

Roll No. _____ (To be filled in by the candidate)

(For all sessions)

Physics (Essay Type)

Time: 2:40 Hours

Marks: 68

Section - I**2- Write short answers of any eight parts from the following.****2 x 8 =16**

- Find unit vectors in the direction of vector $\vec{A}$, $\vec{A} = 8\hat{i} + 4\hat{j}$.
- What do you mean by scientific notations? Give one example.
- Time period of a simple pendulum is measured by stop watch. What type of errors are possible in the time period?
- Differentiate between base units and derived units with examples.
- Calculate the number of seconds in one year.
- Write briefly about Ballistic Missile.
- Define viscosity and give its units.
- Explain the circumstance in which $\vec{V}$ and $\vec{a}$ are : (i). in parallel. (ii). are perpendicular.
- Vector $\vec{A}$ lies in xy plane. For what orientations will both of its rectangular components be negative and for what orientations, its rectangular components be positive.
- Describe Newton's second law of motion in terms of momentum.
- Explain briefly how the swing is produced in a fast moving cricket ball with figure.
- Define positive and negative acceleration along with their directions.

3- Write short answers of any eight parts from the following.**2 x 8 =16**

- Calculate the work done in Killo joules in lifting a mass of 10kg through vertical height of 10m.
- A boy uses a catapult to throw a stone which accidentally smashes a green house window. Discuss the possible energy changes.
- Convert 1.4kw into joule/sec.
- Prove that $1\text{rad} = 57.3^\circ$.
- Show that for a body attached with a spring $\vec{a} = \frac{-k}{m} \vec{x}$.
- Can we realize an ideal simple pendulum?
- Why does sound travel faster in solids than in gasses?
- What are the uses of beats?
- What is meant by moment of inertia? Explain its role in angular motion.
- How artificial gravity is produced in a satellite orbiting around the Earth.
- What happens to the period of a simple pendulum if its length is doubled?
- Differentiate between mechanical waves and electromagnetic waves.

4- Write short answers of any six parts from the following.**2 x 6 =12**

- Under what conditions two or more sources of light behave as coherent sources?
- How would you manage to get more orders of spectra using a diffraction grating?
- Can visible light produce interference fringes? Explain.
- How the light signal is transmitted through the optical fibre?
- Why would it be advantageous to use blue light with a compound microscope?
- Specific heat of a gas at constant pressure is greater than specific heat at constant volume. Why?
- Is it possible to construct a heat engine that will not expel heat into the atmosphere?
- Can the mechanical energy be converted completely into heat energy? if so give an example.
- Define isothermal process and adiabatic process.

Section - II**NOTE: Answer any three questions from the following.****8x3=24**

- (a) How can a vector be resolved into its rectangular components? How a vector is determined if its rectangular components are given? **05**
(b) A ball is thrown with a speed of 30mS^{-1} in a direction 60° with horizontal. Calculate the range of the ball. **03**
- (a) Define absolute potential energy. Derive an expression for the absolute potential energy on the surface of the Earth, considering $r=R$ (Radius of the Earth). **05**
(b) A body of moment of Inertia $I=080\text{Kg}\text{m}^2$ about a fixed axis, rotates with a constant angular velocity of 100radS^{-1} . Calculate its angular momentum L and the torque to sustain this motion. **03**
- (a) What is "Carnot Engine"? Derive formula for its efficiency. **05**
(b) How large must a heating duct be if air moving 3.0mS^{-1} along it can replenish the air in a room of 300m^3 volume every 15min? Assume air's density remains constant. **03**
- (a) Derive Newton's formula for velocity of sound in air and describe the correction made by Laplace. **05**
(b) A simple pendulum is 50cm long. What will be its frequency of vibration at a place where $g=9.8\text{mS}^{-2}$? **03**
- (a) Explain Young's double slits experiment. Derive the relation for position of m th bright and dark fringes from the center of the screen. **05**
(b) A telescope is made of an objective of focal length 20cm and an eye piece of 5.0cm, both convex lenses. Find the angular magnification. **03**