



UF-6205

B. E. II (Sem. III) (Electrical) Examination
May/June - 2012
Electrical Machine - I

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

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

Name of the Examination :
B. E. II (Sem. III) (Electrical)

Name of the Subject :
Electrical Machine - I

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

Seat No. :

Student's Signature

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

- 1 (a) Fill in the blanks : 6
- (i) In a compound machine the resistance of shunt field is _____ than the resistance of series field.
(ii) In a dc machine _____ carries the magnetic flux produced by the field poles.
(iii) A dc generator develops the emf of 220V at the speed of 1000 rpm. Assuming linear magnetic circuit, it develops the emf of _____ V when runs at constant speed, and flux is reduced to 50%.
(iv) Transformer core is laminated in order to reduce _____ loss.
(v) A $1-\Phi$ transformer with $K=10$ and secondary rating of 1000V, number of primary turns = _____, if emf per turns is 10V.
(vi) Short circuit test is performed on a transformer to measure its _____ loss.
- (b) Match the following List I and List II : 4
- | List I | List II |
|---------------------|------------------------|
| (i) Back emf | (a) DC series motor |
| (ii) Yoke | (b) Speed governor |
| (iii) Varying flux | (c) Magnetic flux path |
| (iv) Constant speed | (d) DC shunt motor. |

- (c) Explain the speed control methods for DC series motor. **6**
- 2** (a) Explain Swinburne's test for testing DC shunt machine. **8**
State its advantages and disadvantages.
- (b) The armature winding of a 200V, 4 Pole, series motor **8**
is lap connected. There are 280 slots and each slot has
4 conductors. The current is 45 A and the flux per Pole
is 18mWb. The field resistance is 0.3Ω , The armature
resistance 0.5Ω and the iron and friction losses total
800W. The pulley diameter is 0.406 m. Find the pull
in Newton at the rim of the pulley.

OR

- 2** (a) Discuss the method by which we can obtain magnetization **8**
curve for separately ans self excited generators. Also
compare magnetization curve of DC shunt and DC
series generator.
- (b) A d.c Shunt machine generates 250 V on open circuit **8**
at 1000 r.p.m. Effective armature resistance is 0.5Ω ,
field resistance is 250Ω . Input to machine running as
a motor on load is 4 A at 250 V. Calculate speed of
machine as a motor taking 40 A at 250 V. Armature
reactions weakens field by 4%.
- 3** Attempt any **three** of the following : **18**
- (a) Explain Principle of D.C. Motor.
- (b) Derive E.M.F. Equation of Generator.
- (c) Explain the construction of DC machine.
- (d) Torque and armature current characteristic of DC Series
Motor.
- (e) Write a short note on 4-point starter.
- 4** (a) Answer in short : (each of **two** marks) **10**
- (i) What is a principle of operation of transformer ?
- (ii) What will happen if primary of a transformer is
connected to D.C. supply ?
- (iii) Which losses can be measured from the no-load test
on 1-ph transformer ? Why ?
- (iv) Why auto transformers not safe for supplying a low
voltage from a high voltage source ?
- (v) What are the advantages of 3-ph transformer over
3 single-ph transformer ?

- (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) State the losses of transformer. What do you mean by efficiency in case of transformer ? Derive the condition for maximum efficiency in a transformer. 8
- (b) Obtain equivalent circuit of A 450/120 V 1-ph, 10 kVA 50 Hz transformer gave following test result : 7
 S.C. test: 9.65V; 22.2A; 120 W meter reading on h.v. side
 O.C. test: 120V; 4.2A; 80 W meter reading on I.v. side.
- OR**
- 5 (a) Draw no-load phasor diagram of a transformer and derive expression for magnetizing and core loss component for current. Also draw on load phasor diagram at lagging power factor. 8
- (b) A 4-KVA, 200/400 V single-phase transformer gave following test result. 7
 O.C. test: 200V. 0.7 A 60 W. (l.v. side)
 S.C. test: 19V. 6 A 21 W. (h.v. side)
 Calculate efficiency at full load unity power factor, secondary voltage at the full load unity power factor. Also calculate magnetizing current and iron loss component at normal voltage and frequency.
- 6 Answer any **three** : 15
- (a) Write a short note : Back-to-back test on 1-ph transformer.
- (b) Short note : Auto transformer.
- (c) Explain V-V connection.
- (d) Draw Dy1, Yd11 and Dd0 connection for 3-phase transformers.
- (e) Explain parallel operation of 3-ph transformer.