C16–A/AA/BM/CH/CHST/AEI/MET/

MNG/TT/IT/PCT—**103**

6003

BOARD DIPLOMA EXAMINATION, (C–16)
MARCH/APRIL—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 any three limitations of dimensional analysis.

2. Define position vector, null vector and unit vector.

3. A ball is dropped from the top of a building of height 40 m. Find the velocity of the ball on reaching the ground.

4. Define simple harmonic motion. Give any two examples.

5. Define specific heat of a gas. Write its SI unit.

6. Write any three applications of beats.

7. Define elasticity. Name any two elastic substances.

8. Define capillarity and angle of contact.

9. State Kirchhoff's first and second laws.

10. Write any three applications of superconductors.

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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 dot product of two vectors. 2

(b) Write any four characteristics of dot product. 4

(c) Find the area of the parallelogram formed by the vectors $\vec{A} = \vec{i} + 2\vec{j} + 3\vec{k}$ and $\vec{B} = 3\vec{i} + 2\vec{j} + \vec{k}$. 4

12. *(a)* Derive the expressions for maximum height and horizontal range of a body projected obliquely. 6

(b) An aeroplane flying horizontally with a speed of 75 m/s releases a body at a height of 490 m from the ground. Find when and where the body strikes the ground. 4

13. *(a)* Define static friction, kinetic friction and rolling friction. 3

(b) Brief any four methods of reducing friction. 4

(c) A car is travelling at a speed of 10 m/s. Suddenly the brakes are applied causing all tyres to skid. How far the car will go before coming to a stop? (Coefficient of friction = 0·2) 3

14. *(a)* Define potential energy. Give two examples. 2

(b) Derive the expression for kinetic energy. 5

(c) A body of mass 10 kg falls from a height of 19·6 m. What is the kinetic energy of the body before striking the ground? 3

15. *(a)* Derive the expressions for acceleration and time period of a particle executing SHM. 6

(b) The SHM of a body is given by equation

$$y = 2\sin\left(0\cdot5\,t - \frac{\pi}{3}\right)$$

where y is in cm. Find *(a)* amplitude, *(b)* angular velocity, *(c)* time period and *(d)* maximum velocity. 4

16. *(a)* State first law of thermodynamics and second law of thermodynamics. 4

(b) Calculate the value of universal gas constant. 3

(c) For a gas at constant pressure of $1\cdot25 \times 10^5$ Pa, energy of 2200 J is supplied. If the volume of the gas is increased by 5×10^{-3} m^3, then find the increase in its internal energy. 3

17. *(a)* Define echo, reverberation and reverberation time. 3

(b) Write the methods of minimizing echoes. 3

(c) A boy hears an echo of his own voice from a distant hill after one second. If the velocity of sound is 340 m/s, what is the distance of the hill from the boy? 4

18. *(a)* Define magnetic moment and magnetic induction field strength. 2

(b) Derive an expression for the magnetic induction field strength at a point on the axial line of a bar magnet. 5

(c) A current of 2 A passes through a conductor, when a potential difference of 50 V applied across it. Find the resistance of the conductor. 3

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