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.

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 kmphps. 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 kmphps. 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 kmphps, 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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