

DGK GRP-1

TIME: 20 MINTUES

MARKS : 17

PHYSICS

GROUP : FIRST

NOTE : You have four choices in each question. Only one choice is correct. 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.

QUESTION NO. 1

1. The horizontal range and maximum range of projectile are related as
 (A) $R = R_{\max} \sin \theta$ (B) $R = R_{\max} \sin 2\theta$
 (C) $R = R_{\max} \sin^2 \theta$ (D) $R = R_{\max} \sin \theta \cos \theta$
2. A body is moving with uniform velocity. Its _____ changes
 (A) Speed (B) Acceleration (C) Direction of motion (D) Displacement
3. Escape velocity from the earth surface is
 (A) 4.2 kms^{-1} (B) 7.5 kms^{-1} (C) 9.5 kms^{-1} (D) 11.2 kms^{-1}
4. Which of the following is correct
 (A) $\vec{v} = \vec{r} \times \vec{\omega}$ (B) $\vec{v} = \vec{\omega} \times \vec{r}$ (C) $\vec{v} = \vec{r} \cdot \vec{\omega}$ (D) $\vec{v} = \vec{\omega} \cdot \vec{r}$
5. The internal energy of 1 mole of an ideal gas depends on
 (A) Volume (B) Pressure (C) Temperature (D) Potential energy
6. The number of geo-stationary satellites to cover the whole earth is
 (A) 5 (B) 24 (C) 3 (D) 7
7. Cloud formation in the atmosphere is _____ process
 (A) Adiabatic (B) Isobaric (C) Isothermal (D) Isochoric
8. Terminal velocity is a _____ velocity
 (A) constant maximum (B) Constant minimum (C) Variable (D) Instantaneous
9. Time period of simple pendulum at the centre of the earth will be
 (A) Zero (B) Infinite (C) Same as on the surface of the earth (D) Doubled
10. Maximum number of beats frequency that can be heard by a human is
 (A) 15 Hz (B) 20 Hz (C) 10 Hz (D) 8 Hz
11. Stationary waves are set up in an open organ pipe of length 2m. The wavelength of waves in first mode of vibration is
 (A) 4 m (B) 1 m (C) 8 m (D) 3 m
12. Light waves cannot be polarized by
 (A) Selective absorption (B) Reflection at large incidence angle
 (C) Interference of light (D) Scattering by air molecules.
13. Which of the following phenomena does not occur in sound waves?
 (A) Diffraction (B) Polarization (C) Interference (D) Reflection
14. If the radius of a sphere $r = 2.25 \pm 0.01 \text{ cm}$ then percentage uncertainty in r is
 (A) 0.2% (B) 0.4% (C) 0.1% (D) 0.3%
15. If we add the numbers 2.7543, 4.10, 1.773, the rounded off answer will be
 (A) 8.1273 (B) 8.127 (C) 8.2 (D) 8.13
16. The minimum number of unequal vectors whose sum can be zero is
 (A) 1 (B) 2 (C) 3 (D) 4
17. The magnitude of resultant of two forces 6N and 8N acting at right angle to each other is
 (A) 10 N (B) 2 N (C) 14 N (D) 8 N

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PHYSICS
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QUESTION NO. 2 Write

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- Differentiate between random and systematic error.
- What are two principal characteristics of an ideal standard?
- Why do we find it useful to have two units for the amount of substance Kilogram and the mole?
- Show that the famous "Einstein equation" $E = mc^2$ is dimensionally consistent.
- Prove that scalar product is commutative.
- Find the projection of $\vec{A} = 2\hat{i} - 8\hat{j} + \hat{k}$ in the direction of $\vec{B} = 3\hat{i} - \hat{j} - 12\hat{k}$
- Show that the sum and difference of two perpendicular vectors of equal lengths are also perpendicular and of the same length.
- Calculate the distance covered by a free falling body during first second of its motion.
- What are inertial and non inertial frame of references.
- Explain the circumstances in which the velocity V and acceleration a of a car are
 - (a) V is zero but a is not zero. (b) a is zero but V is not zero
- At what point or points in its path does a projectile have its minimum speed its maximum speed?
- Explain how swing is produced in a fast moving cricket ball.

QUESTION NO. 3 Write short answers of any Eight (8) parts of the following

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- Calculate the work done in Kilo joules in lifting a mass of 10 kg (at a steady velocity) through a vertical height of 10 m.
- When a rocket re-enters the atmosphere, its nose cone becomes very hot. Where does this heat energy come from?
- Define term "Ampere"
- Show that orbital angular momentum $L_o = mvr_p$
- Explain how many minimum numbers of geo-stationary satellites are required for global coverage of T.V transmission.
- Prove that $2\pi \text{ radian} = 360^\circ$
- Name two characteristics of simple harmonic motion
- What is the total distance travelled by an object moving with S.H.M in a time equal to its period, if its amplitude is A ?
- Define resonance and give its example.
- Is it possible for two identical waves travelling in the same direction along a string to give rise a stationary wave.
- Why does sound travel faster in solids than in gases?
- What is condition for path difference in constructive interference and write its general equation?

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QUESTION NO. 4 Write short answers of any Six (6) parts of the following

- State the Huygen's principle.
- How would you distinguish between un-polarized and plane-polarized lights?
- An oil film spreading over a wet path shows colours. Explain how does it happen?
- What is the function of a collimator in spectrometer?
- How would it be advantageous to use blue light with a compound microscope?
- How can the efficiency of a practical heat engine be increased?
- Why spark plug is not needed in a diesel engine?
- Specific heat of a gas at constant pressure is greater than specific heat at constant volume why?
- Does the entropy of a system increase or decrease due to friction?

SECTION - II

NOTE: Attempt any three questions from this section (8 x 3 = 24) (Part A - 5 marks & Part B - 3 marks)

- Q. No.5 (A) Explain the vector product with its characteristics and examples.
(B) How large force is required to accelerate an electron ($m = 9.1 \times 10^{-31} \text{ kg}$) from rest to a speed of $2.3 \times 10^8 \text{ m}^{-1}$ through a distance of 5.0 cm.
- Q. No.6 (A) Define centripetal force and derive its formula. $F_c = \frac{mv^2}{r}$
(B) A football is thrown at angle of 30° with respect to horizontal to throw a 40m pass. What must be the initial speed of the ball.
- Q. No.7 (A) State and explain equation of continuity.
(B) What is the average translational kinetic energy of molecules in a gas at temperature 27°C ?
- Q. No.8 (A) Discuss the effects of variations of pressure, density and temperature on the speed of sound in a gas.
(B) What is a spectrometer? Explain its main parts.
- Q. No.9 (A) A light is incident normally on a grating which has 2500 lines per centimeter. Calculate the wave length of a spectral line for which the deviation is second order is 15°