



KC-8075

B. E. II (Sem. III) (EC) Examination
November/December – 2012
Electrical Machines
(New Syllabus)

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दशांश देव निशान्नीवाणी विगतो उत्तरवडी पर अवश्य बपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/>
<input type="text" value="B. E. II (Sem. III) (EC)"/>	<input type="text"/>
Name of the Subject :	<input type="text"/>
<input type="text" value="Electrical Machines (New)"/>	<input type="text"/>
Subject Code No. : <input type="text" value="8"/> <input type="text" value="0"/> <input type="text" value="7"/> <input type="text" value="5"/>	<input type="text"/>
Section No. (1, 2,.....): <input type="text" value="Nil"/>	<input type="text"/>
	Student's Signature

- (2) Answer all questions.
- (3) Figures on right hand side indicate marks.
- (4) Assume suitable data whatever is necessary.
- (5) Scientific calculator fx100 or equivalent is permissible.

1 (a) Fill in the blanks :

10

- (i) Short circuit test on a single phase transformer gives _____ loss. (copper, core)
- (ii) The slip of induction motor at standstill is _____ (zero, one)
- (iii) _____ loss constitute of eddy current loss and hysteresis loss. (copper, core)
- (iv) Maximum regulation occurs when the power factor of the load is _____ (leading, lagging)
- (v) Back-to-Back test on a transformer is also called as _____ test. (sumpnerns, swinburnes)
- (vi) An autotransformer is a transformer having a part of its winding _____ to the primary and secondary circuits. (separate, common)
- (vii) Stator iron loss in an induction motor is practically _____ (constant, variable)

- (viii) Star/star transformers operate satisfactorily only when the load is _____ (balanced, unbalanced)
 - (ix) The most popular method of connecting transformers is the _____ connections. (star/delta, delta/star)
 - (x) At normal load the slip of an induction motor is usually _____. (high, less)
 - (b) What is slip ? Derive an expression of rotor frequency in terms of main supply frequency and slip. **5**
 - (c) Derive the emf equation of a single phase transformer. **5**
- 2**
- (a) Explain the equivalent circuit of a single phase transformer. **7**
 - (b) In a 6pole, three phase, 50 Hz induction motor with star connected rotor, the rotor resistance per phase is 0.3 ohm, and the reactance at standstill is 1.5 ohm per phase, and an emf between the slip rings on open circuit is 175V. Calculate **8**
 - (i) Slip at speed of 950 rpm
 - (ii) Rotor emf per phase
 - (iii) Rotor frequency and reactance at a speed of 950 rpm

OR

- 2** (a) Explain no load test and blocked rotor test for a three phase induction motor. **7**
 - (b) A 10 kVA, 200/400 V, 50 Hz single phase transformer gave the following test results : **8**
 - O.C. Test : (hv winding open) 200 V, 1.3A, 120 W
 - S.C. Test: (Iv winding short circuited) 22V, 30A, 200 W

Find parameters of equivalent circuit as referred to low voltage side.
- 3** Attempt any three : **15**
- (a) Write a short note on short circuit test on a transformer.
 - (b) Write a short note on V-V connection of a three phase transformer.
 - (c) Derive the condition for maximum torque for a three phase induction motor.
 - (d) State various starting methods of a three phase induction motor and explain any one in detail.

- 4 (a) Fill in the blanks : 10
- (i) Brushes facilitate the collection of current from _____ (commutator, armature)
 - (ii) _____ are used in a dc machine to reduce sparking at the brushes. (interpoles, poles)
 - (iii) Salient pole alternators are used preferred when speed required is _____. (high, low)
 - (iv) Generally alternator field is mounted on _____ part of the alternator. (rotating, stationary)
 - (v) For parallel operation, the frequencies of two machines should be _____ (equal, unequal).
 - (vi) When two alternators are working in synchronism, synchronizing power will be _____. (one, zero)
 - (vii) The field winding of a self excited dc generator is excited with _____ (ac, dc)
 - (viii) Pole winding is also called as _____ winding. (field, armature)
 - (ix) For a given dc motor the speed depends upon _____. (applied, voltage, flux)
 - (x) Alternator generates _____ power. (dc, ac)
- (b) Explain the construction of dc machine and state the function of each part with relevant diagrams. 10
- 5 (a) Explain the voltage build up of a dc shunt generator. 8
What is the effect of field circuit critical resistance on it.
- (b) What is the principle of operation of an alternator ? 7
Derive the emf equation of an alternator.
- OR**
- 5 (a) A three phase star connected synchronous generator 8
is rated at 1500 kVA, 11 kV. The armature effective resistance and synchronous reactance are $1.2\ \Omega$ and $25\ \Omega$ respectively per phase. Calculate the percentage voltage regulation for a load of 1437.5A at 0.8 pf lagging.
- (b) Explain the working principle of dc motor and also 7
explain the significance of back emf.
- 6 Attempt any three : 15
- (i) Write a short note on synchronous impedance method.
 - (ii) Derive the torque of a dc motor
 - (iii) Write a short note on three point starter
 - (iv) Explain dc series motor characteristics.