. and S.C. tests on 8 kVA, 400/120 V 50 Hz. Transformer : 8
Open circuit : 120 V, 4 Amp, 75 W on primary.
Short circuit : 9.5 V, 20 A, 110 W on secondary.
Draw the equivalant circuit. And calculate the voltage regulation and efficiency for 0.8 pf, full load.

OR

2 (a) Define voltage regulation of a single transfomer and derive the equation of voltage regulation of single phase transformer. Also explain its importance. 8

(b) What is "Rotating MMF" with respect to induction motor ? How it is produced ? Derive the necessary equation showing the magnitude of rotating MMF. 8

3 Attempt any **three** : 18

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

(b) For a 3 phase induction motor, derive the equation of torque, maximum torque, the speed at which it occurs.

(c) Draw the speed torque characteristics of an induction motor and explain in detail.

(d) Write a short note on construction of transformer explaining the function of various parts.

(e) Compare 3 phase squirrel cage induction motor and 3 phase slipring induction motor.

SECTION – II

4 (a) Answer in short : (2 marks) **10**

(1) Where do you use (a) Salient pole alternator (b) Cylindrical rotor alternator.

(2) In what machines are (a) split rings (b) slip rings used?

(3) On what does the output frequency and voltage of an alternator running on no load depend ?

(4) What is the function of damper winding in an alternator ?

(5) What is back emf in DC motors ?

(b) Write a note on classification of DC machines. **6**

5 (a) Explain the AT method to find the voltage regulation of an alternator. 8

(b) Draw various parts of DC machine and explain the function of each in short. 8

OR

5 (a) Explain the load and voltage regulation characteristics of DC shunt generator. 8

(b) A three-phase 5kVA, 208 V, four-pole, 60 Hz wye-connected synchronous machine has negligible stator winding resistance and a synchronous reactance of 8 S per phase at rated voltage. The machine is operated as a generator in parallel with a three-phase 208V, 60 Hz power supply.

Determine the generator voltage and the power angle when the machine is delivering rated kVA at 0.8 PF lagging. Draw the phasor diagram.

6 Write short notes on : 18

(1) Ward-Leonard method of speed control.

(2) Losses in DC motor and Efficiency.

(3) Swinburne's test.

(4) Write a note on classification of alternators.

(5) Voltage regulation of alternator by synchronous impendence method.