



C09-EE-605 B

3767

BOARD DIPLOMA EXAMINATION, (C-09)

OCT/NOV—2013

DEEE—SIXTH SEMESTER EXAMINATION

ELECTRICAL TRACTION AND PLC

Time : 3 hours]

[*Total Marks* : 80

PART—A

- 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. What is an electric traction? 3
2. List out the reasons why 3-phase system of electrification is obsolete. 3
3. Define maximum speed and average speed. $1\frac{1}{2}+1\frac{1}{2}=3$
4. List out the factors affecting specific energy consumption. 3
5. State the methods of improving the coefficient of adhesion. 3
6. Explain briefly about end-on generation. 3
7. State the advantages of PLCs. 3
8. Draw the ladder diagram for start and stop a pump. 3
9. What is a PLC scan? 3
10. List out the types of proximity switches. 3

PART—B

- 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) Derive an expression for the tractive effort during up gradient. 5
 (b) A train, with electric locomotive, weighing 300 tons attains a maximum speed of 50 kmph in 25 seconds up a gradient of 1 in 150. The frictional resistance and rotational inertia are 50 newton/ton and 10% of train weight respectively. Find the tractive effort required. 5
- 12.** Explain trapezoidal speed-time curve and derive relationships among various quantities in this speed-time curve. 3+7=10
- 13.** An electric train has an average speed of 42 kmph on a level track between stops 1400 m apart. It is accelerated at 1.7 kmphs and is braked at 3.3 kmphs. Draw the speed-time curve for the run. Estimate the energy consumption at the axels of the train WH/per ton per km. [Take tractive resistance as 50 newton/ton and allow 10% for the rotational inertia]. 3+7=10
- 14.** A tram car consists of two motors of each 12 T and develops 10 kW while the car ascends on an incline of 2.5%. Find the speed of the car if the gearing efficiency is 95% and track resistance is 60 newton/ton. 10
- 15.** (a) Explain briefly different current collectors used in electric traction. 5
 (b) Briefly explain the working of booster transformer in traction system with a neat sketch. 5
- 16.** Draw the block diagram of PLC, and explain the purpose of each part. 10
- 17.** Develop the ladder diagram for automatic traffic lights. 10
- 18.** (a) Explain the communication standards and protocols of
 (i) RS-422 and (ii) RS-485. 5
 (b) Explain about SCADA and list out the SCADA softwares. 5
