

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-6 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK

Subject Name & Code:

ELEMENT OF ELECTRICAL DESIGN - 3160918

Unit 1: GENERAL DESIGN ASPECTS

Repeated Questions:

1. **Define real and apparent flux densities in the tooth of d.c. machine armature and give difference between them. Also derive the relation between them.**
(S25 - Q1c, 07 marks)
(W23 - Q2 OR(c), 07 marks)
(W22 - Q4(c), 07 marks)
(S22 - Q2(a), 03 marks)
2. **List / State properties of good insulating materials.**
(S25 - Q1a, 03 marks)
(W25 - Q1a, 03 marks)
(W24 - Q1a, 03 marks)
(W23 - Q1(a), 03 marks)
(S23 - Q1a, 03 marks)
3. **What is Carter's fringing curve? Why it is used?**
(W25 - Q3a, 03 marks)
(W24 - Q4b, 04 marks)
(W23 - Q4(a), 03 marks)
4. **Define and clearly explain: (1) Stacking Factor (2) Gap contraction factor for slots and ducts.**
(W25 - Q1b, 04 marks)
(W23 - Q4a, 04 marks)
(S22 - Q4a, 04 marks)
5. **Discuss B-H curve in magnetic circuit.**
(W23 - Q2b, 04 marks)
(W24 - Q3a, 03 marks)

Other Important Questions:

1. **Explain various methods for calculating the mmf required for tapered teeth. (S22 - Q2 OR(c), 07 marks)**
2. **State various methods for calculating mmf required for teeth in DC machine & describe any one method. (S23 - Q3.5 OR(b), 04 marks)**
3. **Derive the equation of gap contraction factor for slots. (S25 - Q1b, 04 marks)**
4. **List various methods for calculating the mmf required for tapered teeth & Explain any one. (S24 - Q2a, 03 marks)**
5. **Discuss the factors to be considered for exact calculation of MMF for Teeth. (W22 - Q2a, 04 marks)**
6. **Discuss Leakage reactance calculation for various types of slots for DC machines. (S23 - Q3.5(b), 04 marks)**
7. **Give the classification of insulating materials used in electrical machines based on thermal stability as per IS with examples. (S22 - Q2b, 04 marks)**
8. **Give classification of insulating material used in electrical machines. (W23 - Q1b, 04 marks)**
9. **Classify different insulating materials on the basis of operating temperature. (W22 - Q2**

OR(c), 07 marks)

10. **Calculate the magnetizing current in a machine with distributed winding.** (S25 - Q3a, 03 marks)
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Unit 2: DESIGN OF STARTERS AND FIELD REGULATORS

Repeated Questions:

1. **Explain working of field regulator / Write short note on field regulator.**
(S25 - Q3b, 04 marks)
(S24 - Q2b, 04 marks)
(W23 - Q3a, 03 marks)
(S22 - Q3a, 03 marks)
(W24 - Q2b, 04 marks)
2. **Why starter is necessary for DC / Induction motors? Discuss necessity of starter.**
(W24 - Q3b, 04 marks)
(S25 OR - Q3a, 03 marks)
(W23 - Q4b, 04 marks)
3. **Explain working of three-point starter for DC motor.**
(S25 OR - Q3a, 03 marks)
(W22 - Q1a, 03 marks)
4. **Explain working of star-delta starter with neat sketch for squirrel cage induction motor.**
(S22 - Q3b, 04 marks)
(S25 OR - Q3b, 04 marks)
5. **Design a suitable 8-section starter for a DC shunt motor from given data (various ratings).**
(W25 - Q2 OR(c), 07 marks)
(W24 - Q3c, 07 marks)
(W23 - Q3c, 07 marks)
(S23 OR - Q3(c), 07 marks)
6. **Design a suitable 4-section rotor resistance starter for a 3-phase slip ring induction motor with given slip and rotor resistance.**
(W24 OR - Q3c, 07 marks)
(S23 - Q3(c), 07 marks)
(S25 OR - Q3c, 07 marks)

Other Important Questions:

1. **Prove that the section resistances of d.c. shunt motor starters are in geometrical progression.** (S22 - Q3c, 07 marks)
 2. **Explain the grading of starting resistance for DC shunt motor starters.** (S25 OR - Q3c, 07 marks)
 3. **Explain the grading of starting resistance for DC series motor starters.** (S25 OR - Q3c, 07 marks)
 4. **Design a suitable 5-section starter for a 7.5 kW, 250 V, 1000 rpm DC shunt motor.** (S24 - Q2c, 07 marks)
 5. **Find resistance of each section of a rotor resistance starter for slip-ring induction motor (9 studs).** (S24 - Q2 OR(c), 07 marks)
 6. **What is soft starter? List benefits and advantages.** (S23 - Q3.5a, 03 marks)
 7. **Explain working of No Volt Coil and Overload Release coil in three-point starter.** (W22 - Q1a, 03 marks)
 8. **Explain working of auto-transformer starter with neat sketch for squirrel cage induction motor.** (S25 OR - Q3b, 04 marks)
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Unit 3: DESIGN OF SMALL TRANSFORMERS AND CHOKE COILS

Repeated Questions:

1. **Explain design procedure / steps for designing a small single-phase transformer.**
(W25 - Q1c, 07 marks)
(W24 - Q1c, 07 marks)
(S24 - Q1c, 07 marks)
(S23 - Q4b, 07 marks)
(S22 - Q3c, 07 marks)
(W22 - Q1c, 07 marks)
2. **Explain steps for design of single-phase variable choke coil.**
(W24 - Q4c, 07 marks)
(W23 - Q1c, 07 marks)
(S23 - Q1c, 07 marks)
3. **Discuss design procedure of 3-phase variable choke coil. Also draw sketch of whole arrangement.**
(W25 - Q3 OR(c), 07 marks)
(W23 - Q3 OR(c), 07 marks)

Other Important Questions:

1. **What is choke coil? State function of chokes used in tube lights.** (S22 - Q3b, 04 marks)
 2. **Draw different types of stampings used for making core of small / 1- Φ transformer.** (S22 - Q3 OR(a), 03 marks)
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Unit 4: ARMATURE WINDINGS

Repeated Questions:

1. **Define: (1) Back pitch (2) Commutator pitch (3) Winding pitch.**
(S25 - Q2a, 03 marks)
(W24 - Q2a, 03 marks)
(W23 - Q3(a), 03 marks)
(S24 - Q3a, 03 marks)
2. **Explain use of dummy coils and equalizer connections in d.c. armature windings.**
(S25 - Q2b, 04 marks)
(S22 - Q1b, 04 marks)
(W24 - Q3b, 04 marks)
(W23 OR - Q3b, 04 marks)
(S24 OR - Q5b, 04 marks)
3. **Differentiate between single layer and double layer winding.**
(W25 - Q3.5a, 03 marks)
(W24 - Q1b, 04 marks)
(W23 - Q3 OR(a), 03 marks)
(S24 - Q3a, 03 marks)
4. **Compare simplex lap winding and simplex wave winding / Give comparison between Lap winding and Wave winding.**
(S22 - Q1a, 03 marks)
(W23 - Q1a, 03 marks)
(W24 - Q3b, 04 marks)
(W22 - Q3b, 04 marks)
5. **Find front pitch, back pitch, winding pitch and commutator pitch for a simplex wave wound ... slots, 4-pole d.c. armature. Draw winding diagram and sequence diagram.**
(S25 - Q2c, 07 marks)
(S22 - Q1c, 07 marks)
(W24 OR - Q2c, 07 marks)
(S24 OR - Q4c, 07 marks)
6. **Design and develop a mush winding for a 3-phase, 4-pole, ... slots stator.**
(S25 OR - Q2c, 07 marks)
(W24 - Q2c, 07 marks)
(W23 - Q2c, 07 marks)

Other Important Questions:

1. **Why equalizer connections are not necessary in case of wave winding?** (S22 - Q1b, 04 marks)
 2. **Compare mush winding and double layer winding for three-phase AC machine.** (S25 OR - Q3b, 04 marks)
 3. **Classify various types of AC armature windings.** (S24 - Q3b, 04 marks)
 4. **Write detailed note on various types of AC armature winding and explain any one with example.** (W22 - Q3c, 07 marks)
 5. **Define progressive and retrogressive lap windings.** (S24 - Q3b, 04 marks)
 6. **Find and give comments whether the following lap windings are symmetrical or not.** (W22 - Q3 OR(c), 07 marks)
 7. **Compare closed windings and open windings.** (W23 - Q3a, 03 marks)
 8. **Define: (1) Back pitch (2) Pole pitch (3) Winding pitch.** (W24 - Q2a, 03 marks)
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Unit 5: ESTIMATION AND COSTING FOR RESIDENTIAL AND COMMERCIAL WIRING

Repeated Questions:

1. **State the rules for electrical wiring as per IS.**
(W25 - Q3a, 03 marks)
(W24 - Q4a, 03 marks)
(S23 - Q3.4a, 03 marks)
(S24 OR - Q5a, 03 marks)
2. **Explain the installation plan, wiring diagram and single line diagram for electric wiring based on a given load. Also give rules for deciding number of sub circuits and power circuit.**
(S23 - Q3.5 OR(c), 07 marks)
(W24 OR - Q5c, 07 marks)
(S22 - Q4 OR(c), 07 marks)
(W22 - Q5c, 07 marks)
3. **Calculate total cost of electrical energy for 30 days for a given residential load.**
(W25 - Q3 OR(c), 07 marks)
(S24 - Q5c, 07 marks)
(W23 - Q5c, 07 marks)
(S22 - Q4 OR(c), 07 marks)

Other Important Questions:

1. **A room of size 4m x 3m is required to be provided with lamp, fan, tube light and one 5A 3-pin socket outlet. Mark location, draw installation plan, wiring diagram and calculate length of PVC conduit.** (W25 - Q4 OR(c), 07 marks)
 2. **Explain with neat sketches, the different systems of wiring used for domestic installations.** (S23 - Q3.4c, 07 marks)
 3. **What is control panel? State and explain various components/devices used in control panel.** (S23 - Q3.4b, 04 marks)
 4. **Discuss factors to be considered while selecting type of wiring system.** (S22 - Q4a, 03 marks)
 5. **Define: (1) Maximum demand (2) Load factor (3) Diversity factor.** (S23 - Q3.5 OR(a), 03 marks)
 6. **What is electric load? Giving examples classify different types of load.** (S22 - Q5 OR(b), 04 marks)
 7. **Explain importance of estimation.** (S24 - Q4a, 03 marks)
 8. **Define wiring diagram and schematic diagram. Explain using suitable example.** (S24 OR - Q4b, 04 marks)
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Unit 6: DESIGN CONSIDERATION OF ELECTRICAL INSTALLATION

Repeated Questions:

1. **Discuss briefly the different types of loads with examples.**
(S25 OR - Q3b, 04 marks)
(W23 - Q5c, 07 marks)
(S24 - Q5b, 04 marks)
(W22 - Q4 OR(b), 04 marks)
2. **Define / Discuss: (1) Load factor (2) Demand factor (3) Diversity factor.**
(S22 - Q5 OR(a), 03 marks)
(W24 - Q5a, 03 marks)
(S23 - Q3.5 OR(a), 03 marks)
3. **Explain the importance of (a) current carrying capacity and (b) voltage drop while determining size of conductor.**
(W23 - Q2b, 04 marks)
(W24 OR - Q5b, 04 marks)

Other Important Questions:

1. **Explain load assessment and permissible voltage drop for electrical installation.** (S22 - Q4b, 04 marks)
2. **Explain selection of permissible voltage drop and conductor size during design of electric wiring.** (W22 - Q4b, 04 marks)
3. **Discuss points to be considered while determination of the size of conductor.** (S22 - Q4 OR(a), 03 marks)
4. **How can you determine number of sub circuits, rating of main switch and distribution board?** (W22 - Q5 OR(a), 03 marks)
5. **List essential elements of estimating and costing before starting any electrical project.** (W22 - Q5 OR(b), 04 marks)
