



C09-EE-605B

**3767**

**BOARD DIPLOMA EXAMINATION, (C-09)**

**OCT/NOV—2015**

**DEEE—SIXTH SEMESTER EXAMINATION**

**ELECTRIC TRACTION AND PLC**

*Time : 3 hours ]*

*[ Total Marks : 80*

**PART—A**

3×10=30

**Instructions :** (1) Answer **all** questions.  
(2) Each question carries **three** marks.  
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Give the advantages of electric traction.
2. Give the importance of simplified speed-time curve.
3. Define tractive effort.
4. Define coefficient of adhesion and give the typical values.
5. Give the factors affecting specific energy consumption.
6. Give the requirement of a traction motor.
7. List the applications of PLC.
8. Write short notes on timer and counters.
9. What is PLC scan time?
10. Draw the ladder diagram for staircase lighting.

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**PART—B**

10×5=50

- Instructions :** (1) Answer *any five* questions.  
(2) Each question carries **ten** marks.  
(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

- 11.** A train has a scheduled speed of 40 kmph between two stops which are 4 km apart. Determine the crest speed over the run, if the duration of stop is 60 seconds, acceleration and retardation are both equal to 2 kmphs. Assume trapezoidal speed-time curve. 10
- 12.** Derive the expression for tractive effort required for the locomotive. 10
- 13.** A 400 tonne goods train is to be hauled by a locomotive up a gradient of 2% with an acceleration of 1 kmphs. Coefficient of adhesion is 20%, track resistance is 40 N/tonne and effort of rotational masses is 10% of dead weight. Find the weight of the locomotive and number of axles, if axle load is not to increase beyond 22 tonnes. 10
- 14.** (a) A 300 tonne EMU is started with a uniform acceleration and reaches a speed of 40 kmph in 24 seconds on a level track. Assuming trapezoidal speed-time curve, find specific energy consumption if rotational inertia is 8%, retardation is 3 kmphs, distance between stops is 3 km, motor efficiency is 0.9 and train resistance is 49 N/tonne. 7  
(b) Explain about end-on generation. 3
- 15.** (a) Explain the control of traction motor by autotransformer with a neat sketch. 5  
(b) Explain the working of booster transformer with a neat sketch. 5
- 16.** (a) Explain the working of PLC.  
(b) Explain the following counter instructions :  
(i) Count up  
(ii) Count down 10
- 17.** Explain about SCADA. Give its importance and list some applications. 6+4=10
- 18.** (a) Give the differences between inductive and capacitive proximity switch. 5  
(b) Draw the ladder diagram for DOL starter and explain it. 5

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