

KADI SARVA VISHWAVIDHYALAYA

ATKT EXAMINATION APRIL 2015

B.E. Semester III

Subject Code:- EE-304

Subject Name:-Electrical Machines – I

Date: 16/04/2015

Time: 10:30 am to 1:30 pm

Total Marks:- 70

Instructions:

1. Answer each section in separate Answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are compulsory.
4. Indicate clearly, the options you attempt along with its respective Question number.
5. Use the last page of main supplementary of rough work.

Section-I

Q:1 (All compulsory)

- (A) Explain the basic principle of d.c.motor with diagram. [05]
(B) Explain the speed control methods for dc motor. [05]
(C) Derive equation of EMF for DC generator for lap winding and wave winding. [05]

OR

- (C) Explain three point starter. [05]

Q-2 Answer the following question.

- (A) What is Armature reaction? How the Armature reaction is minimized? [05]
(B) Derive the torque equation for dc motor. [05]

OR

- (A) Explain the characteristics of dc shunt generator. [05]
(B) Explain simple electromechanical system. [05]

Q-3 Answer the following question.

- (A) Explain any one characteristic of dc series motor. [05]
(B) What is necessity of starter for dc motor? [05]

OR

- (A) A 250V dc shunt motor takes a load current of 20A. The shunt field and armature resistance are 200 ohm and 0.3 ohm respectively. Find value of back emf and output power. [05]
(B) Explain types of dc generators. [05]

Section-II

Q-4 (All compulsory)

- (A) Construction and principle of single-phase transformer. [05]
- (B) Explain operation at no load and on load of transformer [05]
- (C) Explain equivalent circuit of transformer [05]

OR

- (C) Explain Sumpner's Test of single phase transformer. [05]

Q-5 Answer the following question.

- (A) Explain why rating of transformer is in KVA. [05]
- (B) Derive the equation of efficiency for single phase transformer. [05]

OR

- (A) Explain the construction and working principle of Autotransformer. [05]
- (B) Derive the equation of emf for single phase transformer. [05]

Q-6 Answer the following question.

- (A) State the difference between core type and shell type transformer. [05]
- (B) Write short note on tertiary winding. [05]

OR

- (A) Explain the conditions for parallel operation of transformer. [05]
- (B) Explain V-V connections of 3- phase transformer in detail. [05]

-----All the Best -----

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester III

Subject Code:- EE-304

Subject Name:-Electrical Machines – I

Date: 27/11/2013

Time: 10:00 am to 1:00 pm

Total Marks:- 70

Instructions:

1. Answer each section in separate Answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are **compulsory**.
4. Indicate **clearly**, the options you attempt along with its respective Question number.
5. Use the last page of main supplementary of **rough work**.

Section-I

Q:1 (All compulsory)

- (A) Explain simple electromechanical system. [05]
(B) What is Armature reaction? Describe the effect of Armature reaction on the d.c. machines. How the Armature reaction is minimized? [05]
(C) Define commutation and Explain different method for improving commutation. [05]

OR

- (C) Explain parallel operation of DC shunt generator. [05]

Q-2 Answer the following question.

- (A) Draw a neat sketch of a D.C.machine with label, Describe its different parts their material and functions. [05]
(B) An 8 pole dc shunt generator has 778 wave connected armature conductors running at 500 rpm, supplies a load of 15.5Ω resistance at a terminal voltage of 250V. Armature resistance is 0.28Ω and shunt field resistance is 250Ω . Find out armature current, the induced emf and flux per pole. [05]

OR

- (A) Derive equation of EMF for DC generator for lap winding and wave winding. [05]
(B) A short shunt compound dc generator supplies a current of 100 A at a voltage of 220V. If the resistance of the shunt field is 50Ω , of the series field 0.025Ω , of the armature 0.05Ω , the total brush drop is 2 V and the iron and friction losses are 1kW. Find (a) the generated emf (b) copper losses (c) the output power of the prime mover driving the generator (d) the generator efficiency. [05]

Q-3 Answer the following question.

- (A) Explain the basic principle of d.c.motor. Derive its torque equation [05]
(B) What is necessity of starter for dc motor? Explain three point starter. [05]

OR

- (A) Explain the speed control methods of d.c.shunt motor. [05]
(B) Explain briefly the construction and working principle of the single phase transformer [05]

Section-II

Q-4 (All compulsory)

- (A) Define transformer and derive EMF equation for single phase transformer. [05]
(B) What is the need of parallel operation of transformers? Discuss the conditions to be satisfied before connecting two single-phase transformers in parallel. [05]
(C) Explain the Sumpner Test on single phase transformer [05]

OR

- (C) Explain equivalent circuit of transformer. [05]

Q-5 Answer the following question.

- (A) Explain On-load operation of transformer with phasor diagrams. Neglect winding resistance and leakage reactance. [05]
(B) The no load current of a transformer is 7 A at 0.3 power factor when supplied at 230 V, 50 Hz. The number of turns on the primary winding is 200.
Calculate a) the maximum value of flux in the core, b) the core loss, and
c) demagnetizing current. [05]

OR

- (A) Define "All day efficiency" of transformer. Explain the construction and working principle of Autotransformer. [05]
(B) A single phase transformer take 10A on no load at power factor of 0.2 lagging. The turn ratio is 4:1 (step down). If the load on secondary is 200A at a power factor of 0.85 lagging. Find the primary current and power factor. Neglect the voltage drop in the winding. [05]

Q-6 Answer the following question.

- (A) Explain the construction of a three phase transformer, with diagrams. [05]
(B) Explain Scott connection of transformer. [05]

OR

- (A) Explain the process of tap changing of transformer. [05]
(B) Explain tertiary winding of transformer in detail. [05]

All the Best

B.E. Semester III Remedial Examination

Subject Code: EE-304

Subject Name: Electrical Machines – I

Date: 26/04/2014

Time: 10:30 am to 1:30 pm

Total Marks: 70

Instructions:

1. Answer each section in separate Answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are **compulsory**.
4. Indicate **clearly**, the options you attempt along with its respective Question number.
5. Use the last page of main supplementary for **rough work**.

Section-I

Q:1 Answer the following question.

- (A) Explain construction of d.c. machine with neat sketch. [05]
(B) Explain simple electromechanical system. [05]
(C) State application of d.c. series, shunt & compound generator. [05]

OR

- (C) Draw & explain O.C.C characteristics of separately excited d.c. generator. [05]

Q-2 Answer the following question.

- (A) Derive emf equation of d.c. generator for lap winding and wave winding. [05]
(B) Calculate the voltage induced in the armature winding of a 4-pole, wave wound dc machine having 728 conductors and running at 1800 rpm. The flux per pole is 35mWb. [05]

OR

- (A) Explain briefly how speed control is achieved for d.c. shunt motors. ? [05]
(B) A 230 V d.c. series motor has an armature resistance of 0.2Ω and Series field resistance of 0.10Ω . Determine :
(i) The current required to develop a torque of 70Nm at 1200 rpm
(iii) percentage reduction in flux when the machine runs at 2000 rpm at half the current. [05]

Q-3 Answer the following question.

- (A) Explain the basic principle of d.c. motor. Derive its torque equation. [05]
(B) What is necessity of starter for dc motor? Explain three point starter. [05]

OR

- (A) Explain the speed control methods of d.c. series motor. [05]
(B) Explain briefly the construction and working principle of the single phase transformer. [05]

P.T.O.

Section-II

Q-4 Answer the following question.

- (A) Define transformer and derive EMF equation for single phase transformer. [05]
- (B) Explain no-load operation of transformer with phasor diagram. [05]
- (C) Explain Open circuit and Short circuit test of transformer and their applications. [05]

OR

- (C) Explain equivalent circuit of transformer. [05]

Q-5 Answer the following question.

- (A) Explain On-load operation of transformer with phasor diagrams. Neglect winding resistance and leakage reactance. [05]
- (B) The no load current of a transformer is 5 A at 0.3 power factor when supplied at 230 V, 50 Hz. The number of turns on the primary winding is 200. Calculate a) the maximum value of flux in the core, b) the core loss, and c) demagnetizing current. [05]

OR

- (A) Define "All day efficiency" of transformer. Explain the construction and working principle of Autotransformer. [05]
- (B) A single phase transformer takes 10A on no load at power factor of 0.2 lagging. The turn ratio is 4:1 (step down). If the load on secondary is 200A at a power factor of 0.85 lagging. Find the primary current and power factor. Neglect the voltage drop in the winding. [05]

Q-6 Answer the following question.

- (A) Explain the construction of a three phase transformer, with diagrams. [05]
- (B) What is the need of parallel operation of transformers? State the conditions to be satisfied before connecting two single-phase transformers in parallel. [05]

OR

- (A) Explain the process of tap changing of transformer. [05]
- (B) Explain the Sumpner Test on single phase transformer. [05]

-----**All the Best** -----

KADI SARVA VISHWAVIDHYALAYA

B.E. Semester III

Subject Code:- EE-304

Subject Name:-Electrical Machines -I

Date: 17/11/2014

Time: 10:30 am to 1:30 pm

Total Marks:- 70

Instruction

1. Answer each section in separate Answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are **compulsory**.
4. Indicate clearly the options you attempt along with its respective Question number.
5. Use the last page of main supplementary of **rough work**.

SECTION-I

Q.1 All questions are compulsory

- A Explain necessity of starter in dc motor and any one starter. [05]
B Draw the construction of DC generator and give the function of each part. [05]
C Explain commutation using appropriate diagram and enlist the methods to improve commutation. [05]

OR

- C Explain flow of energy in electromechanical device /system. [05]

Q.2 Answer the following question.

- A Derive the EMF equation for DC generator for lap winding and wave winding. [05]
B A 30KW,300V dc shunt generator has armature and field resistances of 0.05Ω and 100Ω respectively. Calculate the total power developed by the armature when it delivers full load output. [05]

OR

- A What is the function of compensating winding and inter pole winding in dc generator. [05]
B Draw and explain the dc shunt generator and dc series generator. [05]

Q.3 Answer the following question.

- A Explain speed control method of dc motor. [05]
B Draw and explain characteristic of dc series motor and dc shunt motor. [05]

OR

- A Explain the armature reaction in dc generator. [05]
B A 440V shunt motor runs at its normal speed of 300 r.p.m. when armature current is 160A. Find the speed when the armature current is 80A and a resistance of

0.5Ω is connected in series with the armature, the shunt field remaining constant. Resistance of armature is 0.2Ω and of interpole winding is 0.05Ω .

SECTION-II

Q.4 (All compulsory)

- A Define transformer and derive emf equation for single phase transformer [05]
B Explain the sumpner test on single phase transformer. [05]
C Explain the equivalent circuit of transformer. [05]

OR

- C Draw the phasor diagram of transformer on load considering [05]
1. Inductive load 2. Capacitive load 3. Resistive load

Q.5 Answer the following question.

- A Drive expression for maximum efficiency. [05]
B A 5 KVA, 500/250V, 50HZ single phase transformer gave the following readings, [05]
O.C. Test: 500V, 1A, 50W (L.V. Side open)
S.C. Test: 25V, 10A, 60W (L.V. Side shorted)
Determine i) The efficiency on full load, 0.8 lagging p.f.
ii) The voltage regulation on full load, 0.8 leading p.f.

OR

- A The no load current of transformer is 10A at a power factor of 0.25 lagging, when [05]
connected to 400V, 50HZ supply. Calculate,
i) Magnetizing component of no load current
ii) Iron loss and
iii) Maximum value of flux in the core
B Explain the short circuit test on transformer. [05]

Q.6 Answer the following question

- A Derive expression for saving of copper effected by using an auto-transformer. [05]
B What do you mean by open delta connection? When it is used? [05]

OR

- A Explain parallel operation of transformer. [05]
B Give the difference between core type transformer and shell type transformer. [05]

-----All the Best -----

KADI SARVA VISHWAVIDHYALAYA
B.E. SEMESTER III EXAMINATION (DEC 2015)

Subject Code:-EE-304

Subject Name:- Electrical Machines - I

Date:-05/12/2015

Time:-10:30 a.m TO 1:30 p.m

Total Marks - 70

Instructions:

1. Answer each section in separate answer sheet.
 2. Use of scientific calculator is **permitted**.
 3. All the questions are **compulsory**.
 4. Indicate **clearly**, the options you attempt along with its respective question number.
 5. Use the last page of main supplementary for rough work.
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Section-1

Q-1. (All Compulsory)

- (A) Give the **function** of (i) Commutator, (ii) Brushes, (iii) Armature core, (iv) armature winding and (v) Pole shoes in DC Machines. **05**
- (B) Derive the **condition for maximum efficiency** for DC Generator. **05**
- (C) Explain the **armature reaction effect** in brief. **05**
- OR**
- (C) Explain the **commutation process** in brief. **05**

Q-2 Answer the following questions.

- (A) List the **speed control methods** of DC shunt motor and explain any one in detail. **05**
- (B) On which type of DC machine Swinburne's test is performed? What is the purpose of this test? Explain the procedure of this test in brief. **05**
- OR**
- (A) Explain that how **energy flow** in electromechanical devices? **05**
- (B) Explain **singly excited magnetic system** in brief. **05**

Q-3 Answer the following questions.

- (A) A 4-pole dc generator is delivering 20A to a load of 10Ω . If the armature resistance is 0.5Ω and the shunt field resistance is 50Ω , calculate the induced e.m.f. and the efficiency of the machine. Allow a drop of 1V per brush. **05**
- (B) What is the necessity of a starter for DC Motor? Draw the three point starter. **05**

OR

- (A) A dc motor takes an armature current of 110A at 480V. The armature **05**

circuit resistance is 0.2Ω . The machine has 6-poles and the armature is lap-connected with 864 conductors. The flux per pole is 0.05Wb . Calculate (i) the speed and (ii) the gross torque developed by the armature.

- (B) Draw and explain "electrical characteristic" of series and shunt motor. **05**

Section – 2

Q-4. (All Compulsory)

- (A) Derive the EMF equation of single phase transformers. **05**
(B) Explain the open circuit test performed on single phase transformer. **05**
(C) Draw and explain vector diagram for transformer on "On Load". **05**

OR

- (C) List the necessary conditions for the parallel operation of single phase transformer and explain Equal Voltage ratio case in brief. **05**

Q-5 Answer the following questions.

- (A) A single phase transformer has 400 primary and 1000 secondary turns. The net cross-sectional area of the core is 60 cm^2 . If the primary winding be connected to a 50Hz supply at 520V, calculate (i) the peak value of flux density in the core. (ii) the voltage induced in the secondary winding. **05**
(B) Derive the equation of Cu saving in auto transformer compared to ordinary transformer. **05**

OR

- (A) A transformer has a reactance drop of 5% and a resistance drop of 2.5%. Find the lagging power factor at which the voltage regulation is maximum and the value of this regulation. **05**
(B) Explain the short circuit test performed on the transformer. **05**

Q-6 Answer the following questions.

- (A) Draw the vector diagram of Dy1 and Yd1 of 3-Ø transformer. **05**
(B) Explain the scott connection of 3-Ø transformer. **05**

OR

- (A) Explain off load and on load tap changer of transformer. **05**
(B) Explain the V-V connection of 3-Ø transformer. **05**

***** ALL THE BEST *****