Note:- You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write **PAPER CODE**, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q. 1

1) Absolute uncertainty in a measuring instrument is equal to
   (A) Least count   (B) Accuracy   (C) Fractional uncertainty   (D) Percentage uncertainity

2) Dimension of moment arm is
   (A) $[M]$ (B) $[T]$ (C) $[LT]$ (D) $[L]$

3) The force of 15 N makes an angle of 90° with x-axis, its y- component is
   (A) 15 N   (B) Zero N   (C) 30 N   (D) 45 N

4) The position vector $\vec{r}$ in xz- plane is
   (A) $y\hat{i} + z\hat{k}$ (B) $x\hat{i} + y\hat{k}$ (C) $x\hat{i} + z\hat{k}$ (D) $x\hat{i} + y\hat{j} + z\hat{k}$

5) Area between the velocity time graph is equal to
   (A) Time   (B) Velocity   (C) Distance   (D) Mass

6) When the finite force is parallel to the direction of motion of the body, the work done is
   (A) Minimum   (B) Maximum   (C) Infinity   (D) Varies

7) A body of mass 10 kg in free falling lift has weight
   (A) 10 N   (B) 9.8 N   (C) Zero N   (D) 980 N

8) 20 N centripetal Force revolving a body along a circular path of radious 1m, the work done by the centripetal Force is
   (A) 20 Joule   (B) 40 Joule   (C) 10 Joule   (D) Zero Joule

9) Stoke's Law hold for bodies when they have
   (A) Spherical shape   (B) Curved shape   (C) Rectangular shape   (D) Oblong shape

10) One Torr is equal to
   (A) 120 Pascals   (B) 100 Pascals   (C) 133.3 Pascals   (D) 80 Pascals

11) A simple pendulum is completing 20 vibration in 5 seconds, its frequency is,
   (A) 4 Hz   (B) 20 Hz   (C) 200 Hz   (D) 40 Hz

12) The Product of frequency and Time Period is
   (A) 2   (B) 3   (C) 1   (D) 1 Hertz

13) Two tuning forks of frequencies 261 Hz and 258 Hz are sounded togather, the number of beats per second are
   (A) 3   (B) 2   (C) 261   (D) 258

14) Which of the following waves can not be polarized
   (A) X-Rays   (B) Light waves   (C) Sound waves   (D) Infrared rays

15) If a convex Lens of focal length " f " is cut into two identical halves along the Lens diameter, the focal length of each half is
   (A) $\frac{3}{2}f$ (B) $2f$ (C) $\frac{f}{2}$ (D) f

16) Solid ice, Liquid water and water vapours consist in thermal equilbrium at a Temperature
   (A) 273 K   (B) 273.16 K   (C) 273 °C   (D) 100 °C

17) The Sum of all the energies of molecules is known as
   (A) Elastic potential energy   (B) Kinetic energy   (C) Internal energy   (D) Gravitational potential energy

SGD-PII-67L 19

Physics (Subjective)   Group (II)   (Session 2015-17 to 2018-20)   Paper (I)

Time Allowed: 2.40 hours   Section ----------------- I   (Inter Part - I)   Maximum Marks: 68

2.   Answer briefly any Eight parts from the followings:- $8 \times 2 = 16$

(i)   Write two differences between base and derived quantities?

(ii)   Name several repetitive phenomena occuring in nature which could serve as reasonable time standard?

(iii)   Under what circumstances would a vector have components that are equal in magnitude?

(iv)   Define component of a vector? What are rectangular components?

(v)   If all the components of a vector $\vec{A}_1$ and $\vec{A}_2$ were reversed, how would this alter $\vec{A}_1 \times \vec{A}_2$?

(vi)   Define conservative field. Give example.   **(vii)** What is Venturi Relation? Explain briefly.

(viii)   What is drag force? On what factors does it depend?

(ix)   Show that 1KWh = 3.6 M J   **(x)** Derive the relation $\omega = \sqrt{\dfrac{k}{m}}$ **(xi)** What is resonance? Example must be given?

(xii)   Does the acceleration of a simple harmonic oscillator ever remain constant? Explain.

3.   Answer briefly any Eight parts from the followings:- $8 \times 2 = 16$

(i)   Can the velocity of an object reverse direction when acceleration is constant? If so, give an example.

(ii)   Define impulse and show that how it is related to linear momentum?

(iii)   Show that the range of projectile is maximum when projectile is thrown at an angle of 45° with horizontal.

(iv)   Differentiate between Ballistic and non-ballistic projectiles.

(v)   What is meant by moment of inertia? Explain its significance.

(vi)   When mud flies off the tyre of a moving bicycle, in what direction does it fly? Explain.

(vii)   Explain how many minimum number of geo-stationary satellites are required for global coverage of T.V. transmission?

(viii)   Define the terms (a) Gravitation, and (b) Geodesics

(ix)   What features do longitudinal waves have in common with transverse waves?

(x)   As a result of a distant explosion, an observer senses a ground tremor and then hears the explosion. Explain the time difference.

(xi)   Why does sound travel faster in solids than in gases? .**(xii)** Differentiate between "Red Shift" and "Blue Shift"

4.   Answer briefly any Six parts from the followings:- $6 \times 2 = 12$

(i)   What is meant by a wavefront?   **(ii)** Can visible light produce interference fringes? Explain.

(iii)   The centre of Newton's rings is dark. Why?   **(iv)** What are the two conditions for total internal reflection to take place?

(v)   How the light signal is transmitted through optical fibre?

(vi)   Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?

(vii)   Is it possible to construct a heat engine that will not expel heat into the atmosphere?

(viii)   Explain why adiabatic is steeper than an isotherm?

(ix)   Can the mechanical energy be converted completely into heat energy? If so give an example.

Note: Attempt any three questions.   Section ------------- II $(8 \times 3 = 24)$

5.   (a)   What is the main difference between petrol engine and diesel engine? Also describe petrol engine elaborating its four strokes.

   (b)   The diameter and length of a metal cylinder measured with the help of vernier callipers of least count 0.01 cm are 1.22 cm and 5.35 cm. Calculate the volume of cylinder and uncertainity in it.

6.   (a)   Derive expressions for the magnitude and direction of resultant of two vectors, added by rectangular component method.

   (b)   A football is thrown upward with an angle of 30° with respect to horizontal. To throw a 40 m pass what must be the initial speed of the ball?

7.   (a)   Define the conservative field. Prove that the work done in the earth's gravitational field is independent of the path followed.

   (b)   A stationary wave is established in a string which is 120 cm long and fixed at both ends. The string vibrate in four segments, at a frequency of 120 Hz. Determine its wavelength and fundamental frequency?

8.   (a)   Derive an expression for the radius of orbit of a geo-stationary satellite.

   (b)   A block of mass 4 kg is dropped from a height of 0.8 m on to a spring of spring constant $K = 1960 \dfrac{N}{m}$. Find the maximum distance through which spring will be compressed.

9.   (a)   Explain compound microscope using suitable diagram. Derive formula for its angular magnification.

   (b)   Sodium light ($\lambda = 589$ nm) is incident normally on a grating having 3000 lines per centimetre. What is the highest order of the spectrum obtained with this grating?

SGD-11-GL-19