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C09–EE–**605B**

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2018

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. Classify various systems of electrification.

2. Sketch the speed-time curves of urban and suburban services and explain in brief.

3. State the factors which affects the schedule speed.

4. Define the following:

(a) Maximum speed

(b) Average speed

(c) Schedule speed

5. What are the factors affecting specific energy consumption.

6. List any six advantages and disadvantages of electric traction.

7. List the input and output devices of a PLC.

8. Draw the ladder diagram for logic OR gate.

9. List the features and benefits of pneumatic switches.

10. List the PLC instruction set.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) The answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Explain briefly the 1-phase AC system of track electrification.

(b) Explain the composite system of electrification.

12. *(a)* Explain (i) bow collector, and (ii) pantograph collector.

(b) Explain the factors affecting the coefficient of adhesion.

13. An electric train is accelerated at 1.5 KMPHPS and braked at 3 KMPHPS. The train has an average speed of 45 KMPH on level track of 1500 metres between stations.

Determine the following :

(a) Actual time of run

(b) Maximum speed

(c) Distance travelled before applying brakes

(d)

Schedule speed
Assume time for stop 15 seconds and run according to trapezoidal speed-time curve.

14. An electric locomotive is required to haul a train of 12 coaches each weighing 30 tonne on the main line service requiring an initial acceleration of 0.8 KMPHPS and up gradient is 1 in 100. Estimate the adhesive weight and hence number of driving axles the locomotive must have if permissible axle loading is 20 tonne per axle. Assume rotational inertia to be 4% for the coaches and 15% for locomotive. Maximum coefficient of adhesion is 0.2 and tractive resistance 5 kg/tonne.

15. *(a)* Draw the block diagram of a locomotive and explain all the components in detail.

(b) Draw the connection diagram of a booster transformer in traction system and briefly explain the working.

16. *(a)* Explain CTU (count up) and CTD (count down) instructions.

(b) Write a brief note on proximity switch.

17. *(a)* Describe the ladder diagram for NAND and NOR gates.

(b) Explain in detail about SCADA system.

18. Draw the ladder diagram for staircase lighting and explain.

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