Sc-104/Ap.Phy-I/1st Sem/Com/2017/M

APPLIED PHYSICS – I

Full Marks – 70

Pass Marks – 21

Time – Three hours

The figures in the margin indicate full marks
for the questions.

All questions are compulsory.

1. (A) Fill in the gaps with appropriate words :
   $1 \times 5 = 5$

   (a) Thermal capacity of a body is equal to the product of mass × ....

   (b) The product of mass and .... is called momentum.

   (c) The loudness of sound depends upon its ....

   (d) .... is the mode of transmission of heat which does not require a material medium.

   (e) $[M^{-1} L^3 T^{-2}]$ is the dimensional formula for ..... .

[Turn over

(B) Choose the correct answer each of the following : $1 \times 5 = 5$

(a) S.I   unit of power is

   (i)   Watt

   (ii) Kilowatt

   (iii) Joule

   (iv) Erg

(b) Principle of transmission of pressure is stated by

   (i)   Newton's law

   (ii) Boyle's law

   (iii) Pascal's law

(c) Which of the following is not a fundamental unit ?

   (i)   Hertz

   (ii) Kelvine

   (iii) Ampere

   (iv) Metre

(d) Value of g is

(i) same at all places

(ii) more on the moon than on the earth

(iii) more at the equator than at the pole

(iv) more at the pole than at the equator

(e) The S.I unit of work i.e Joule is a

(i) derived

(ii) fundamental

(iii) radium

2. (a) How force is measured from Newton's 2nd law of motion ? Define force from Newton's 1st law of motion. 3+1=4

(b) Derive the relationship between linear velocity and angular velocity. 3

(c) What is K.E and P.E of a body ? Derive the mathematical expression for the P.E.

2+2=4

(d) Why a centripetal force does not work on the body while it is moving along a circle ? 1

3. (a) What is work ? Show that

Power = Force · Velocity. $1+2=3$

(b) A body is moving with uniform acceleration reaches 108m and 140m in the 5th and 11th second respectively. Find its initial velocity and acceleration. 4

4. (a) State Newton's law of gravitation. Hence define gravitational constant and give its dimensional formula. $2+1+1=4$

(b) State Hooke's law. Justify the statement – "Steel is more elastic than rubber." $1+2=3$

Or

A load of 2 kg produces an extension of 1mm in a wire 3m in length and 1mm in diameter. Calculate Young's modulus of the wire.

(c) Define density and relative density. What is the value of density of water in S.I unit ? The relative density of certain substance is 8, what is its density ? $2+1+1=4$

5. (a) Define : calorie, specific heat, thermal capacity. 3

(b) Distinguish between sensible heat and latent heat. 2

(c) Establish the relation between the coefficient of linear expansion and coefficient of superficial expansion.

Define coefficient of linear expansion of solid and show that it does not depend on the unit of length. 3+2=5

6. (a) Define latent heat of fusion of ice and coefficient of real expansion of heat. 2

(b) 40 gm of water at 60°C are poured into a calorimeter whose temperature is 20°C. The final temperature of the two is 45°C. Find the water equivalent of the calorimeter. 3

(c) What are the different modes of transmission of heat ? 2

7. Explain with the help of a graph the anomalous expansion of water. 3

Or

State Joule's law of heat and define mechanical equivalent of heat. Write its value in S.I.

1+1+1=3

8. (a) State Newton's formula for velocity of sound in air and hence explain Laplace's correction.

$1+2=3$

(b) Deduce a relation between N, η and λ stating the significance of the symbols. What is the difference between musical sound and noise ?

$2+2=4$

(c) How does velocity of sound depend on temperature ?

3