C09–A–103/C09–AA–103/C09–AEI–103/C09–BM–103/
C09–C–103/C09–CM–103/C09–CH–103/
C09–CHPP–103/C09–CHPC–103/C09–CHOT–103/
C09–CHST–103/C09–EC–103/C09–EE–103/
C09–IT–103/C09–M–103/C09–MET–103/C09–MNG–103/

C09–PET–103/C09–TT–103/C09–RAC–103

3003

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2017

FIRST YEAR (COMMON) EXAMINATION

ENGINEERING PHYSICS

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. Write the dimensional formulae for the following :

   (a) Momentum

   (b) Density

   (c) Work

2. Define equal vector, negative vector and unit vector.

3. A body is allowed to fall freely from a height 1960 m. Find the time taken to reach the ground.

4. State the laws of static friction.

5. The time period of a simple pendulum is 2 seconds. If its length is increased 4 times, find its time period.

6. Write the statement of Boyle's law. If P_1V_1 and P_2V_2 are pressures and volumes, write the relation between them using Boyle's law.

7. Write any two methods of controlling noise pollution in urban areas.

8. Define surface tension and explain any one example.

9. Two north poles of pole strengths 1 A-m each are separated by a distance of 1 m in air. Calculate the force of repulsion between them.

10. Write any three applications of optical fibers.

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PART—B   10×5=50

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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)* Define scalar product of two vectors.   3

     (b) Explain potential energy on the basis of scalar product.   3

     (c) Find the work done in moving an object through a displacement of $2i\ 3j\ 5k$ when the applied force is $5i\ 4j\ 2k$.   4

12. *(a)* Derive an expression for the magnitude and direction of resultant velocity of a body after any instant *t* in case of an oblique projection.   7

     (b) The range of a projectile is twice its maximum height. Its velocity of projection is 10 m/s. What is the range of the projectile? (Take $g\ 10\,\text{m/s}^2$)   3

13. *(a)* Define potential energy. Give its units and dimensional formula. 3

(b) Derive an expression for potential energy. 4

(c) A body of mass 5 kg is raised to a height of 10 m is 5 minutes. Find the potential energy and power required. 3

14. *(a)* Define time period of a particle in SHM. 2

(b) Derive the expression for time period of a particle in SHM. 5

(c) A particle moving in SHM has a velocity of 2 m/s when passing through center of its path and its time period is 3·142 s. Find its amplitude. 3

15. *(a)* Distinguish between isothermal and adiabatic processes. 6

(b) State the laws of thermodynamics. 4

16. *(a)* Explain Doppler effect in sound. Write any three applications of Doppler effect. 4

(b) A train at the outer signal of railway station blows a whistle of frequency 400 Hz in air. What is the frequency of the whistle for a platform observer when the train *(i)* approaches the platform with a speed of 10 m/s and *(ii)* recedes from the platform with a speed of 10 m/s. (Velocity of sound in air = 340 m/s) 6

17. *(a)* State Hooke's law. 2

(b) Derive an expression for Young's modulus. 4

(c) Calculate the force required to increase the length of a wire of cross-sectional area $10^{6}\,\mathrm{m}^2$ by 50%, if the Young's modulus of the material of wire is 90×10^9 Pa. 4

18. *(a)* Derive an expression for the specific resistance of the material of a conductor using meter bridge. 6

(b) State and explain Coulomb's inverse square law of magnetism. 4

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