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C09–EE–605C

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2016

DEEE—SIXTH SEMESTER EXAMINATION

ELECTRIC TRACTION AND RENEWABLE ENERGY SOURCES

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. State any three requirements of electric traction.

2. Draw a simplified trapezoidal speed-time curve and note all the parameters.

3. State three factors that affect the scheduled speed.

4. Define average speed and scheduled speed.

5. List any six conventional sources of energy.

6. What are different types of concentrating collector?

7. Write any three advantages of PV cells.

8. List any six components of a windmill.

9. How do you use biomass for electricity production?

10. Write any three advantages of a combined cycle power plant.

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. An electric train is accelerated at 1·5 kmphps and braked at 3 kmphps. The train has an average speed of 45 kmph on a level track of 1·5 km between two stations. Find *(a)* actual time of run, *(b)* maximum speed, *(c)* distance travelled before the brakes are applied, and *(d)* scheduled speed. Assume a trapezoidal speed-time curve and take the duration of stop as 15 seconds. 10

12. *(a)* What is tractive effort and why is it required? 4

(b) An electric train of weight 300 ton is started on a 3% up gradient with uniform acceleration of 2 kmphps. The rotational inertia is 12%. Find the torque developed by the motors. Take wheel diameter as 90, the gear efficiency as 95% and a gear ratio of 4. Take the track resistance as 45 newton per ton. 6

13. *(a)* Derive an expression for specific energy consumption of a train. 6

(b) Explain the factors that affect the specific energy consumption. 4

14. *(a)* Draw a sketch of single-catenary overhead supply system and explain catenary wire, contact wire, droppers and mast. 5

(b) Explain the booster transformer used in traction with a neat sketch. 5

15. *(a)* Draw a neat sketch of a solar flat-plate collector and explain its each component. 6

(b) Explain a solar water heater with a neat diagram. 4

16. *(a)* Explain a vertical-axis windmill with a neat sketch. 5

(b) Explain a horizontal-axis windmill with a neat sketch. 5

17. *(a)* Explain the process of biogas generation. 4

(b) Draw a neat sketch of a fixed-dome biogas plant and explain. 6

18. Draw a neat diagram of a combined cycle power plant and explain its advantages. 10

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