

GUJARAT TECHNOLOGICAL UNIVERSITY

DI -3 SEMESTER – OLD PAPER – W22 TO S25 – QUESTION BANK(English)

Subject Name & Code:

D. C. Machines And Transformer- 4330901

Unit I - D.C. Generator

REPEATED QUESTIONS:

1. **Derive the EMF equation of a D.C. generator.**
 - Appeared in: SUM 23 (Q1b, 04 marks), WIN 22 (Q1b, 04 marks), WIN 23 (Q3b, 04 marks), SUM 24 (Q3b, 04 marks), SUM 25 (Q2b, 04 marks)
2. **Explain different types of D.C. generators with a circuit diagram.**
 - Appeared in: SUM 23 (Q1c OR, 07 marks), WIN 22 (Q1c OR, 07 marks), WIN 23 (Q1c OR, 07 marks)
3. **List and Explain methods to improve commutation.**
 - Appeared in: WIN 22 (Q2a, 03 marks), SUM 23 (Q5b, 04 marks)
4. **Explain the magnetizing characteristic of a D.C. generator.**
 - Appeared in: WIN 22 (Q2b OR, 04 marks), WIN 23 (Q2b, 04 marks)
5. **Derive the condition for maximum efficiency in a D.C. generator.**
 - Appeared in: WIN 23 (Q1c, 07 marks), SUM 25 (Q1b, 04 marks)

OTHER IMPORTANT QUESTIONS:

1. **Define the following terms: (1) Pole pitch (2) Coil pitch (3) Commutator pitch.**
 - Appeared in: WIN 23 (Q1a, 03 marks)
2. **Describe the function and material of various parts of DC machines.**
 - Appeared in: WIN 23 (Q1b, 04 marks)
3. **State and explain conditions for voltage buildup in a DC shunt generator.**
 - Appeared in: WIN 23 (Q2a, 03 marks), SUM 25 (Q1a, 03 marks)
4. **A DC generator has following data. No. of pole=06, Flux /pole=12 mWb, Total conductors in armature=900, Armature speed=1500 rpm. Calculate generated EMF for 1) lap winding and 2) wave winding type machine.**
 - Appeared in: WIN 23 (Q2b, 04 marks)
5. **Explain the field test of a DC motor with a circuit diagram.**

- Appeared in: WIN 23 (Q2c, 07 marks)
- 6. **Compare lap winding and wave winding in a DC generator.**
 - Appeared in: WIN 23 (Q2a OR, 03 marks), SUM 23 (Q5a, 03 marks)
- 7. **With the help of sketches describe the main parts of a DC machine? Explain the main function of each.**
 - Appeared in: WIN 22 (Q1c, 07 marks), SUM 24 (Q1c, 07 marks)
- 8. **A 4-pole D.C. shunt generator has 36 slots with 10 conductors in each slot. The flux is 0.03Wb and the speed is 750rpm. Calculate the emf generated if the armature is (a) Lap Wound and (b) Wave wound.**
 - Appeared in: WIN 22 (Q2b, 04 marks), SUM 24 (Q2b, 04 marks)
- 9. **List the parts of the D.C. Generator and write the function of each.**
 - Appeared in: SUM 23 (Q1a, 03 marks)
- 10. **A D.C. generator supplies 95A at terminal voltage of 200V. Armature and shunt field resistances are 0.1Ω and 40Ω respectively. Stray losses are 2000W. Calculate total copper losses and efficiency.**
 - Appeared in: SUM 23 (Q1c, 07 marks)
- 11. **Draw the power stage diagram of D. C. generator and obtain the condition for maximum efficiency.**
 - Appeared in: SUM 23 (Q1c OR, 07 marks)
- 12. **Write the procedure to obtain the magnetizing characteristic of a DC shunt generator. Draw the characteristic and explain it.**
 - Appeared in: SUM 25 (Q1c OR, 07 marks)
- 13. **Explain load characteristic of a DC shunt generator.**
 - Appeared in: SUM 25 (Q5a, 03 marks)
- 14. **Explain critical resistance in a DC shunt generator.**
 - Appeared in: SUM 25 (Q5a OR, 03 marks)
- 15. **What is armature reaction? Explain effects of armature reaction in a D.C. generator.**
 - Appeared in: SUM 23 (Q5c OR, 07 marks)
- 16. **Explain methods to overcome the effect of armature reaction in a DC generator.**
 - Appeared in: SUM 25 (Q5b, 04 marks)
- 17. **List methods to improve commutation in a DC generator and explain any one.**
 - Appeared in: SUM 25 (Q5b OR, 04 marks)

Unit II - D.C. Motor

REPEATED QUESTIONS:

1. **Derive the torque equation of a D.C. motor.**
 - Appeared in: SUM 23 (Q2b, 04 marks), WIN 22 (Q3b, 04 marks), SUM 24 (Q3b, 04 marks)
2. **Explain the necessity of a starter in a D.C. motor. Draw and explain a three-point starter.**
 - Appeared in: WIN 22 (Q3c OR, 07 marks), SUM 23 (Q2c, 07 marks)
3. **Explain Swinburn's test for a D.C. motor. State its merits and demerits.**
 - Appeared in: WIN 22 (Q2c OR, 07 marks), SUM 23 (Q2c OR, 07 marks), SUM 25 (Q2c, 07 marks)
4. **Explain the brake test for a D.C. motor.**
 - Appeared in: WIN 22 (Q2c, 07 marks), SUM 23 (Q5c, 07 marks), SUM 25 (Q4b, 04 marks)
5. **State the applications of D.C. shunt and series motors.**
 - Appeared in: WIN 22 (Q3a OR, 03 marks), WIN 23 (Q3a OR, 03 marks)

OTHER IMPORTANT QUESTIONS:

1. **What is back EMF? Explain.**
 - Appeared in: SUM 23 (Q2a, 03 marks), WIN 22 (Q3a, 03 marks), SUM 24 (Q3a, 03 marks), WIN 24 (Q1c, 07 marks)
2. **List the various applications for different types of DC motors.**
 - Appeared in: SUM 23 (Q2a OR, 03 marks), WIN 24 (Q1a, 03 marks)
3. **A 440V dc motor has an armature resistance of 0.25Ω . It draws the armature current of 60A when running at 750 RPM. Calculate the torque developed by the motor.**
 - Appeared in: SUM 23 (Q2b OR, 04 marks)
4. **Explain the speed control of a D.C. series motor.**
 - Appeared in: WIN 22 (Q3c, 07 marks), SUM 24 (Q3c, 07 marks)
5. **Obtain the Starting Characteristics of a D.C. Shunt Motor.**
 - Appeared in: WIN 22 (Q3b OR, 04 marks), SUM 24 (Q3b OR, 04 marks)
6. **List out specifications of DC shunt and series motors.**
 - Appeared in: WIN 23 (Q3a, 03 marks)
7. **Explain the working principle of a brushless DC motor with a diagram.**
 - Appeared in: WIN 23 (Q3b, 04 marks), WIN 24 (Q3c, 07 marks)
8. **Explain the starting and running characteristic of a DC series motor.**

- Appeared in: WIN 23 (Q3b OR, 04 marks), SUM 23 (Q5a OR, 03 marks)
9. **Explain various methods for speed control of a DC series motor with a circuit diagram.**
- Appeared in: WIN 23 (Q3c OR, 07 marks)
10. **Explain the working principle of a D.C. motor.**
- Appeared in: SUM 25 (Q2a, 03 marks)
11. **Draw a neat sketch of a 2-point starter and explain it in brief.**
- Appeared in: SUM 25 (Q2b, 04 marks)
12. **Draw & explain the starting characteristic of a D.C. Shunt motor.**
- Appeared in: SUM 25 (Q2a OR, 03 marks)
13. **Explain power stages and efficiency of a DC motor.**
- Appeared in: SUM 25 (Q2b OR, 04 marks)
14. **Explain the method to reverse the direction of rotation of a DC shunt motor.**
- Appeared in: SUM 25 (Q2c OR, 07 marks)
15. **A 4 pole, 230 volt, lap wound, D.C. motor has 540 conductors. Its speed is found to be 1000 RPM. The flux per pole is 25 mwb. Assume the armature resistance is 0.8 ohm. Determine back emf, armature current and torque developed by armature.**
- Appeared in: WIN 24 (Q1c OR, 07 marks)
16. **Explain armature control method for speed control in a D.C. shunt Motor.**
- Appeared in: SUM 23 (Q5b OR, 04 marks)

Unit III - Single-phase Transformer

REPEATED QUESTIONS:

1. **Derive the E.M.F. equation of a single-phase transformer.**
 - Appeared in: SUM 23 (Q3b, 04 marks), WIN 23 (Q4c, 07 marks), SUM 25 (Q3a, 03 marks)
2. **Compare core type and shell type transformer.**
 - Appeared in: WIN 24 (Q2a, 03 marks), SUM 23 (Q3a, 03 marks), SUM 25 (Q3b OR, 04 marks)
3. **Explain the losses occurring in a transformer.**
 - Appeared in: WIN 22 (Q4c, 07 marks), WIN 23 (Q4b, 04 marks), SUM 23 (Q4b OR, 04 marks)
4. **Draw & Explain the vector diagram of a single-phase transformer for lagging power factor load.**
 - Appeared in: WIN 22 (Q4c OR, 07 marks), WIN 24 (Q4c, 07 marks)
5. **Explain the working principle of a transformer.**
 - Appeared in: WIN 24 (Q2a OR, 03 marks), SUM 25 (Q4c, 07 marks)

OTHER IMPORTANT QUESTIONS:

1. **Develop/Draw and explain the equivalent circuit of a single-phase transformer.**
 - Appeared in: WIN 22 (Q4a, 03 marks), WIN 23 (Q4b OR, 04 marks), SUM 23 (Q4b, 04 marks)
2. **Define the voltage transformation ratio and turns ratio.**
 - Appeared in: WIN 22 (Q4b OR, 04 marks), WIN 24 (Q4a OR, 03 marks)
3. **Derive the condition for maximum efficiency of a single-phase transformer.**
 - Appeared in: WIN 22 (Q4a OR, 03 marks), SUM 25 (Q3c OR, 07 marks)
4. **Explain transformer on NO LOAD and ON LOAD with necessary vector diagram.**
 - Appeared in: SUM 23 (Q3c, 07 marks)
5. **Define all-day efficiency of a transformer.**
 - Appeared in: SUM 23 (Q3a OR, 03 marks), SUM 25 (Q3c, 07 marks)
6. **The Iron loss and full load copper loss of a 100 KVA, single-phase transformer is 3 KW and 4 KW respectively. Find its efficiency at full load 0.8 power factor.**
 - Appeared in: SUM 23 (Q3b OR, 04 marks)
7. **Explain the voltage regulation and the factors affecting voltage regulation.**
 - Appeared in: SUM 23 (Q3c OR, 07 marks)
8. **Explain the equivalent resistance and reactance in a transformer.**

- Appeared in: SUM 25 (Q4c OR, 07 marks)

9. Explain an ideal transformer.

- Appeared in: SUM 25 (Q3a OR, 03 marks)

10. Draw a vector diagram of a single-phase transformer for leading power factor load.

- Appeared in: WIN 23 (Q4c OR, 07 marks), WIN 24 (Q4c OR, 07 marks), SUM 25 (Q3b, 04 marks)

11. Draw a core type transformer.

- Appeared in: WIN 24 (Q4a, 03 marks)

Unit IV - Testing of Single-phase Transformer

REPEATED QUESTIONS:

1. **State the conditions for parallel operation of two single-phase transformers.**
 - Appeared in: WIN 22 (Q5a, 03 marks), SUM 23 (Q4a, 03 marks), SUM 25 (Q5c OR, 07 marks)
2. **Explain the O.C. (Open Circuit) and S.C. (Short Circuit) test to find out the efficiency of a transformer.**
 - Appeared in: WIN 22 (Q5c, 07 marks), WIN 23 (Q5c, 07 marks)
3. **Explain the direct load test of a transformer.**
 - Appeared in: WIN 22 (Q5c OR, 07 marks), WIN 23 (Q5a OR, 03 marks), SUM 23 (Q4c, 07 marks)
4. **Explain the back-to-back (Sumpner's) test.**
 - Appeared in: WIN 23 (Q5c OR, 07 marks), SUM 23 (Q4c OR, 07 marks), SUM 25 (Q5c, 07 marks)
5. **State the necessity of parallel operation of transformers.**
 - Appeared in: WIN 22 (Q5a OR, 03 marks), SUM 25 (Q5c OR, 07 marks)

OTHER IMPORTANT QUESTIONS:

1. **The iron losses and full load copper losses of a 400/200V, 50Hz, 8 KVA single-phase transformer are 90W and 200W respectively. Find the efficiency at this load at 0.8 lagging p.f.**
 - Appeared in: WIN 22 (Q5b, 04 marks)
2. **Illustrate the working of an Auto transformer.**
 - Appeared in: WIN 22 (Q5b OR, 04 marks), WIN 23 (Q5b OR, 04 marks)
3. **Explain voltage regulation of a transformer.**
 - Appeared in: WIN 23 (Q5b, 04 marks), SUM 23 (Q3c OR, 07 marks)
4. **Explain the working of an Auto transformer with a diagram.**
 - Appeared in: WIN 23 (Q5b OR, 04 marks)
5. **List the advantages and disadvantages of O.C. and S.C. test of a single-phase transformer.**
 - Appeared in: SUM 23 (Q4a OR, 03 marks)
6. **Explain direct load test on a transformer with a diagram in short.**
 - Appeared in: WIN 24 (Q5b, 04 marks)
7. **Define stack factor and derive EMF equation of a transformer.**
 - Appeared in: WIN 24 (Q5c, 07 marks)
8. **What is the need for parallel operation for a transformer?**
 - Appeared in: WIN 24 (Q5a OR, 03 marks)
9. **Explain short circuit test on a transformer with a diagram in short.**
 - Appeared in: WIN 24 (Q5b OR, 04 marks)
10. **State the ideal condition of a transformer and derive the condition for its maximum efficiency.**
 - Appeared in: WIN 24 (Q5c OR, 07 marks)
11. **Draw the connection of a two-winding transformer as an auto transformer.**
 - Appeared in: SUM 25 (Q4a, 03 marks)
12. **State the application of an Auto transformer.**
 - Appeared in: SUM 25 (Q4a OR, 03 marks)
13. **Give the advantages and disadvantages of Swinburn's test.**
 - Appeared in: SUM 25 (Q4b OR, 04 marks)
