GUJARAT TECHNOLOGICAL UNIVERSITY

DI -5 SEMESTER – OLD PAPER – W23 TO S25 – QUESTION BANK(English)

Subject Name & Code:

Electrical Tranction & control- 4350907

Unit I: Traction System And Speed Time Curve

Repeated Questions:

1. **Define/State advantages and disadvantages of electric traction system.**
    - **Appeared in:** W23 (Q1a, 03 marks), WIN 24 (Q1a, 03 marks)
2. **Explain why D.C. series motor is mostly used as a traction motor?**
    - **Appeared in:** W23 (Q1b, 04 marks), WIN 24 (Q2b, 04 marks)
3. **A train has a schedule speed of 60 kmph between two stops 6 km apart with a duration of stop of 60 Seconds. The rate of acceleration and retardation are 2 kmphps and 3 kmphps respectively. Calculate the value of average speed, maximum speed assuming simplified speed time curve.**
    - **Appeared in:** SUM 24 (Q1c OR, 07 marks), W23 (Q1c OR, 07 marks)
4. **A train run with an average speed of 40 kmph. Distance between station is 2 km. Values of acceleration and retardation are 1.5 kmphps and 2.5 kmphps respectively. Find the maximum speed assuming trapezoidal speed time curve.**
    - **Appeared in:** WIN 24 (Q1c, 07 marks), WIN 24 (Q1c OR, 07 marks)
5. **Define following terms: 1) Crest speed 2) Average speed 3) Schedule speed**
    - **Appeared in:** SUM 24 (Q1a, 03 marks), WIN 24 (Q1b, 04 marks) [Partially]

Other Important Questions:

1. **Define the following terms: (1) Average Speed (2) Acceleration (3) scheduled speed (4) coasting retardation**
    - **Appeared in:** WIN 24 (Q1b, 04 marks)
2. **Explain meta-dyne control of dc series motor.**
    - **Appeared in:** SUM 24 (Q1b, 04 marks)
3. **Derive equation of maximum speed by trapezoidal curve.**
    - **Appeared in:** SUM 24 (Q1c, 07 marks)
4. **Draw a simplified speed time curve and explain each part.**
    - **Appeared in:** W23 (Q1c, 07 marks)

5. **Write-down factors affecting the schedule speed of train.**
    - **Appeared in:** SUM 25 (Q1a, 03 marks)
6. **Explain the principle of magnetic levitation.**
    - **Appeared in:** W23 (Q5b, 04 marks), SUM 25 (Q1b, 04 marks)
7. **A train has a schedule speed of 40 km on a level track. The distance between two station being 2 km, station stopping time is 40 seconds. Assuming braking retardation of 4 kmpps and maximum speed 30 percentages greater than average speed, Calculate acceleration to run the service. Assume trapezoidal speed time curve.**
    - **Appeared in:** SUM 25 (Q1c, 07 marks)
8. **An electric train is to have a braking retardation of 3.6 kmpps. If the ratio of maximum speed to average speed is 1.6, the time for stops is 26 sec, and acceleration is 1.2 kmpps, find the schedule speed for a run of 3 km. assume trapezoidal speed time curve.**
    - **Appeared in:** SUM 25 (Q1c OR, 07 marks)
9. **State and explain the factors affecting schedule speed.**
    - **Appeared in:** WIN 24 (Q3a OR, 03 marks)
10. **Define following (1) Dead weight, (2) Train resistance, (3) Co-efficient of adhesion.**
    - **Appeared in:** SUM 25 (Q5a OR, 03 marks)
11. **Derive general equation for tractive effort.**
    - **Appeared in:** WIN 24 (Q3c, 07 marks), SUM 25 (Q5c, 07 marks)
12. **State the requirement of Tractive Effort in Electric Traction System. Derive general equation for tractive effort.**
    - **Appeared in:** WIN 24 (Q3c, 07 marks)
13. **Explain the factors affecting specific energy consumption. Define train resistance and coefficient of adhesion.**
    - **Appeared in:** WIN 24 (Q3c OR, 07 marks)
14. **Derive formula for specific energy consumption.**
    - **Appeared in:** SUM 25 (Q5c OR, 07 marks)

Unit II: Traction Motors And Its Control

Repeated Questions:

1. **Explain series-parallel control of two D.C. series motors.**
    - **Appeared in:** W23 (Q2b, 04 marks), WIN 24 (Q2c OR, 07 marks)
2. **Explain transition. Explain working of shunt and bridge transition with diagram.**
    - **Appeared in:** WIN 24 (Q2c, 07 marks), W23 (Q3b, 04 marks)
3. **Explain the classification of traction substations.**
    - **Appeared in:** W23 (Q2c, 07 marks), WIN 24 (Q3b, 04 marks) [Related to Feeding]
4. **Explain starting of four DC series motor using series-parallel control.**
    - **Appeared in:** SUM 24 (Q2c OR, 07 marks), W23 (Q2b, 04 marks) [For 2 motors]
5. **State advantages and disadvantages of three phase induction motor for traction purpose.**
    - **Appeared in:** W23 (Q3a, 03 marks), SUM 25 (Q2b, 04 marks) [For LIM]
6. **State and explain the types of braking and explain regenerative braking system in detail.**
    - **Appeared in:** W23 (Q3c OR, 07 marks), SUM 24 (Q3b OR, 04 marks)

Other Important Questions:

1. **Draw and explain series parallel control for 4 motors.**
    - **Appeared in:** W23 (Q2b OR, 04 marks)
2. **Explain bridge transition method for speed control of traction motor.**
    - **Appeared in:** W23 (Q3b, 04 marks)
3. **State and explain electrical & mechanical features of traction system.**
    - **Appeared in:** W23 (Q3c, 07 marks)
4. **Compare open circuit transition and shunt transition.**
    - **Appeared in:** W23 (Q3a OR, 03 marks)
5. **State advantages of repulsion motor in traction system.**
    - **Appeared in:** W23 (Q3b OR, 04 marks)
6. **Explain the electrical characteristics of traction motor.**
    - **Appeared in:** WIN 24 (Q2a, 03 marks)
7. **Explain the working principle of Pulse width modulation control.**
    - **Appeared in:** WIN 24 (Q2a OR, 03 marks)
8. **Draw and explain speed torque characteristics of 3 phase induction motor.**
    - **Appeared in:** WIN 24 (Q2b OR, 04 marks)

9. **What is plugging? How it is employed to dc series motor?**
    - **Appeared in:** WIN 24 (Q2c OR, 07 marks)
10. **Write merits and demerits of regenerative braking.**
    - **Appeared in:** WIN 24 (Q3a, 03 marks)
11. **Explain open circuit transition for starting of dc series motor.**
    - **Appeared in:** WIN 24 (Q3a OR, 03 marks)
12. **Write short note on drum controller.**
    - **Appeared in:** WIN 24 (Q3c OR, 07 marks)
13. **Select and justify any motor as traction motor.**
    - **Appeared in:** SUM 25 (Q2a, 03 marks)
14. **List advantages and disadvantages of Linear induction motor.**
    - **Appeared in:** SUM 25 (Q2b, 04 marks)
15. **Explain repulsion motor with necessary diagram.**
    - **Appeared in:** SUM 25 (Q2c, 07 marks)
16. **Discuss any one method to make suitable DC series motor for regenerative braking.**
    - **Appeared in:** SUM 25 (Q2c OR, 07 marks)
17. **Describe constructional features of ac series motor.**
    - **Appeared in:** SUM 25 (Q2a OR, 03 marks)
18. **Calculate energy saving by series parallel control of 4 dc motors.**
    - **Appeared in:** SUM 25 (Q2c OR, 07 marks)
19. **Compare plugging electric braking for dc series, dc shunt and three phase induction motor.**
    - **Appeared in:** SUM 25 (Q3c, 07 marks)
20. **Write short note on repulsion motor.**
    - **Appeared in:** SUM 24 (Q2b, 04 marks)
21. **Write short note on master controller.**
    - **Appeared in:** SUM 24 (Q3a, 03 marks)
22. **Explain construction and working principle of AC series motor with diagram and applications.**
    - **Appeared in:** SUM 24 (Q2c, 07 marks)
23. **State advantages and disadvantages of linear induction motor.**
    - **Appeared in:** SUM 24 (Q2a OR, 03 marks)

Unit III: Feeding, Distribution System And Specific Energy Consumption Calculation

Repeated Questions:

1. **Explain methods of feeding traction substations.**
    - **Appeared in:** W23 (Q2c OR, 07 marks), WIN 24 (Q3b, 04 marks) [Related to Substation Location]
2. **Explain the importance of neutral section.**
    - **Appeared in:** WIN 24 (Q3b OR, 04 marks), W23 (Q4a, 03 marks) [Related to Equipment]
3. **Explain working principle of negative booster with diagram.**
    - **Appeared in:** SUM 24 (Q3c, 07 marks), W23 (Q2a OR, 03 marks), SUM 25 (Q5a, 03 marks)

Other Important Questions:

1. **Draw the key diagram of 25 KV AC substation.**
    - **Appeared in:** W23 (Q2a, 03 marks)
2. **Explain the negative booster.**
    - **Appeared in:** W23 (Q2a OR, 03 marks)
3. **Explain how the location and distance between two substations is determined.**
    - **Appeared in:** WIN 24 (Q3b, 04 marks)
4. **Explain various factors related to location and spacing of substation.**
    - **Appeared in:** SUM 24 (Q3b, 04 marks)
5. **Draw neat line diagram of 25 kV traction substation. Briefly explain main components used in 25 kV traction substation.**
    - **Appeared in:** WIN 24 (Q5c OR, 07 marks)
6. **Explain the construction and working of double catenary system.**
    - **Appeared in:** SUM 25 (Q3b, 04 marks)
7. **Explain conductor rail system.**
    - **આવ્યો હતો:** SUM 25 (Q4b OR, 04 marks)

Unit IV: Electric Locomotives And Auxiliary Equipment

Repeated Questions:

1. **Explain working of the battery changeover switch.**
    - **Appeared in:** W23 (Q4a, 03 marks), WIN 24 (Q4b OR, 04 marks)
2. **Explain Rosenberg generator in detail.**
    - **Appeared in:** W23 (Q4b, 04 marks), SUM 24 (Q4b, 04 marks)
3. **Draw and explain the Arno converter used for auxiliary power supply.**
    - **Appeared in:** W23 (Q4b OR, 04 marks), SUM 24 (Q4a, 03 marks), SUM 25 (Q4b, 04 marks)
4. **Draw and explain block diagram of D.C. locomotive.**
    - **Appeared in:** W23 (Q4c OR, 07 marks), SUM 25 (Q3a, 03 marks)
5. **Explain pantograph collectors in detail.**
    - **Appeared in:** W23 (Q5c, 07 marks), WIN 24 (Q4c OR, 07 marks)

Other Important Questions:

1. **Explain major equipment of composite locomotives and their functions with diagrams.**
    - **Appeared in:** W23 (Q4c, 07 marks)
2. **Explain bow-collector in detail.**
    - **Appeared in:** W23 (Q4a OR, 03 marks)
3. **Draw the layout of DC locomotive and label the main components.**
    - **Appeared in:** WIN 24 (Q4a, 03 marks), SUM 25 (Q3a, 03 marks)
4. **Explain the construction and working of pantograph current collector with neat diagram.**
    - **Appeared in:** WIN 24 (Q4c, 07 marks)
5. **Draw the layout of single-phase ac locomotive and label the main components.**
    - **Appeared in:** WIN 24 (Q4a OR, 03 marks)
6. **Draw the power circuit diagram of composite locomotive and explain functions of main equipments used in it.**
    - **Appeared in:** WIN 24 (Q4c OR, 07 marks)
7. **State functions of various auxiliary equipment used in electric locomotive.**
    - **Appeared in:** SUM 24 (Q4a OR, 03 marks)
8. **Describe working of nose suspension drive.**
    - **Appeared in:** SUM 24 (Q5a, 03 marks)
9. **State functions of battery change over switch with diagram.**

- **Appeared in:** SUM 24 (Q5b, 04 marks)

10. **Describe working of direct quill drive.**
    - **Appeared in:** SUM 24 (Q5a OR, 03 marks)
11. **Explain block diagram of diesel electric locomotive.**
    - **Appeared in:** SUM 24 (Q5b OR, 04 marks)
12. **Give classification of electric locomotives.**
    - **Appeared in:** SUM 25 (Q4a, 03 marks)
13. **Construct double battery system for coach lighting and explain various switches used in it.**
    - **Appeared in:** SUM 25 (Q4c, 07 marks)
14. **Discuss nose suspension drive.**
    - **Appeared in:** SUM 25 (Q4a OR, 03 marks)
15. **Develop block diagram of AC to DC composite locomotive and give the function of main components of it.**
    - **Appeared in:** SUM 25 (Q4c OR, 07 marks)

Unit V: Modern Trends In Electric Traction System

Repeated Questions:

1. **State the advantages of high speed trains.**
   - **Appeared in:** W23 (Q5a, 03 marks), SUM 25 (Q5b, 04 marks)
2. **Explain the principle of magnetic levitation.**
   - **Appeared in:** W23 (Q5b, 04 marks), SUM 25 (Q1b, 04 marks) [Also in Unit I, highly repeated]
3. **Explain variable frequency drive for three phase induction motors.**
   - **Appeared in:** W23 (Q5b OR, 04 marks), SUM 25 (Q5b OR, 04 marks), SUM 24 (Q5c OR, 07 marks)
4. **State the advantages of monorails.**
   - **Appeared in:** W23 (Q5a OR, 03 marks), WIN 24 (Q5b OR, 04 marks) [Related to Metro]

Other Important Questions:

1. **Draw and explain magnetic light switch and single battery system.**
   - **Appeared in:** W23 (Q5c OR, 07 marks)
2. **Explain working principle of monorail and metro system of traction.**
   - **Appeared in:** WIN 24 (Q5b OR, 04 marks)
3. **Explain high speed traction system.**
   - **Appeared in:** WIN 24 (Q5a OR, 03 marks), SUM 25 (Q5b, 04 marks)
4. **Describe construction and working of Linear induction motor.**
   - **આવ્યો હતો:** WIN 24 (Q5b OR, 04 marks)
5. **Write a short note on Arno convertor. Explain Negative Booster with diagram.**
   - **આવ્યો હતો:** WIN 24 (Q5c OR, 07 marks)
6. **Discuss various technologies used for high speed train.**
   - **આવ્યો હતો:** SUM 24 (Q5c, 07 marks)
7. **Describe working of variable frequency drive for three phase induction motor.**
   - **આવ્યો હતો:** SUM 24 (Q5c OR, 07 marks)

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