With BISE Model Paper & 2006 Paper Lahore

# Typical Questions

## of the Textbook

# PHYSICS XI

*(Selected from different Boards)*

**Words / terms underlined are to be emphasized**

* Not included, Problems and Short Questions (of the Text book).
  For that see my books
  "Short Answers to Questions" & "Solution Hints"

* Distribution of Marks may vary from different Patterns or Schemes.

* Time management:
  Proportional time for the distribution of marks is: 1 mark ≈ 2 minutes
  e.g. for 8 marks question, you will have 16 minutes.
  For more guidelines please read my book
  "How to Pass Exams & Strengthen Memory".

**Ross Nazir Ullah**

# Measurements (Chap 1)

1. a) Express the following quantities using the prefixes:
   i) $3 \times 10^{-4}$ m  ii) $5 \times 10^{-5}$ S (2)
   b) Differentiate between Precision and Accuracy. (2)
   c) Write dimensions of i) Force, ii) Acceleration (2)

# Vectors & Equilibrium (Chap 2)

1. a) Define rectangular components of a vector. How these components are determined? Describe the addition of two vectors by their rectangular components. (1,2,5)
   b) Define couple and its arm. Find out the torque due to a couple. (4)

2. a) What are rectangular components? Determine the rectangular components of a vector $\vec{F}$ making an angle $\theta$ with x-axis. How will you find the resultant vector, if its rectangular components are given? (8)

3. a) State and explain Scalar product of two vectors. Give its any four characteristics. (8)
   b) Prove that $(\vec{A} \times \vec{B})^2 + (\vec{A} \cdot \vec{B})^2 = A^2 B^2$ (4)

4. a) By how many manners the two vectors are multiplied? (1)
   b) Define and explain vector product. Give its any four characteristics. (5)

5. a) What is scalar product and vector product? Write down the characteristics of vector product. Prove that (8)

$$\vec{A} \times \vec{B} = \begin{pmatrix} \hat{i} & \hat{j} & \hat{k} \\ A_x & A_y & A_z \\ B_x & B_y & B_z \end{pmatrix}$$

   b) Find the value of 'q' for which the following two vectors will become perpendicular to each other.

$$\vec{a} = 2\hat{i} - 4\hat{j} + 5\hat{k} \quad \& \quad \vec{b} = 13\hat{i} + q\hat{j} + 2\hat{k}$$ (4)

# Motion and Force (Chap 3)

1. a) Define Isolated System. (1)
   b) State and explain the law of conservation of linear momentum. (5)

2. a) Define elastic and inelastic collision. Derive expressions for final velocities of the two bodies after an elastic collision. (8)
   b) Discuss the four special cases for elastic collisions. (4)

3. a) What is projectile motion. Deduce equations for maximum height, range and total time of flight in case of projectile motion. Write down the application to ballistic missile. (8)
   b) If the force of gravity acts on all bodies in proportion to their masses, why does not a heavier body fall faster than a lighter body? (2)

# Work and Energy (Chap 4)

1. a) Define work and give its unit in S.I. system. Prove that: (1,1,3,3)
      i) "Work done in the earth's gravitational field is independent of the path followed".
      ii) "Work done, along a closed path in the earth's gravitational field is zero".

2. a) What is absolute potential energy? Calculate the absolute potential energy in the gravitational field. (8)
   b) A stone is taken to the bottom of a tunnel. Does the stone posses any potential energy? (2)

3. a) i) Define escape velocity. Derive relation for escape velocity and calculate its value on the earth surface. (8)
      ii) Also prove that work done on the body is equal to the change in its K.E.
   b) Explain interconversion of potential energy and kinetic energy. (5)

# Circular Motion (Chap 5)

1. a) What do you mean by instantaneous angular acceleration and centripetal acceleration? (2)
   b) What is centripetal force? Derive its formula in vector form in terms of linear velocity and angular velocity. (8)

2. a) In a satellite, what is gravity free system? (1)
   b) Describe weightlessness in the satellite. Also calculate its orbital velocity. (8)

3. a) Show that $v_{disc} > v_{hoop}$ , rolling down an inclined plane of height h. (5)
   b) Derive an expression for frequency by which space ship rotates so that astronauts feel artificial gravity like earth inside the space ship. Also calculate this frequency for a space ship having outer radius equal to 9.8 m. (5)

# Fluid Dynamics (Chap 6)

1. a) What do you mean by terminal velocity? A particle moves under gravity in air. Under what condition its velocity becomes constant? Find out the expression of this velocity in terms of mass and density. (8)
   b) State Stokes law. (1)

2. a) State and prove Equation of Continuity. (5)
   b) What is meant by fluid friction and streamline flow? (2)

3. a) State and prove Bernoulli's equation. Give its two applications. (8)
   b) What is venturi meter? Apply Bernoulli's equation on it. (2)

# Oscillations (Chap 7)

1. a) Find an expression for instantaneous velocity in case of horizontal mass spring system. (8)
   b) What does the prefix 'micro' signify in the word microwave oven? (2)

2. a) Show that the motion of projection of a particle moving along the circle is Simple Harmonic Motion. Also derive the expression for its displacement, time period and instantaneous velocity and acceleration in terms of ω. (8)
   b) What do you mean by a driven harmonic oscillator? (1)

3. a) What is the condition of SHM? (1)
   b) What is a simple pendulum? Show that its motion satisfies condition of SHM. Also calculate the time period of the simple pendulum. (5)

4. a) Define and explain resonance. (3 ½ )
   b) Prove that total energy of a body executing simple harmonic motion remains constant at every instant. (5)

# Waves (Chap 8)

1. a) State and explain principle of superposition of waves. How can this principle be applied in case of beats? (8)
   b) What is meant by quantization of frequencies? (2)

2. a) Differentiate Intensity and Loudness of sound and explain Weber-Fechner Law. Define also the unit of intensity level. (8)
   b) How Laplace corrected Newton's formula for speed of sound in air (5)

3. a) What are stationary waves? Describe the transverse stationary waves in a stretched string and show that the frequencies of stationary waves on the stretched string are quantized.
   b) Discuss three modes of vibrating air column in the organ pipe when both ends are open. (1,2,5)

4. a) State and explain Doppler's effect. Write down the four cases. Also Give its two applications. (8)
   b) State and explain the term beats. (5)

# Physical Optics (Chap 9)

1. a) Explain with diagram the second part of Huygen's Principle. (1)
   b) Explain the Young's Double Slit Experiment mathematically with diagram and geometry. (5)

2. a) Give the construction theory and use of plane diffraction grating. (8)
   b) What is a Polaroid. Give its two uses. (3)

3. a) Explain interference of light through thin films of uniform and variable thickness. How this idea leads to the formation of Newton's rings. Explain with the help of experimental arrangement. (2,2,4)
   b) Describe the account for the interference phenomenon which can be seen when a convex lens is pressed against a glass plate. Under what conditions interference of light can take place? (3 ½ )

# Optical Instruments (Chap 10)

1. a) Define linear magnification and angular magnification. Find expression for angular magnification of simple microscope. (8)
   b) Why is a convex lens of small focal length preferred for magnifying glass? (2)

2. a) Calculate angular magnification of a compound microscope with the help of a neat diagram. (8)
   b) Explain the construction and working of a compound microscope. Derive expression for its magnification. (5)

3. a) Define magnifying power and write its units. (2)
   b) Explain with diagram the construction and working of astronomical telescope. Also find its magnifying power. (5)

4. a) What are different types of optical fibres? Which type is useful for long distance applications for white light? (8)
   b) What is the principle of fibre optics? How the power is lost in the optical fibre through dispersion? Explain. (3 ½ )

# Heat & Thermodynamics (Chap 11)

1. a) Write down the basic postulates of Kinetic theory of gases and derive the relation for pressure of a gas. (8)
   b) Define temperature in the light of Kinetic theory of gases. Also derive Charles's Law. (5)

2. a) State and explain 1st Law of Thermodynamics. Give its two applications. (8)
   b) Prove that $C_p - C_V = R$ (5)

3. a) Define molar specific heat at constant volume and molar specific heat at constant pressure. (5)
   b) Does the entropy of system increase or decrease due to friction? (2)

4. a) State and explain 2nd Law of Thermodynamics. (2)
   b) Show that no heat engine can be more efficient than a Carnot engine operating between the same two temperatures. (8)

5. a) Explain the working of petrol engine and diesel engine. (5)
   b) How can you relate entropy with 2nd Law of Thermodynamics? (5)

**(Academic Sessions 2003-2005, 2004-2006 & 2005-2007 )**

PHYSICS 206-(INTER PART – I ) ROLL NO : (In Figures ) _____

PAPER – I (Objective Type) (In Words) _____

Write Serial No. of your answer book _____

Time Allowed : 45 Minutes
Maximum Marks : 29

Signature of Deputy Supdt._____

Note : Use this paper to write the answers to the objective questions. No mark will be awarded for cutting, over-writing or using a pencil. This paper must be tagged with the answer-book.

Some possible answers to each statement are given below. Tick (✓) mark the correct answer : 10

(i) The distance between a node and antinode is : ( $\lambda$ , $\frac{\lambda}{2}$ , $\frac{\lambda}{4}$ , $\frac{3\lambda}{2}$ )

(ii) If $|\vec{a} + \vec{b}| = |\vec{a} - \vec{b}|$ then angle between $\vec{a}$ and $\vec{b}$ is : ( $90^o$ , $0^o$ , $180^o$ , $45^o$ )

(iii) Energy stored in winding spring :

( Elastic P.E. , K.E. , Solar Energy , Electrical Energy )

(iv) Angular velocity of vibrating body is given by :

( $w = \frac{k}{m}$ , $w = \frac{\sqrt{k}}{m}$ , $w = \sqrt{\frac{k}{m}}$ , $w = \frac{k}{\sqrt{m}}$ )

(v) Human Blood-Pressure is measured in : ( $N\text{-}m^{-2}$ , mm , Pascal , cm )

(vi) Isothermal process is carried out at constant :

( Volume. , Pressure , Energy. , Temperature )

(vii) $\hat{i} \cdot (\hat{j} \times \hat{k})$ is equal to : ( $\hat{k}$ , 2 , 1 , 0 )

(viii) The slope of velocity time graph gives :

( Distance , Area , Acceleration , Speed )

(ix) The total base quantities are : ( 9 , 7 , 3 None )

(x) If focal length is 5 cm then power of a lens is : ( 5 , 10 , 15 , 20 )

Complete the following sentences : 10

(i) A precise measurement is one which has _____ precision.

(ii) Force is equal to change in _____ per second.

(iii) Speed of geostationery satellite is always equal to _____ speed.

(iv) The spring of spring constant K is cut into two pieces, then spring constant of each spring is _____

(v) The sky is blue due to _____

(vi) Entropy measures _____

(vii) The minimum number of unequal forces whose vector sum is zero is _____

( Turn Over )

8. (viii) A crest travelling from rarer medium to denser medium is reflected as _____

(ix) Cladding is layer of _____ refractive index over the core

(x) The ratio of orbital to escape velocity is _____

9. Match the column A with column B and write correct answer in column C :

| Column A | Column B | Column C |
|---|---|---|
| Mass is | Zero | |
| $\hat{j} \times \hat{j}$ | Projectile | |
| Motion in two dimensions | Base unit | |
| Dimensions of work | $ML^2 T^{-2}$ | |
| Power is a | Unity | |
| | $2\pi$ radian | |
| | $ML T^{-2}$ | |
| | Scalar quantity | |

| Column A | Column B | Column C |
|---|---|---|
| Angular frequency | $f\lambda$ | |
| Wave speed | $2\pi f$ | |
| Grating element | $L \times N$ | |
| $C_p - C_v$ | $L / N$ | |
| | R | |
| | k | |

ROLL NO. _____ (To be filled in by the candidate)

PHYSICS **(Academic Sessions 2003-2005 , 2004-2006 & 2005-2007 )**

206 (INTER PART-I) Time Allowed : 1.45 hours

PAPER – I (Essay Type) Maximum Marks : 46

Note : All questions are attempted on the answer book.

## SECTION – I

1. Write any EIGHT short answers of the following questions : 16

(i) The period of a simple pendulum is measured by a stop watch. What types of errors are possible?

(ii) Can a body rotate about its center of gravity under the action of its weight?

(iii) A boy uses a catapult to throw a stone which accidently smashes a green house window. List the possible energy changes.

(iv) A disc and a hoop start moving down from the top of an inclined plan at the same time. Which one will be moving faster on reaching the bottom? Explain.

(v) Two row boats moving parallel in the same direction are pulled towards each other. Explain.

(vi) If a mass spring system is hung vertically and set into oscillations, why does the motion eventually stop?

(vii) How do beats useful in tuning a musical instrument ?

(viii) How would you manage to get move orders of spectra using a diffraction grating?

(ix) Could you obtain Newton's rings with transmitted light? Explain.

(x) Why objective of short focal length is preferred in microscope?

(xi) What happens to the temperature of the room, when an air conditioner is left running on a table in the middle of the room?

(xii) Give an example of a natural process that involves an increase in entropy.

## SECTION – II

2. Attempt any THREE questions.

(a) By how many manners the two vectors are multiplied? 1

(b) Define and explain vector product. Give its any four characteristics. 5

(c) Find the angle between following vectors : 4

$$\vec{A} = 5\hat{i} + \hat{j}$$
$$\vec{B} = 2\hat{i} + 4\hat{j}$$

(Turn Over)

3. (a) Define escape velocity.

   (b) Explain interconversion of potential energy and kinetic energy.

   (c) Ten bricks, each 6 cm thick and mass 1.5 kg lie flat on a table. How much work is required to stock them one on the top of another?

4. (a) Define phase.

   (b) Prove that total energy of a body executing simple harmonic motion remains constant at every instant.

   (c) An 8.0 kg body executes SHM with amplitude 30 cm. The restoring force is 60 N when the displacement is 30 cm. Find its period of oscillation.

5. (a) Define transverse waves.

   (b) Explain the formation of beats with one use.

   (c) The frequency of the note emitted by a stretched string is 300 Hz. What will be the frequency of this note when the tension is increased by one-third without changing the length of the wire.

6. (a) What is entropy?

   (b) Explain the working of petrol engine and diesel engine.

   (c) Calculate the entropy change when 1.0 kg ice at 0 °C melts into water at 0 °C. Latent heat of fusion $L_f = 3.36 \times 10^5$ J $Kg^{-1}$.

# MODEL PAPER "PHYSICS"

## Intermediate Part - I Examination, 2007

## (Academic session 2006 - 2008)

Roll No.
In Figures _____
In Words _____

## OBJECTIVE

**Time : 20 minutes** **Marks : 17**

**Note : Write your Roll No. in the space provided. Cutting, overwriting erasing, using lead pencil will have no credit.**

**Q.No. 1 Each question has FOUR possible answers. Select the correct answer and encircle it.**

**(i) The dimensions of moment of inertia are**

(a) $ML^{-2}$ (b) $ML^2$ (c) $M^2L$ (d) ML

**(ii) The resultant of two forces 10N and 8N cannot be**

(a) 2N (b) 18N (c) 10N (d) 12N

**(iii)** $\hat{i} . (\hat{j} \times \hat{k}) =$ ----------

(a) $\hat{i}$ (b) $\hat{j}$ (c) $\hat{k}$ (d) 1

**(iv) The velocity – Time graph is parallel to Time – axis, the acceleration of the moving body is**

(a) Positive (b) Negative (c) Zero (d) Maximum

**(v) A body of weight 5N falls through a height of 10m. Its energy 5m above ground is**

(a) 25N (b) 50N (c) both 'a' and 'b' (d) 75N

**(vi) The ωt of man in an elevator moving down with an acceleration $9.8ms^{-2}$ will become**

(a) half (b) double (c) unchanged (d) zero

**(vii) The moment of linear momentum is called**

(a) Impulse (b) Torque
(c) Angular momentum (d) Couple

**(viii) High concentration of red blood cells increases the viscosity of blood from**

(a) 2 – 3 times that of water (b) 3 – 4 times that of water
(c) 3 – 5 times that of water (d) 4 – 5 times that of water

(ix) **The product of time-period and frequency is equal to**

(a) 3 (b) 2 (c) 1 (d) 0

(x) **The velocity of sound in Hydrogen as compared to Oxygen under similar conditions is**

(a) $\frac{1}{4}$ the velocity in $O_2$ (b) Four times the velocity in $O_2$

(c) $\frac{1}{2}$ the velocity in $O_2$ (d) Two times the velocity in $O_2$

(xi) **When two notes of frequencies $f_1$ and $f_2$ are sounded together, beats are formed. If $f_1 > f_2$, then frequency of beats is**

(a) $f_1 + f_2$ (b) $f_1 - f_2$ (c) $\frac{f_1 + f_2}{2}$ (d) $\frac{f_1 - f_2}{2}$

(xii) **Light from sun reaches the earth in the form of**

(a) cylindrical wave front (b) spherical wave front

(c) plane wave front (d) all of the above

(xiii) **The central part of Newton's Rings when observed with reflected light is dark due to the reason that**

(a) The part of ray reflected from upper surface of convex lens undergoes a phase shift of 180°.

(b) The reflection from upper surface of air film undergoes a phase shift of 180°.

(c) The reflection from lower surface of air film undergoes a phase shift of 180°.

(d) ali of above

(xiv) **A double convex lens acts as a diverging lens when the object is**

(a) Inside the focus (b) away from 2f

(c) between f and 2f (d) on 2f

(xv) **Least distance of distinct vision**

(a) Increases with increase of age. (b) Remain same with increase of age.

(c) Decrease with increase of age. (d) all of these

(xvi) **The temp scale which is independent of the nature of the substance used in thermometer is called**

(a) Centigrade scale (b) Fahrenheit scale

(c) Kelvin or absolute scale (d) Thermodynamic scale

(xvii) **Which of the following process is irreversible**

(a) slow compression of an elastic spring.

(b) Slow evaporation of a substance in an isolated vessel.

(c) Slow compression of a gas.

(d) A chemical explosion.

# MODEL PAPER "PHYSICS"

## Intermediate Part - I Examination, 2007

## (Academic session 2006 - 2008)

## SUBJECTIVE

**Time : 2.10 Hours** **Marks = 68**

**Note : Attempt any TWENTY TWO (22) questions from Section - I and any THREE questions from Section - II.**

## SECTION - I

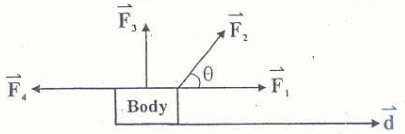
**Q.No. 2 Write short answers to any twenty two of the following questions.** **(2 × 22 = 44) Marks**

(i) Name the two physical quantities which have the same dimensional formula. Write their dimensions also.

(ii) Find the dimensions of η in the relation $F = 6\pi\eta rv$, r = radius and v = velocity.

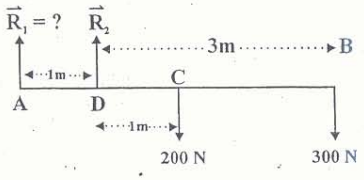
(iii) Write the name of two supplementary units and define than.

(iv) In Fig. which force will give max. work and why?

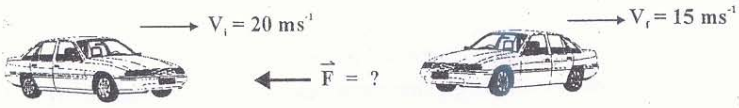



(v) Given that $\vec{A} = \hat{i} - 2\hat{j} + 3\hat{k}$ and $\vec{B} = 3\hat{i} - 4\hat{k}$, find the length of the projection of $\vec{A}$ on $\vec{B}$.

(vi) Find the value of unknown force $\vec{R}_1$ in the figure. (Rod AB is pivot at point D) Using 2nd condition of equilibrium.




(vii)

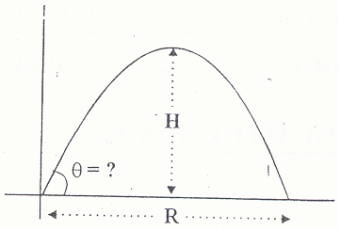



Mass = 1500 kg after 3 sec

In figure the velocity of car is reduced due to the retarding force $\vec{F}$, find its value.

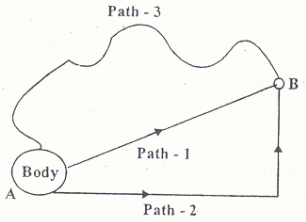
(viii) Define impulse and show that how it is related to linear momentum?

(ix) In figure, maximum height and horizontal range are equal, find the angle of projection of projectile.

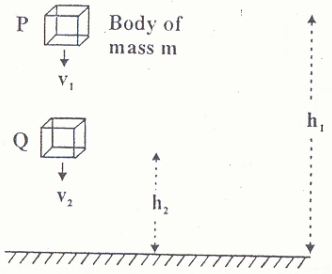



(x) Prove that power is a scalar product of force and velocity.

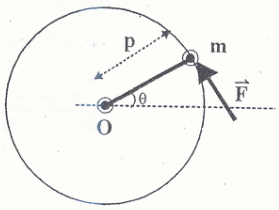
(xi) In figure, there are three paths between points A and B on which path the work done in moving a body from A to B will be maximum or remain same.




(xii) A body of mass m is falling down with velocity $V_1$ and at a height $h_1$ from a point P. If there is no frictional force, write the work - energy Eqn for the body at point Q.




(xiii) Figure shows a mass m attached to a massless rod at 0 (pivot point). A force $\vec{F}$ is applied on it as shown. Find the value of TORQUE in terms of moment of inertia I and angular acceleration $\alpha$.




(xiv) A 1000 kg car traveling with a speed of 144 $kmh^{-1}$ round a curve of radius 100m. Find the necessary centripetal force.

(xv) Describe what should be the minimum velocity for a satellite, to orbit close to the earth around it.

(xvi) State the Torricellis' Theorem with diagram.

(xvii) Explain the difference between laminar flow and Turbulent flow.

(xviii) Two row boats moving parallel in the same direction are pulled towards each others. Explain?

(xx) A mass m is attached with a spring and pulled slowly through $x_o$ against the elastic resoring force F, using Hook's Law, calculate the work done in displacing the mass and hence calculate elastic PE of the spring.

(xxi) Explain S.H Motion for a body of mass m, attached with a spring of spring constant k.

(xxii) Explain the terms crest, trough, node and antinode.

(xxiii) Name the three important cases of super position of two waves when act simultaneously upon the particles of medium.

(xxiv) What is Doppler effect?

(xxv) Draw the diagram of Michelson's Interferometer and write the equation by which we can find the displacement L of the mirror.

(xxvi) Define Grating element.

(xxvii) How is the distance between interference fringes affected by the separation between the slits of Young's Experiment?

(xxviii) Draw the Ray-diagram of a compound Microscope.

(xxix) How the magnification of (i) Simple microscope and (ii) Astronomical Telescope changes by descreasing the focal length of an eye piece, Explain.

(xxx) Name the three types of optical fibres.

(xxxi) State Ist law of Thermodynamics, with sign convension.

(xxxii) Why $C_p > C_v$?

(xxxiii) Explain the principle of Heat engine with diagram.

## SECTION - II

**Note : Attempt any three questions. All questions carry equal marks.**
**$(3 \times 8 = 24)$**

Q.No. 3 (a) Define VECTOR PRODUCT of two vectors with two examples. State right hand rule. Show that $\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$

(b) Find the angle between two vectors, $\vec{A} = 5\hat{i} + \hat{j}$ and $\vec{B} = 2\hat{i} + 4\hat{j}$.

Q.No.4 (a) Derive an expression for CENTRIPETAL Force.

(b) What is the least speed at which an aeroplane can execute a vertical loop of 1.0 km radius so that there will be no tendency for the pilot to fall down at the highest point.

Q.No.5 (a) State and prove Bernoullis Theorem.

(b) How large must a heating duct be if air moving 3.0 $ms^{-1}$ along it can replenish the air in a room of 300 $m^3$ volume every 15 min?

Q.No.6 (a) Give drawback of Newton's formula for velocity of sound. How was corrected by Laplace.

(b) Find the temperature at which the velocity of sound in air is two times its velocity at 0°C.

Q.No.7 (a) Prove that $C_p - C_v = R$

(b) A cannot engine whose low temperature reservoir is at 7°C has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees, the temperature of the hot source be increased?