



SE-8075

B. E. - II (Sem. III) (EC/IC) Examination

May / June - 2011

Electrical Machines

(New Syllabus)

Time :3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दशावेक निशानीवाणी विगतो उत्तरवही पर अवश्य लखवी.  
Fillup strictly the details of signs on your answer book.

Name of the Examination :  
B. E. - 2 (SEM. 3) (EC/IC)

Name of the Subject :  
Electrical Machines

Subject Code No. : 8 0 7 5 Section No. (1, 2,.....) : 1&2

Seat No. :

Student's Signature

- 1) Attempt all question.
- 2) Figure to the right indicates full marks.
- 3) Scientific calculator up to Casio-100D, 100MS series is permitted.

Section-I

- Q-1 (a) Match the following 05
- |                           |                                     |
|---------------------------|-------------------------------------|
| (i) Field winding         | (i) Reduce armature reaction        |
| (ii) Commutator           | (ii) Support to field winding       |
| (iii) Carbon brush        | (iii) Produce magnetic field        |
| (iv) Compensating winding | (iv) Convert AC to DC               |
| (v) Pole core             | (v) Collect current from commutator |
- Q-1 (b) Identify that the given statement is True or False 05
- (1) DC motor works on AC supply
  - (2) Three point starter is used with DC shunt motor
  - (3) DC series motor is used for traction application
  - (4) Alternator always runs at synchronous speed
  - (5) As load increases generated voltage of DC series motor increases.
- Q-1 (d) Give classification of DC generator as per excitation 05
- Q-2 Attempt any Five 35
- (a) Discuss construction of DC machines.
  - (b) Explain speed control of DC shunt motor
  - (c) A shunt generator has generates emf of 254 V. When machine is loaded, the terminal voltage drops down to 240 V. Neglecting effect of armature reaction, determine the load current. Armature resistance is 0.04 ohm and field resistance is 24 ohm.

- (d) Derive emf equation of DC generator.
- (e) Discuss external-internal characteristics of DC separately excited generator
- (f) Draw different configuration of Compound generator. Discuss load characteristics of it
- (g) Write conditions for parallel operation of two alternators.
- (h) Discuss Swinburne test.

## SECTION - II

3 (a) **Do as directed:** 10

- (1) Transformer core is made up of high silicon content material in order to reduce \_\_\_\_\_ loss.
- (2) In a shell type transformer \_\_\_\_\_ surrounds a considerable part of \_\_\_\_\_.
- (3) A 1- $\Phi$  transformer with  $K=10$  and secondary rating of 1000V, number of primary turns = \_\_\_\_\_, if emf per turn is 10V.
- (4) Open circuit test is performed on a transformer to measure its \_\_\_\_\_ loss.
- (5) In a Dd11 type of connection of a 3- $\Phi$  transformer, '11' indicates the phase shift of \_\_\_\_\_ degree.
- (6) In \_\_\_\_\_ type of induction motor, rotor consist of 3- $\Phi$  rotor winding connected in either star or delta.
- (7) A 3- $\Phi$ , 50Hz, 6-pole induction motor runs at 900 rpm. The percentage slip of it is \_\_\_\_\_ %.
- (8) 1- $\Phi$  induction motor is not self starting. (True or False)
- (9) Secondary of current transformer must not be open circuited. (True or False)
- (10) At any loading conditions, the flux in the transformer core always remains constant. (True or False)

(b) **Match the following List I and List II** 05

- | List I                 | List II                           |
|------------------------|-----------------------------------|
| (1) V-V connection     | (a) Reduce eddy current loss      |
| (2) Phase wound motor  | (b) Polarity must be same         |
| (3) Laminated core     | (c) 3-phase to 2-phase conversion |
| (4) Parallel operation | (d) High starting torque          |
| (5) Scott connection   | (e) Open delta                    |

(c) Write a short note on transformer losses. 05

4 **Attempt any three:** 30

- (a) A 200/400 V, 50 Hz, 1-  $\Phi$  transformer has the following test results:  
 O.C. test: 200V, 0.7 A, 70 W (on L.V. side)  
 S.C. test: 15 V, 10 A, 85 W (on H.V. side)  
 Compute the parameters of approximate equivalent circuit referred to low voltage side and draw the circuit.
- (b) A 3-phase, 400 V induction motor gave the following test readings;  
 No load: 400 V, 9 A, 1250 W  
 Blocked rotor: 150 V, 38 A, 4000 W  
 Normal rating of the motor is 14.9 KW. Draw the circle diagram and find full load current, power factor, and slip from it.
- (c) What is ideal transformer? Explain the operation of transformer on load.

- (d) Draw the phasor diagram of 1-phase transformer on load with lagging, leading and unity power factor
- (e) A 4 pole, 3-phase induction motor operates from a 50 Hz supply. Calculate:
- 1) Synchronous speed of the stator magnetic field
  - 2) The speed of the rotor when the slip is 4%.
  - 3) The frequency of the rotor currents when the slip is 3%
  - 4) The frequency of the rotor current at standstill.
  - 5) Slip when rotor speed is 1425 rpm
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