



**KC-6205**

**B. E. - II (Sem. III) (Electrical) Examination**  
**November / December – 2012**  
**Electrical Machine - I**

Time : 3 Hours]

[Total Marks : 100

**Instructions :**

(1)

नीचे दशावलि निशानीवाणी विगतो उत्तरवही पर अवश्य लभवी.  
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 MACHINE - 1**

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

Seat No. :

Student's Signature

- (2) All questions are compulsory.  
(3) Draw figure wherever necessary and make necessary assumptions wherever required.  
(4) Figures to the right indicate full marks.

1 (a) Do as directed : 6

- (1) For wave connected armature winding the number of parallel path is equal to \_\_\_\_\_.
- (2) A dc generator develops the emf of 200 V at the speed of 1500 rpm. Assuming constant flux, it develops the emf of \_\_\_\_\_ V when runs at 1000 rpm.
- (3) In a dc motor the direction of rotation can be found by applying \_\_\_\_\_ rule.
- (4) Effect of armature reaction increases with the increase in load current.  
(True or False)
- (5) In a DC generator commutator converts AC induced emf to DC.  
(True or False)
- (6) In a DC machine series field winding has lesser no. of turns as compared to shunt field winding.  
(True or False)

- (b) Match the following List I and List II 4
- | <b>List I</b>            | <b>List II</b>             |
|--------------------------|----------------------------|
| (1) Demagnetization      | (a) DC series motor        |
| (2) Cross magnetization  | (b) Weakens the main flux  |
| (3) Constant flux        | (c) Distorts the main flux |
| (4) High starting torque | (d) DC shunt motor         |
- (c) Explain armature reaction and its effect on DC generator. 6
- 2 (a) Explain Swinburne's test for testing DC shunt machine. State its advantages and disadvantages. 8
- (b) A long shunt compound generator delivers a load current of 50 A at 500 V and has armature, series field and shunt field resistances of  $0.03\ \Omega$  and  $250\ \Omega$  respectively. Calculate the generated voltage and the armature current. Allow 1 V per brush for contact drop. 8
- OR**
- 2 (a) Discuss the method by which we can obtain magnetization curve for separately and self excited generators. Also compare magnetization curve of DC shunt and DC series generator. 8
- (b) A four - pole generator, having wave - wound armature winding has 51 slots, each slot containing 20 conductors. What will be the voltage generated in the machine when driven at 1500 r.p.m. assuming the flux per pole to be 7.0 mWb. 8
- 3 Attempt any three of the following : 18
- (a) Write a brief note speed control of DC shunt motor.
- (b) Explain voltage build up process of DC shunt generator.
- (c) Explain the construction of DC machine.
- (d) Torque and armature current characteristic of D.C Series Motor.
- (e) Write a short note on 3-point starter.

- 4 (a) Answer in short : (each of two marks) 10
- (1) How is the transformer rated? Why?
  - (2) What are the advantages of 3-ph transformer over 3 single-ph transformer?
  - (3) Which losses can be measured from the no-load test on 1-ph transformer? Why? ?
  - (4) Why auto transformers not safe for supplying a low voltage from a high voltage source?
  - (5) Classify the iron losses. How may iron losses reduce to minimum.
- (b) Explain theory of ideal transformer and draw phasor diagram of practical transformer operating on full load for unity, lagging and leading power factor 10
- 5 (a) Develop an equivalent circuit of a transformer referred to the primary side and draw an approximate equivalent circuit of a transformer. Indicate how it differs from the exact equivalent circuit of a transformer. 8
- (b) Consider a 4-KVA, 200/400 V single -phase transformer supplying full load current at 0.8 lagging power factor. The o.c./s.c. test results are as follows : 7
- O.C. test : 200 V    0.8 A    70 W.    (l.v. side.)  
S.C. test : 20V    10 A    60 W    (h-v. side}
- Calculate efficiency, secondary voltage and current into primary at the above load.
- OR**
- 5 (a) Define voltage regulation and derive equation for voltage regulation of single-phase transformer at unity, lagging and leading power factor. 8
- (b) A 250/500 V transformer gave following test result : 7
- S.C. test : 20 V;    12 A;    100w  
O.C. test : 250 V;    1 A;    80w on l.v. side
- Determine the circuit constant and draw equivalent circuit.

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

**15**

- (a) Write a short note: construction of 1-ph transformer.
  - (b) Short note: Auto transformer.
  - (c) Explain V-V connection.
  - (d) Discuss conditions to be satisfied for the parallel operation of two 1-phase transformer.
  - (e) Draw standard connection with showing angular displacement for 3-ph transformer.
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