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RN-8127

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

May / June – 2010

Electrical Machines & Electronics

(131901)

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) (Mechanical)**

Name of the Subject :

☛ **Electrical Machines & Electronics (131901)**

☛ Subject Code No. : **8 1 2 7** ☛ Section No. (1, 2,.....) : **1&2**

Seat No. :

Student's Signature

(2) All questions are compulsory.
(3) Write both sections in separate answer sheets.
(4) Draw figures wherever necessary and make necessary assumptions wherever required.
(5) Figures to the **right** indicate **full** marks.
(6) Please write answers in point wise and try to avoid essay type answers.

SECTION – I

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

(1) State the types of transformer.
(2) Classify : Transformer.
(3) What are the applications of single phase induction motor ?
(4) What are the different methods of speed control of three phase induction motor ?
(5) Classify : Electric supply system.

(b) Fill in the blanks : (each one mark) **10**

(1) The expression for synchronous speed is _____.
(2) The value of slip at starting is _____ .

(3) Variable losses include _____ and _____ loss.
(4) The frequency of rotor induced emf is _____.
(5) A current transformer is operated with _____ secondary.
(6) _____ (type of transformer) is used for measurement of ac voltage.
(7) A transformer works on the principle of _____.
(8) A transformer power rating is always in terms of _____.
(9) Ideally voltage regulation of a transformer should be _____.
(10) Ideally power factor should be _____.

2 (a) Explain : Important parts of a transformer. **5**

(b) State : The difference between transformer and induction motor. **4**

(c) A three-phase induction motor is wound for 4 poles and is supplied from a 50 Hz supply. Calculate : **6**
(1) The synchronous speed
(2) The speed of the motor when the slip is 3%
(3) The rotor frequency.

OR

2 (a) Explain construction of induction machine. **5**

(b) Write short note : speed control of three-phase induction motor. **4**

(c) A 5 kVA, 250/500 V, 50 Hz, single -phase transformer gave following test results : **6**
No load test : 250 V, 0.75 A, 60 W (L.V. Side)
Short circuit test : 9 V, 6 A, 21.6 W (H.V. Side)
Calculate the equivalent circuit components and represent in an equivalent circuit.

3 Answer any **three** : **15**
(1) Explain the principle of operation of transformer.
(2) Compare : Shell type and core type transformer.
(3) Write short note : Torque-slip characteristic of a three-phase induction motor.
(4) Compare : Three phase induction motor and single-phase induction motor.
(5) State disadvantages of poor power factor. Suggest methods for power factor improvement.

SECTION – II

4 (a) Answer in short ; (each 2 marks) **10**

(1) Classify : DC Generator.
(2) State : Applications of DC generators.
(3) Why DC series motor is suitable for traction ?
(4) Classify : Alternators.
(5) Classify : Substations.

(b) Fill in the blanks : (each one mark) **10**

(1) A _____ operates as a rectifier which converts the AC voltage to DC voltage.
(2) The _____ is an iron body that provides the path for flux.
(3) The load characteristics of the _____ DC generator is almost flat.
(4) DC motor coverts _____ energy to _____ energy.
(5) _____ method gives us the speed control below base speed.
(6) The _____ type motor is never started on no load.
(7) The field winding of an alternator is placed on the _____.
(8) The expression for the frequency of alternator output is _____.
(9) The frequency of alternator voltage can be changed by changing its _____.
(10) The ideal value of voltage regulation of an alternator is _____.

5 (a) Explain : Construction of DC generator. **5**

(b) Explain : Construction of Alternator. **4**

(c) A 4 pole, lap wound 750 RPM dc shunt generator has an armature resistance of 0.4 Ohm and field resistance of 200 Phm. The armature has 720 conductors and the flux per pole is 30 mWb. If the load resistance is 15 Ohm, determine the terminal voltage. **6**

OR

5 (a) Derive the expression for the torque developed in DC motor. **5**

(b) Explain : Alternator operation on load. **4**

(c) A four pole lap would DC motor has 480 coductors. The flux per pole is 24 mWb, and the armature resistance is 1 Ohm. If the motor is connected to a 200 V dc supply and running at 1000 RPM on no load, calculate : **6**

(1) Back emf (2) Armature current (3) Power output.

6 Answer any **three** : **15**

(1) Write short notes : Losses in DC generator.
(2) Explain significance of back emf in the DC motor.
(3) Write short note : Cooling of alternator.
(4) Write short note : Pole mounted substation.
(5) Write short note : Parallel operation of alternators.