Time: 3 Hrs **Marks: 80**

Note:- 1. Question No. 1 is compulsory
2. Attempt any three questions out of remaining five questions
3. Assume suitable data if necessary & justify the same
4. Figures to the right indicates marks

Qu.1 Attempt **any Four**.

(a) Explain Kando system of track electrification. What are the advantages and disadvantages of Kando system? **[5]**

(b) State and explain the factors affecting to schedule speed **[5]**

(c) Discuss the various protection schemes at traction substation. **[5]**

(d) Explain the working of Pantograph collector. Give its advantages **[5]**

(e) Explain block section concept. **[5]**

Qu.2 (a) Derive the equation for maximum speed in simplified trapezoidal speed-time curve. **[10]**

(b) A Speed-time curve of a train consists of:
1. Uniform acceleration of 5 Km/Hr/sec for 20 sec.
2. Free running for 20 minutes.
3. Uniform deceleration of 6 Km/Hr/sec.
4. A stoppage of 5 minutes.

Calculate (1) Distance between stations(2) Average speed (3) Schedule speeds **[10]**

Qu.3 (a) Discus the operation of DC traction using chopper control drive. **[10]**

(b) State the desirable characteristics of traction motor. How DC series motor are suitable for traction drive? Justify **[10]**

Qu.4 (a) Explain the feeding and sectioning arrangements with circuit diagram. **[10]**

(b) Describe the working of booster transform in traction system. Also state the limitation of booster transformer **[10]**

Qu.5 (a) Discuss the design consideration of catenary wire in traction system. **[10]**

(b) Explain the working of Automatic Weight Tension and Automatic Tensioning Device **[10]**

Qu.6 (a) What is Interlocking Principle? Explain various Techniques of interlocking. **[10]**

(b) Derive an expression for specific energy output on a level track using simplified time- speed curve **[10]**

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