Total No. of printed pages = 6

Sc-104/AP-I/1st Sem/2016/N

APPLIED PHYSICS – I

Full Marks – 70

Pass Marks – 21

Time – Three hours

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

Answer question No.1 and any *five* from the rest.

1. (A) Fill in the blanks : 1×5=5

(i) The dimensional formula for energy is ———.

(ii) The value of acceleration due to gravity at pole is ——— .

(iii) On increase of pressure melting point of ice is ——— .

(iv) In case of simple pendulum, the sum of the P. E and K. E is ——— .

(v) The dot product of two vectors is a ——— quantity.

[Turn over

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

(i) Which of the following is a vector quantity ?

(a) mass

(b) force

(c) work

(d) time.

(ii) The resultant of two vectors of magnitude 2 and 3 is 1. The angle between them is

(a) 180°

(b) 270°

(c) 120°

(d) 90°

(iii) When a particle is moving with uniform velocity, which of the following quantity changes ?

(a) speed

(b) velocity

(c) position vector

(d) acceleration.

(iv) The value of – 40°C in Fahrenheit scale is

(a) 40°F

(b) 0°F

(c) – 40°F

(d) 100°F.

(v) The momentum of a body is doubled, its K.E will

(a) be doubled

(b) be halved

(c) increase four times

(d) decrease four times.

2. (a) Define unit. Name the basic and supplementary units of S.I. 1+3=4

(b) Define average velocity and instantaneous velocity. 2

(c) State Newton's 2nd law of motion. Give quantitative definition of force from this law. 1+2=3

(d) A body starts from rest and has a velocity of 15 m/s in 6 sec. If the acceleration is uniform, how far will it move in next 6 seconds ? 3

3. (a) Define work and power.

Calculate the K. E. of a motor car of mass 6×10^3 kg moving with velocity 48 km/h in a straight line. 2+2=4

(b) Define centripetal force.

Deduce an expression of angle of banking of a curved track. 1+3=4

(c) State dot product and cross product of two vectors with examples. 3

State the principle of conservation of linear momentum. 1

4. (a) State and explain Newton's law of gravitation. Write the dimension of universal gravitational constant G. 2+1=3

(b) State the characteristics of S. H. M. 2

(c) Define stress, strain and Poisson's ratio. 3

(d) The diameter of the pump plunger and press plunger of a hydraulic press are 0.02m and 0.12m respectively. It is worked by a hand lever of which the ratio of the arms is 1:8. If force 30 kgf is applied on the handle, what is the force exerted on load ? 4

5. (a) Define calorie, thermal capacity and water equivalent. 3

(b) What do you mean by co-efficient of linear expansion ? Establish the relation between α and β. 1+3=4

(c) When 150 gm of water at 50°C is mixed with 100 gm of water at 20°C in a copper calorimeter, the temperature of the mixture becomes 25°C. Find the water equivalent of calorimeter. 3

(d) Distinguish between evaporation and boiling. 2

6. (a) Define density and specific gravity. 2

(b) What is co-efficient of thermal conductivity ? Write its dimension. 2+1=3

(c) "The dew point at a place on a certain day is 14.5°C." What do you mean by the statement ? 2

(d) State Pascal's law. Hence explain the law of multiplication of force. 4

Define Joule's mechanical equivalent of heat. 1

7. (a) Deduce a relation between wavevelocity, wavelength and frequency of a wave. 2

(b) What is musical sound ? Write the characteristic of musical sound. 1+3=4

(c) Write the difference between : 2+2=4

(i) Echo and reverberation

(ii) Longitudinal and transverse wave.

(d) State the effect of temperature and pressure on velocity of sound in a medium. 2