M. C. Qs.

of the Textbook

PHYSICS XI

Chapter Wise Multiple Choice Questions

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PAGE

Measurements (Chapter 1)

Q. No. 1. *Select the correct answer and encircle it.*

i) The branch of Physics which is concerned with the ultimate particles of which the matter is composed of is called,
(a) Atomic physics (b) Nuclear physics (c) Plasma physics (d) Particle physics

ii) Computer chips are made of,
(a) germanium (b) silicon (c) cadmium (d) cobalt

iii) Electromagnetic theory was proposed by,
(a) Faraday (b) Maxwell (c) Young (d) Bohr

iv) Cathode rays were discovered in 1878 by,
(a) Crooks (b) Roentgen (c) J.J.Thomson (d) Newton

v) The first book of physics was written by,
(a) Maxwell (b) Newton (c) Faraday (d) Aristotle

vi) The velocity of light was determined accurately by,
(a) Newton (b) Michelson (c) Young (d) Fresnel

vii) The concept of an atom with central nucleus was introduced by,
(a) De Broglie (b) Bohr field (c) Rutherford (d) J. J. Thomson

viii) Neutron was discovered by,
(a) Curie (b) Fermi (c) Lawrence (d) Chadwick

ix) Quantum Mechanics was introduced by,
(a) G. P. Thomson (b) De Broglie (c) Heisenbergs (d) Max Plancks

x) Transistor was invented by,
(a) Edison (b) Bardeen (c) Thomson (d) Faraday

xi) X-rays were discovered by,
(a) Crookes (b) Lorentz (c) Roentgen (d) J. J. Thomson

xii) Who was the most outstanding theoretical physicist?
(a) Daniel (b) Maxwell (c) Ampere (d) Young

xiii) The base units in S.I. system are,
(a) four (b) five (c) six (d) seven

xiv) The S.I. unit of solid angle is,
(a) degree (b) radian (c) steradian (d) candela

xv) Light year is unit of,
(a) time (b) light (c) radiation (d) distance

xvi) One light year is equal to,
(a) 9.46×10^{15} cm (b) 9.46×10^{15} m (c) 9.46×10^{15} km (d) 7.88×10^{14} m

xvii) S.I. unit of force is,
(a) Joule (b) Watt (c) Newton (d) Joule-second

xviii) One atto is equal to,
(a) 10^{-10} (b) 10^{-12} (c) 10^{-15} (d) 10^{-18}

xix) One femto is equal to,
(a) 10^{-12} (b) 10^{-15} (c) 10^{-18} (d) 10^{-21}

xx) The scientific notation of number 0.0023 is expressed as,
(a) 2.3×10^{-3} (b) 23×10^{-4} (c) 0.23×10^{-2} (d) 0.023×10^{-1}

xxi) Significant figures in 0.0010 are,
(a) one (b) two (c) three (d) four

xxii) The systematic error may occur due to,
(a) zero error of instrument (b) poor calibration of the instrument
(c) incorrect marking (d) all of these

xxiii) A precise measurement is the one which has,
(a) max precision (b) absolute precision (c) less precision (d) none of these

xxiv) The dimensions of pressure are,
(a) MLT (b) $ML^{-1}T^{-1}$ (c) $ML^{-1}T^{-2}$ (d) $ML^{2}T^{-2}$

xxv) The dimensions of angular momentum are,
(a) $ML\,T^{-2}$ (b) $ML\,T^{-1}$ (c) $ML^{2}T^{-1}$ (d) $ML^{-1}T^{-1}$

xxvi) The dimensions of work are,
(a) $ML\,T^{2}$ (b) $ML^{2}T^{-1}$ (c) $ML^{2}T^{-2}$ (d) $ML^{-1}T^{-1}$

xxvii) The dimensions of power is,
(a) $ML^{2}T^{-2}$ (b) $ML^{2}T^{-1}$ (c) $ML^{-1}T^{-1}$ (d) $ML^{2}T^{-3}$

xxviii) The dimensions of density are,
(a) ML^{-2} (b) ML^{-3} (c) ML^{3} (d) $M^{2}L^{2}$

xxix) The dimensions of viscosity are,
(a) $ML^{-1}T^{-1}$ (b) $ML^{-1}T^{-2}$ (c) $ML^{-2}T^{-2}$ (d) $ML^{-1}T^{-2}$

xxx) The dimensions of gravitational constant are,
(a) $ML^{-1}T^{-2}$ (b) $M^{-1}L^{3}T^{-2}$ (c) $ML^{-2}T^{-2}$ (d) $ML^{-2}T^{-1}$

xxxi) The dimensions of moment of inertia are,
(a) ML^{2} (b) ML^{-2} (c) ML (d) $M^{2}L^{2}$

Vectors & Equilibrium (Chapter 2)

Note: *Select the correct answer and encircle it.*

i) Which of the following is dimensionless quantity,
(a) displacement (b) impulse (c) work (d) angle

ii) An example of scalar quantity is,
(a) torque (b) velocity (c) energy (d) acceleration

iii) A unit vector represents,
(a) magnitude of a vector (b) direction of a vector
(c) neither magnitude nor direction (d) none of these

iv) The angle between two rectangular components of any vector is,
(a) 30^0 (b) 60^0 (c) 90^0 (d) 120^0

v) The position vector of a point in (X-Z) plane is given by,
(a) $\vec{r} = y\hat{i} + z\hat{k}$ (b) $\vec{r} = x\hat{i} + y\hat{k}$ (c) $\vec{r} = x\hat{i} + z\hat{k}$ (d) $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$

vi) If the resultant of two forces each of magnitude $\vec{F}$ is also $\vec{F}$, then angle between them is,
(a) 0^0 (b) 30^0 (c) 60^0 (d) 120^0

vii) The minimum number of an equal forces whose vector sum can be zero is,
(a) 1 (b) 2 (c) 3 (d) 4

viii) If a force of 10 N makes an angle of 30^0 with x-axis, its y-component is given by,
(a) 0 N (b) 5 N (c) 8.66 N (d) 7.07 N

ix) Two forces each of 10 N magnitude act on a body. If the forces are inclined at 30^0 and 60^0 with x-axis, then the x-component of their resultant is,
(a) 10 N (b) 20 N (c) 13.66 N (d) 1.366 N

x) The resultant of two forces 5 N and 12 N making an angle 90^0 with each other is,
(a) 17 N (b) 7 N (c) 13 N (d) 15 N

xi) The angle between the two vectors $\vec{A} = 5\hat{i} + \hat{j}$ & $\vec{B} = 3\hat{i} + 2\hat{j}$ is,
(a) 30^0 (b) 45^0 (c) 52^0 (d) 60^0

xii) When $\vec{A} \cdot \vec{B} = 0$ then the two vectors are,
(a) perpendicular (b) parallel (c) anti-parallel (d) none of these

xiii) The dot product of vector $\vec{A}$ with itself $\vec{A} \cdot \vec{A}$ is equal to,
(a) A/2 (b) A (c) 2A (d) A^2

xiv) If $\vec{A} \cdot \vec{B} = \vec{B} \cdot \vec{A}$, the scalar product is,
(a) additive (b) associative (c) commutative (d) multiplicative

xv) The cross product of two vectors $\vec{F}$ with itself $\vec{F} \times \vec{F}$ is,
(a) 1 (b) F^2 (c) $2\vec{F}$ (d) zero

xvi) The magnitude of vector $\vec{A} = 2\hat{i} - 2\hat{j} + \hat{k}$ is,

(a) 1 (b) 2 (c) 3 (d) 5

xvii) The cross product of two vectors is a negative vector when the angle between them is,

(a) 0^0 (b) 90^0 (c) 180^0 (d) 270^0

xviii) If $\vec{A} \times \vec{B} = \vec{C}$ points along z-axis, then the vector $\vec{A}$ and $\vec{B}$, must be in,

(a) yz plane (b) zx plane (c) xy plane (d) xθ plane

xix) Which of the following is correct,

(a) $\vec{A} \times \vec{B} = -\vec{B} \times \vec{A}$ (b) $\vec{A} \times \vec{B} = \vec{B} \times \vec{A}$ (c) $\vec{A} \times \vec{B} = -\vec{C}$ (d) $\vec{A} \times \vec{B} \neq \vec{B} \times \vec{A}$

xx) The dot product $\hat{i} \cdot \hat{i} = \hat{j} \cdot \hat{j} = \hat{k} \cdot \hat{k}$ is equal to,

(a) 0 (b) –1 (c) 1 (d) i^2

xxi) The cross product $\hat{i} \times \hat{i} = \hat{j} \times \hat{j} = \hat{k} \times \hat{k}$ is equal to,

(a) 0 (b) i (c) 1 (d) –1

xxii) $(\hat{i} \times \hat{j}) \cdot (\hat{k})$ is equal to,

(a) k (b) k^2 (c) 1 (d) –1

xxiii) The cross product of $\hat{k} \times \hat{j}$ is equal to,

(a) $\hat{i}$ (b) $-\hat{i}$ (c) 1 (d) –1

xxiv) The perpendicular distance between the line of action of force and axis of rotation is called,

(a) torque (b) moment arm (c) moment of a force (d) displacement

xxv) The torque has a zero value. If the angle between $\vec{r}$ and $\vec{F}$ is,

(a) 0^0 (b) 30^0 (c) 60^0 (d) 90^0

xxvi) The torque is also called as,

(a) moment of a force (b)moment of inertia (c) moment arm (d) angular velocity

xxvii) Two equal and opposite forces acting on a body form a,

(a) torque (b) couple (c) moment arm (d) linear momentum

xxviii) A body will be in rotational equilibrium. If,

(a) $\Sigma\vec{F} = 0$ (b) $\Sigma\tau = 0$ (c) $\Sigma\vec{P} = 0$ (d) $\Sigma\vec{L} = 0$

xxix) If $\vec{A} = 2\hat{i} + \hat{j} + 2\hat{k}$ then $|\vec{A}|$ is,

(a) 0 (b) 3 (c) 5 (d) 9

xxx) Angular momentum of a particle when $\vec{r} = 4$ cm and $\vec{p} = 2$ N-sec and the angle between $\vec{r}$ and $\vec{p}$ is 30^0,

(a) 2 kg m^2 s^{-1} (b) 4 kg m^2 s^{-1} (c) 8 kg m^2 s^{-1} (d) 12 kg m^2 s^{-1}

Motion and Force (Chapter 3)

Note: *Select the correct answer and encircle it.*

i) The change in position of a body from its initial position to final position is called,
(a) speed (b) velocity (c) acceleration (d) displacement

ii) A body moving with uniform velocity has acceleration,
(a) zero (b) positive (c) negative (d) infinite

iii) The velocity-time graph is parallel to time axis, the acceleration of the moving body is,
(a) maximum (b) negative (c) positive (d) zero

iv) If a car moves with uniform acceleration, then the area between the velocity time graph and the time axis is equal to,
(a) force (b) velocity (c) acceleration (d) distance covered

v) When the value of average velocity and instantaneous velocity are equal, then the body is said to be moving with,
(a) average acceleration (b) uniform acceleration
(c) negative acceleration (d) positive acceleration

vi) Acceleration of bodies of different masses, allowed to fall freely is,
(a) variable (b) the same (c) different for different heights
(d) different for different bodies

vii) Distance covered by freely falling body in 2 seconds is,
(a) 4.9 m (b) 19.6 m (c) 39.2 m (d) 44.1 m

viii) The property of the body due to which it opposes its state of rest or of uniform motion is called,
(a) momentum (b) torque (c) weight (d) inertia

ix) Pull of Earth on a mass 20 kg on the surface of Earth is ,
(a) 19.6 N (b) 196 N (c) 392 N (d) 1960 N

x) A force of 500 N acts on a body for 10 seconds. What will be the change in momentum,
(a) 250 N (b) 500 N (c) 750 N (d) 1000 N

xi) A body is thrown vertically upward with an initial velocity 9.8 ms^{-2} . It will reach the height,
(a) 4.9 m (b) 9.8 m (c) 19.8 m (d) 29.4 m

xii) The path of the projectile is,
(a) straight line (b) circle (c) parabola (d) hyperbola

xiii) Motion of the projectile is,

(a) one dimensional (b) two dimensional (c) three dimensional
(d) four dimensional

xiv) A bomber drops its bomb when it is vertically above the target. It misses the target due to,

(a) horizontal component of the velocity (b) vertical component of the velocity
(c) air resistance (d) pull of gravity

xv) The time of flight of a projectile is,

(a) $\frac{v_i^2 \sin^2\theta}{g}$ (b) $\frac{v_i^2 \cos^2\theta}{g}$ (c) $\frac{v_i^2 \sin^2\theta}{2g}$ (d) $\frac{2v_i \sin\theta}{g}$

xvi) The horizontal range of the projectile is maximum when it is projected at an angle of,

(a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0

xvii) The maximum vertical height is,

(a) $\frac{v_i^2 \sin^2\theta}{g}$ (b) $\frac{v_i \sin\theta}{2g}$ (c) $\frac{v_i^2 \cos^2\theta}{g}$ (d) $\frac{v_i^2 \sin^2\theta}{2g}$

xviii) To improve the span of the jump, one should jump at an angle of,

(a) 30^0 (b) 45^0 (c) 60^0 (d) 90^0

xix) The horizontal component of a projectile moving with initial velocity 500 ms^{-1} at an angle of 60^0 with x-axis is equal to,

(a) zero (b) 250 ms^{-1} (c) 500 ms^{-1} (d) 1000 ms^{-1}

xx) In a projectile motion, the horizontal range depends upon,

(a) initial velocity (b) angle of projection
(c) both initial velocity and angle of projection (d) none of these

xxi) Dimensions of impulse is similar to the dimension of,

(a) work (b) force (c) torque (d) momentum

xxii) An unpowered and unguided missile is called a,

(a) simple missile (b) plastic missile (c) ballistic missile (d) unguided missile

xxiii) The ballistic missiles are used only for,

(a) long ranges (b) short ranges (c) medium ranges (d) none of these

Work and Energy (Chapter 4)

Note: *Select the correct answer and encircle it.*

i) The work done will be negative of the angle between $\vec{F}$ and $\vec{d}$ is,
(a) 0^0 (b) 45^0 (c) 90^0 (d) 180^0

ii) The dimensions of power are,
(a) MLT^{-1} (b) ML^2T^{-2} (c) ML^2T^{-1} (d) ML^2T^{-3}

iii) A field in which the work done in moving a body along a closed path is zero is called,
(a) electric field (b) nuclear field (c) electromagnetic field
(d) conservative field

iv) Which of the following force cannot do any work on the particle on which it acts,
(a) frictional force (b) gravitational force (c) electrostatic force
(d) centripetal force

v) If a body of mass 1 kg is raised vertically through 2 m then the work done will be,
(a) 19.6 J (b) 39.2 J (c) 9.8 J (d) 4.9 J

vi) The relationship between horse power and watt is,
(a) 1 hp = 546 watt (b) 1 hp = 646 watt
(c) 1 hp = 746 watt (d) 1 hp = 846 watt

vii) The kinetic energy of m = 2 kg moving with a velocity of 4 ms^{-1} has KE equal to,
(a) 4 J (b) 8 J (c) 12 J (d) 16 J

viii) The scalar product of force and velocity is ,
(a) work (b) power (c) momentum (d) energy

ix) The consumption of energy in 60 watt bulb is ,
(a) 30 J (b) 60 J (c) 90 J (d) 120 J

x) The escape velocity on the surface of the Earth is given by the formula,
(a) $\sqrt{gR_e}$ (b) $\sqrt{\frac{1}{2}gR_e}$ (c) $\sqrt{2gR_e}$ (d) $\sqrt{\frac{3}{4}gR_e}$

xi) The ratio between orbital speed and escape velocity is,
(a) $\frac{1}{\sqrt{2}}$ (b) 1 (c) $\sqrt{2}$ (d) 2

xii) 25000 watt power is equal to,
(a) 30.5 hp (b) 33.5 hp (c) 38.5 hp (d) 40 hp

xiii) The dimensions of impulse are the same as that of,
(a) work (b) energy (c) power (d) momentum

xiv) Tarbela Dam on a river produces electricity,
(a) 1600 mega watt (b) 1750 mega watt
(c) 1850 mega watt (d) 1900 mega watt

xv) The energy stored in a dam is,
(a) PE (b) KE (c) heat energy (d) nuclear energy

xvi) Solar cells are made from the material called,
(a) carbon (b) hydrocarbon (c) iron (d) silicon

xvii) One kilowatt hour is equal to,
(a) 3.6 MJ (b) 7.2 MJ (c) 10.8 MJ (d) 14.4 MJ

xviii) If the speed of the moving body is doubled its KE is,
(a) halved (b) doubled (c) unchanged (d) four times

xix) Earth receives a large amount of energy directly from,
(a) wind (b) moon (c) sun (d) water

xx) Solar energy at normal incidence outside the Earth's atmosphere is about,
(a) 1.4 KWm^{-2} (b) 1.6 KWm^{-2} (c) 1.8 KWm^{-2} (d) 1 KWm^{-2}

Circular Motion (Chapter 5)

Note: *Select the correct answer and encircle it.*

i) The angle subtended at the center of the circle by an arc equal to its radius is called,
(a) one degree (b) one revolution (c) half rotation (d) one radian

ii) One radian is equal to,
(a) 57.3^0 (b) 60^0 (c) 67.3^0 (d) 87.3^0

iii) When a body moves in a circle, the angle between the linear velocity and angular velocity ω is always,
(a) 0^0 (b) 45^0 (c) 90^0 (d) 180^0

iv) The dimension of angular velocity is,
(a) T^{-1} (b) LT^{-1} (c) LT^{-2} (d) L^{-1}

v) When an object moves with uniform speed in a circular orbit, its centripetal acceleration must be directed,
(a) along the direction of motion (b) towards the center along the radius
(c) away from center along the radius (d) opposite to the motion of the body

vi) When a body is whirled in a horizontal circle by means of a string, the centripetal force is supplied by,
(a) mass of the body (b) velocity of the body
(c) tension in the string (d) centripetal acceleration

vii) Centripetal force performs,
(a) minimum work (b) no work (c) maximum work (d) negative work

viii) If a car moves with a uniform speed of 2 ms^{-1} in a circle of radius 0.4 m. Its angular speed is,
(a) 1.6 rad s^{-1} (b) 2.8 rad s^{-1} (c) 4 rad s^{-1} (d) 5 rad s^{-1}

ix) When a body is whirled in a vertical circle by means of a string, the tension is maximum at,
(a) at the top (b) at the bottom (c) at the horizontal (d) at center of diameter

x) A stone is whirled in a vertical circle at the end of the string. When the stone is at highest position the tension in the string is,
(a) minimum (b) maximum (c) zero (d) infinite

xi) The angular speed for daily rotation of Earth in rad s^{-1} is,
(a) π (b) 2π (c) 4π (d) 7.3×10^{-5} rad s^{-1}

xii) The angular momentum $\vec{L}$ is defined by the equation,
(a) $\vec{L} = m\vec{v}$ (b) $\vec{L} = \vec{r} \times \vec{F}$ (c) $\vec{L} = \vec{p} \times \vec{r}$ (d) $\vec{L} = \vec{r} \times \vec{p}$

xiii) The alternate unit of angular momentum are given by,
(a) J-m (b) $J\text{-}s^{-1}$ (c) J-s (d) $J\text{-}s^{-2}$

xiv) Angular momentum of a body under central force is,
(a) minimum (b) maximum (c) constant (d) zero

xv) S.I. unit of moment of inertia is,
(a) $kg\ m^{-1}$ (b) $kg\ m^{-2}$ (c) $kg\ m^2$ (d) kg m

xvi) The value of g at the center of the Earth is,
(a) maximum (b) minimum (c) zero (d) infinite

xvii) Angular momentum of a particle when r = 4 m, p = 2 N s and the angle between $\vec{r}$ and $\vec{p}$ is 30^0 is,
(a) $2\ kg\ m^2\ s^{-1}$ (b) $4\ kg\ m^2\ s^{-1}$ (c) $8\ kg\ m^2\ s^{-1}$ (d) $12\ kg\ m^2\ s^{-1}$

xviii) The value of g at a height equal to the radius of the Earth from its surface is,
(a) $g' = g$ (b) $g' = \frac{g}{2}$ (c) $g' = \frac{g}{4}$ (d) $g' = \frac{g}{9}$

xix) A man in an elevator, ascending with an acceleration will conclude that his weight has,
(a) remains constant (b) increased (c) decreased (d) reduced to zero

xx) Minimum number of communication satellites required to cover the whole Earth is,
(a) 2 (b) 3 (c) 4 (d) 5

xxi) A man of 100 kg is standing on an elevator. The net force on the man when elevator is going down with an acceleration of 4 ms^{-2} would be,
(a) 580 N (b) 680 N (c) 500 N (d) 100 N

xxii) The frequency of rotation of a space ship about its own axis to create artificial gravity like that on the Earth is,
(a) $f = \frac{1}{2\pi}\sqrt{\frac{R}{g}}$ (b) $f = \frac{1}{2\pi}\sqrt{\frac{g}{R}}$ (c) $f = \frac{1}{2\pi}\sqrt{\frac{g}{R^2}}$ (d) $f = 2\pi\sqrt{\frac{g}{R}}$

xxiii) The linear velocity of a disc moving down an inclined plane is,
(a) $\sqrt{\frac{1}{2}gh}$ (b) $\sqrt{gh}$ (c) $\sqrt{\frac{2}{3}gh}$ (d) $\sqrt{\frac{4}{3}gh}$

xxiv) One communication satellite covers a longitude of,
(a) 90^0 (b) 120^0 (c) 270^0 (d) 360^0

xxv) The diver spins faster when moment of inertia becomes,
(a) smaller (b) greater (c) constant (d) none of these

xxvi) Einstein theory states that bodies and light rays move along,
(a) geo disc (b) force of gravity (c) both a & b (d) none of these

Fluid Dynamics (Chapter 6)

Note: *Select the correct answer and encircle it.*

i) The study of fluids in motion is called,
(a) fluid statics (b) fluid dynamics (c) dynamics (d) none of these

ii) An object moving through fluid experiences a retarding force called,
(a) surface tension (b) frictional force (c) drag force (d) gravitational force

iii) The drag force increases as the speed of the object,
(a) increases (b) decreases (c) remains constant (d) none of these

iv) S.I. unit of viscosity is,
(a) kg m^2 s^{-1} (b) kg m^2 s^{-2} (c) kg m^{-1} s^{-1} (d) kg m^{-2} s^{-2}

v) The equation $F = 6\pi\eta rv$ is called,
(a) Stokes' law (b) Newton's law (c) Faraday's law (d) Lenz's law

vi) The fluid which is incompressible and non viscous is called,
(a) viscous fluid (b) non-ideal fluid (c) ideal fluid (d) perfect fluid

vii) The irregular or unsteady flow of the fluid is called,
(a) turbulent flow (b) laminar flow (c) stream line flow (d) steady flow

viii) When the drag force on an object falling vertically downward becomes equal to its weight, the body will fall with constant velocity is called,
(a) drag velocity (b) terminal velocity (c) average velocity (d) instantaneous velocity

ix) The terminal velocity of water droplet of radius 1×10^{-4} m & density 1000 kg m^{-3} descending through air of viscosity 19×10^{-6} kg m^{-1} s^{-1} is,
(a) 1.1 m s^{-1} (b) 2.2 m s^{-1} (c) 3.3 m s^{-1} (d) 4.4 m s^{-1}

x) If each particle of the fluid passing through a point follows the same path, then the flow is called,
(a) irregular flow (b) turbulent flow (c) stream line flow (d) none of these

xi) The terminal velocity of a spherical droplet is given by,
(a) $v_t = \frac{2\rho^2 gr^2}{9\eta}$ (b) $v_t = \frac{2\rho gr^2}{9\eta}$ (c) $v_t = \frac{2\rho g^2 r^2}{9\eta^2}$ (d) $v_t = \frac{2\rho^2 g^2 r^2}{9\eta^2}$

xii) The terminal velocity of a tiny droplet of radius r falling vertically downward through air is proportional to,
(a) $v_t \propto r$ (b) $v_t \propto r^2$ (c) $v_t \propto r^3$ (d) $v_t \propto 1/r$

xiii) The product of cross section area of the pipe and the fluid speed at any point along the pipe is,

(a) zero (b) variable (c) flow rate (d) none of these

xiv) The pressure will be low when the speed of the fluid is,

(a) low (b) zero (c) constant (d) high

xv) Velocity of the efflux is measured by the relation,

(a) $\sqrt{gh}$ (b) $\sqrt{2gh}$ (c) $\sqrt{\frac{1}{2}gh}$ (d) $\sqrt{\frac{4}{3}gh}$

xvi) 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

Oscillations (Chapter 7)

Note: *Select the correct answer and encircle it.*

i) In S.H.M. the acceleration of a body is directly proportional to,

(a) applied force (b) amplitude (c) displacement (d) restoring force

ii) Any type of vibratory motion is called,

(a) oscillatory motion (b) translatory motion
(c) rotatory motion (d) simple harmonic motion

iii) The maximum distance of the vibrating body from the mean position when the body is executing S.H.M. is called,

(a) frequency (b) time period (c) displacement (d) amplitude

iv) A body executing S.H.M. has displacement equal to,

(a) $x_o \sin\omega t$ (b) $x_o \cos \omega t$ (c) $x_o \sin^2 \omega t$ (d) $x_o \cos^2 \omega t$

v) In S.H.M. the velocity of the particle is maximum at,

(a) extreme position (b) mean position
(c) intermediate position (d) none of these

vi) The acceleration of the projection on the diameter for a particle moving along a circle is,

(a) $\omega^2 x$ (b) ωx^2 (c) $-\omega^2 x$ (d) $-\omega x^2$

vii) The maximum velocity v_o of the mass attached to one end of the elastic spring is,

(a) $v_o = x_o\sqrt{\frac{k}{m}}$ (b) $v_o = x\sqrt{\frac{k}{m}}$ (c) $v_o = x\sqrt{\frac{m}{k}}$ (d) $v_o = x_o\sqrt{\frac{m}{k}}$

viii) Time period of a simple pendulum is,

(a) $2\pi\sqrt{\frac{\ell}{g}}$ (b) $\frac{1}{2\pi}\sqrt{\frac{\ell}{g}}$ (c) $2\pi\sqrt{\frac{g}{\ell}}$ (d) $\frac{1}{2\pi}\sqrt{\frac{g}{\ell}}$

ix) The time period of a second' pendulum is,

(a) 1 second (b) 2 seconds (c) 3 seconds (d) 4 seconds

x) The length of the second's pendulum is,

(a) 98 cm (b) 99 cm (c) 99.2 cm (d) 100 cm

xi) If length of simple pendulum becomes four times then the time period will become,

(a) two times (b) four times (c) remains the same (d) none of these

xii) The force responsible for the vibratory motion of the simple pendulum is,

(a) $mg \cos\theta$ (b) $mg \sin\theta$ (c) $mg \sec\theta$ (d) $mg \tan\theta$

xiii) If the mass of the bob of a simple pendulum is doubled, its time period,

(a) becomes one half (b) becomes double
(c) becomes four times (d) remains same

xiv) The time period of the simple pendulum is independent of the ,

(a) mass (b) length (c) acceleration due to gravity (d) restoring force

xv) If the mass attached to the spring increases, then its time period,

(a) increases (b) decreases (c) remains constant (d) none of these

xvi) Simple harmonic motion is a type of,

(a) rectilinear motion (b) circular motion (c) angular motion (d) rotational motion

xvii) When the bob of the simple pendulum is at the extreme position, it has,

(a) KE (b) PE (c) both PE & KE (d) none of these

xviii) When the bob of the simple pendulum is at the mean position, the value of the PE is,

(a) zero (b) minimum (c) maximum (d) infinite

xix) Total energy of a particle executing S.H.M. at any displacement x is given by,

(a) kx (b) $\frac{1}{2} kx$ (c) kx_o (d) $\frac{1}{2} kx_o^2$

xx) The frequency of a body of mass m attached to a spring constant k is given by,

(a) $2\pi\sqrt{\frac{m}{k}}$ (b) $2\pi\sqrt{\frac{k}{m}}$ (c) $\frac{1}{2\pi}\sqrt{\frac{k}{m}}$ (d) $\frac{1}{2\pi}\sqrt{\frac{m}{k}}$

xxi) Angular frequency ω is given by the expression,

(a) $\omega = \frac{v}{r}$ (b) $\omega = \frac{2\pi}{T}$ (c) $\omega = \sqrt{\frac{k}{m}}$ (d) all of these

xxii) In microwave oven, the heating is produced by the phenomenon of,

(a) damped oscillations (b) resonance
(c) forced oscillations (d) free oscillations

xxiii) The vibrations of a factory floor caused by the running of the factory of a heavy machinery is,

(a) due to uneven floor (b) due to rough surface of the floor
(c) due to forced vibrations (d) due to bad construction

xxiv) When damping is small, the amplitude of vibration at resonance will be,

(a) small (b) large (c) unchanged (d) none of these

Waves (Chapter 8)

Note: *Select the correct answer and encircle it.*

i) The waves in which the particles of the medium vibrate at right angle to the direction of the wave motion are called,

(a) compressional waves (b) longitudinal waves
(c) electromagnetic waves (d) transverse waves

ii) Waves formed on the surface of water,

(a) stationary waves (b) transverse waves
(c) longitudinal waves (d) electromagnetic waves

iii) The waves which do not require any medium for their propagation are called,

(a) sound waves (b) water waves
(c) transverse waves (d) electromagnetic waves

iv) Crest and trough are formed in,

(a) compressional waves (b) stationary waves
(c) longitudinal waves (d) transverse waves

v) The speed of the waves in terms of frequency f and wavelength λ is given by,

(a) $v = f\lambda$ (b) $v = \frac{\lambda}{f}$ (c) $v = \frac{f}{\lambda}$ (d) $v = \frac{f^2}{\lambda}$

vi) The distance between two consecutive nodes is,

(a) λ (b) 2λ (c) $\lambda/2$ (d) $\lambda/4$

vii) The distance between a node and the next antinode is,

(a) λ (b) 2λ (c) $\lambda/2$ (d) $\lambda/4$

viii) The distance between a crest and a trough is equal to,

(a) λ (b) 2λ (c) $\lambda/2$ (d) $\lambda/4$

ix) Sound waves in air are,

(a) longitudinal waves (b) transverse waves
(c) matter waves (d) electromagnetic waves

x) The velocity of sound in vacuum is,

(a) 300 ms^{-1} (b) 332 ms^{-1} (c) zero ms^{-1} (d) 280 ms^{-1}

xi) Increase in velocity of sound in air due to increase in temperature by 1 ^0C is,

(a) 0.61 ms^{-1} (b) 1.61 ms^{-1} (c) 2 ms^{-1} (d) 61 ms^{-1}

xii) When sound waves enter in different medium, the quantity that remains unchanged is,

(a) speed (b) intensity (c) frequency (d) wavelength

xiii) Sound of frequencies higher than 20,000 hertz are,

(a) supersonics (b) audible (c) ultrasonic (d) none of these

xiv) Two tuning forks of frequencies 260 hertz and 256 hertz are sounded together, the number of beats / sec is ,

(a) zero (b) 2 (c) 4 (d) 256

xv) Doppler effect applies to,

(a) sound waves (b) light waves (c) both sound and light waves (d) none of these

xvi) Radar is a device which transmits and receives,

(a) heat waves (b) electromagnetic waves (c) radio waves (d) matter waves

xvii) The stationary waves are produced when two identical waves are moving on the string along,

(a) same direction (b) opposite direction (c) perpendicular direction
(d) none of these

xviii) When the bob of the simple pendulum is at the mean position, the value of the PE is,

(a) zero (b) minimum (c) maximum (d) infinite

xix) The phenomenon of interference comes out because waves obey,

(a) law of conservation of energy (b) 1^{st} law of thermodynamics
(c) the inverse square law (d) the principle of superposition of waves

Physical Optics (Chapter 9)

Note: *Select the correct answer and encircle it.*

i) The idea of the particle nature of light was given by,
(a) Huygen (b) Maxwell (c) Newton (d) Thomas Young

ii) The idea of the wave nature of light was proposed by,
(a) Thomas Young (b) Fresnel (c) Maxwell (d) Huygen

iii) Electromagnetic waves transport,
(a) energy (b) momentum (c) both energy and momentum (d) none of these

iv) Which one of the following properties of light does not change with the nature of the medium,
(a) amplitude (b) wavelength (c) frequency (d) velocity

v) Light reaches the Earth from Sun in nearly,
(a) 8 minutes (b) 8 minutes & 30 seconds (c) 10 minutes (d) 12 minutes

vi) Photoelectric effect can be explained if the light is considered to have,
(a) wave nature (b) particle nature (c) dual nature (d) none of these

vii) Longitudinal waves do not exhibit (show),
(a) reflection (b) refraction (c) diffraction (d) polarization

viii) The locus of all the points in a medium having the same phase of vibration is called,
(a) crest (b) trough (c) wave front (d) wave length

ix) Huygen's Principle states that,
(a) light travels in straight lines (b) light travels in electromagnetic waves
(c) all points on the primary wave front are the source of secondary wave let
(d) light has dual nature

x) In Young's Double Slit experiment, the fringe spacing is equal to,
(a) $\frac{d}{\lambda L}$ (b) $\frac{2\lambda L}{d}$ (c) $\frac{\lambda L}{d}$ (d) $\frac{\lambda d}{L}$

xi) In a Young's Double Slit experiment, the positions of bright fringes are given by,
(a) $y = m\frac{\lambda L}{d}$ (b) $y = (m + \frac{1}{2})\frac{\lambda L}{d}$ (c) $y = m\frac{\lambda L}{2d}$ (d) $y = 2m\frac{\lambda L}{2d}$

xii) In a Young's Double Slit experiment, the positions of dark fringes are given by,
(a) $y = (m + \frac{1}{2})\frac{\lambda L}{d}$ (b) $y = m\frac{\lambda L}{d}$ (c) $y = (m - \frac{1}{2})\frac{\lambda L}{d}$ (d) $y = 2m\frac{\lambda L}{2d}$

xiii) The velocity of light was determined by,

(a) Newton (b) Michelson (c) Huygen (d) Young

xiv) Soap film in sun light appears coloured due to ,

(a) dispersion of light (b) diffraction of light
(c) scattering of light (d) interference of light

xv) A white light when passed through a prism is,

(a) deviated (b) diffracted (c) dispersed (d) polarized

xvi) A light ray traveling from rare to denser medium suffers a phase change of,

(a) 45^0 (b) 60^0 (c) 90^0 (d) 180^0

xvii) The phase change of 180^0 is equal to the path difference of,

(a) λ (b) $\lambda / 2$ (c) 2λ (d) 3λ

xviii) When Newton's rings interference is seen from the above by means of reflected light, the central point is,

(a) bright (b) dark (c) blue (d) red

xix) The wavelength of X-rays is of the order of,

(a) 1 $\mathring{A}$ (b) 10 $\mathring{A}$ (c) 100 $\mathring{A}$ (d) 1000 $\mathring{A}$

xx) The equation for Michelson's Interferometer is,

(a) $L = m\frac{\lambda}{2}$ (b) $L = m\lambda$ (c) $L = 2m\lambda$ (d) $L = \frac{2}{3}m\lambda$

xxi) Polarization of light shows that light is,

(a) corpuscular in nature (b) longitudinal waves
(c) transverse waves (d) none of these

xxii) A Polaroid is,

(a) a device used in polarimeter (b) a light filter
(c) an adjustable shutter (d) none of these

xxiii) Which of the following cannot be polarized,

(a) X-rays (b) radio waves (c) ultraviolet rays (d) sound waves

xxiv) One Angstrom is equal to,

(a) 10^{-8} cm (b) 10^{-6} m (c) 10^{-8} nm (d) 10^{-10} nm

xxv) Diffraction is a special type of,

(a) polarization (b) interference (c) reflection (d) none of these

Optical Instruments (Chapter 10)

Note: *Select the correct answer and encircle it.*

i) A lens which converges the beam of parallel rays to a fixed point is called,
(a) concave lens (b) convex lens (c) plano-concave lens (d) none of these

ii) A fixed point inside the lens through which a ray of light does not change its path is called,
(a) pole (b) focus (c) optical center (d) center of curvature

iii) The diameter of the lens is called,
(a) aperture (b) optical center (c) focal length (d) principal axis

iv) The distance between the principal focus and the optical center of the lens is called,
(a) aperture (b) focal length (c) principal axis (d) radius of curvature

v) The reciprocal of focal length expressed in meters is called,
(a) focus (b) aperture (c) power of the lens (d) optical center

vi) The unit of power of the lens is,
(a) Joule (b) Watt (c) Diopter (d) Newton

vii) The power of a lens of one meter focal length is called,
(a) 1 dioptre (b) 2 dioptre (c) 2.5 dioptre (d) 5 dioptre

viii) If an object is placed between the focus and the lens the final image will be,
(a) virtual, erect and magnified in front of the lens
(b) virtual, inverted and magnified and in front of the lens
(c) real, erect and magnified behind the lens
(d) real, inverted and magnified behind the lens

ix) The image formed by a convex lens of focal length 10 cm is twice the size of the object. The position of the object will be,
(a) 10 cm (b) 12 cm (c) 15 cm (d) 20 cm

x) The least distance of distinct vision for normal eye is,
(a) 10 cm (b) 20 cm (c) 25 cm (d) 30 cm

xi) The magnifying power of a simple microscope (or magnifying glass) is,
(a) $M = \left(1 + \frac{f}{d}\right)$ (b) $M = \left(1 - \frac{f}{d}\right)$ (c) $M = \left(1 + \frac{d}{f}\right)$ (d) none of these

xii) The magnifying power of a compound microscope,
(a) $\frac{q}{p}\left(1 + \frac{d}{f_e}\right)$ (b) $\frac{p}{q}\left(1 - \frac{d}{f_e}\right)$ (c) $\frac{p}{q}\left(1 + \frac{d}{f_e}\right)$ (d) none of these

xiii) The final image produced by a compound microscope is,

(a) real and inverted (b) real and erect
(c) virtual and inverted (d) virtual and erect

xiv) The focal length of the objective and eye piece of an astronomical telescope are f_o and f_e. The magnifying power of the telescope when focused for infinity is given by ,

(a) $f_o + f_e$ (b) $f_o - f_e$ (c) $\frac{f_o}{f_e}$ (d) $\frac{f_e}{f_o}$

xv) For normal adjustment, the length of the astronomical telescope is,

(a) $f_o + f_e$ (b) $\frac{f_o}{f_e}$ (c) $f_o - f_e$ (d) $\frac{f_e}{f_o}$

xvi) The ability of an instrument to reveal the minor details of the object under examination is called,

(a) magnifying power (b) resolving power
(c) power of the lens (d) none of these

xvii) A spectrometer is used to find,

(a) wavelength of light (b) refractive index of the prism
(c) wavelength of different colours (d) all of them

xviii) The formulae $\alpha_{min} = 1.22\frac{\lambda}{D}$ for resolving power is given by,

(a) Newton (b) Huygen (c) Young (d) Raleigh

xix) The speed of light in vacuum or air is,

(a) $3 \times 10^6\ ms^{-1}$ (b) $3 \times 10^8\ ms^{-1}$ (c) $3 \times 10^{10}\ ms^{-1}$ (d) $3 \times 10^{-8}\ ms^{-1}$

xx) The value of the critical angle θ_C for glass is,

(a) 41^0 (b) 41.5^0 (c) 42^0 (d) 42.5^0

xxi) Types of optical fibre are,

(a) single mode step index fibre (b) multimode step index fibre
(c) multimode graded index fibre (d) all of these

xxii) The diameter of the core of the single mode step index fibre is,

(a) 2.5 μ m (b) 5 μ m (c) 10 μ m (d) 25 μ m

xxiii) Multimode step index fibre is used for ,

(a) long distance (b) short distance
(c) neither long nor short (d) none of these

xxiv) The light emitted from LED has a wavelength,

(a) 1.3 μ m (b) 1.2 μ m (c) 1.4 μ m (d) 1.5 μ m

xxv) The most common method of modulation is called,

(a) frequency modulation (b) wave modulation
(c) digital modulation (d) none of these

Heat and Thermodynamics (Chapter 11)

Note: *Select the correct answer and encircle it.*

i) S.I. unit of heat energy is given by,

(a) calorie (b) kilo calorie (c) Joule (d) Joule sec

ii) The total sum of the energies of all the molecules (or atoms) in an object is known as,

(a) potential energy (b) kinetic energy (c) internal energy (d) elastic PE

iii) S.I. unit of pressure of a gas is,

(a) $N\,m^{-2}$ (b) N-m (c) N^2/m (d) N^2-m

iv) A gas which strictly obeys gas laws under all conditions of temperature and pressure is called,

(a) real gas (b) ideal gas (c) perfect gas (d) inert gas

v) The ideal gas law is given in the form of,

(a) $PV = \frac{nR}{T}$ (b) $PV = nRT$ (c) $PT = nRV$ (d) $TV = nRP$

vi) The value of the universal gas constant R in S.I. units is,

(a) 8.314 J $mole^{-1}$ K^{-1} (b) 83.14 J $mole^{-1}$ K^{-1} (c) 8314 J $mole^{-1}$ K^{-1} (d) 831.4 J $mole^{-1}$ K^{-1}

vii) The Boltzmann constant k in terms of universal gas constant R and Avogadro No. N_A is given as,

(a) $k = N_A R$ (b) $k = \frac{R}{N_A}$ (c) $k = \frac{N_A}{R}$ (d) $k = nRN_A$

viii) The expression for the pressure exerted by an ideal gas is given by,

(a) $\frac{1}{3}N_o < \frac{1}{2}mv^2 >$ (b) $\frac{2}{3}N_o < \frac{1}{2}mv^2 >$

(c) $\frac{1}{2}N_o < \frac{1}{2}mv^2 >$ (d) $\frac{2}{3}N_A < \frac{1}{2}mv^2 >$

ix) The average translational KE per molecule of an ideal gas in terms of pressure is given by,

(a) $\frac{3P}{2N_0}$ (b) $\frac{2P}{3N_0}$ (c) $\frac{3N_0}{2P}$ (d) $\frac{2N_0}{3P}$

x) If the pressure is increased, the boiling point of the liquid,

(a) decreases (b) increases (c) remains constant (d) none of these

xi) Under the same condition of temperature and pressure, equal volume of all the gases contains the same No. of kilo molecules. It is the statement of,

(a) Charles' Law (b) Boyles' Law (c) Avogadro's Law (d) Law of pressure

xii) At constant temperature, the graph between V and 1 / P is a,

(a) parabola (b) hyperbola (c) straight line (d) ellipse

xiii) At constant pressure the graph between V and T (absolute temperature) is,

(a) ellipse (b) parabola (c) hyperbola (d) straight line

xiv) For a gas obeying Boyle's law, if the pressure is doubled, the volume becomes ,

(a) one half (b) double (c) remains constant (d) three times

xv) 4180 Joules of work raises the temperature of 1 litre water through,

(a) 1 ^{0}F (b) 1 ^{0}C (c) 273 K (d) none of these

xvi) The first law of thermodynamics can be expressed as,

(a) $Q = \Delta U - W$ (b) $Q = \Delta U + W$ (c) $\Delta U = Q + W$ (d) $W = Q + \Delta U$

xvii) In adiabatic process,

(a) $Q = \Delta U + W$ (b) $Q = \Delta U$ (c) $Q = W$ (d) $Q = 0$

xviii) Which is the process in which the temperature remains constant,

(a) adiabatic process (b) isobaric process (c) isothermal process (d) isochoric process

xix) The temperature scale which is independent of the nature of the substance used in a thermometer is called,

(a) Centigrade scale (b) Fahrenheit scale (c) Kelvin scale (d) thermodynamic scale

xx) If the temperature of the source increases, the efficiency of the Carnot engine,

(a) increases (b) decreases (c) remains constant (d) none of these

xxi) If the temperature of the sink is decreased the efficiency of the Carnot engine,

(a) increases (b) decreases (c) remains constant (d) none of these

xxii) The highest efficiency of a heat engine whose lower temperature is 17 ^{0}C and high temperature is 200 ^{0}C is,

(a) 30 % (b) 38 % (c) 40 % (d) 60 %

xxiii) The change in the entropy of the system is given by,

(a) $\Delta Q = \frac{\Delta S}{T}$ (b) $\Delta S = \frac{T}{\Delta Q}$ (c) $\Delta S = \frac{\Delta Q}{T}$ (d) $\Delta S = T \times \Delta Q$

xxiv) When the temperature of the source and sink of the heat engine becomes equal, the entropy change will be,

(a) negative (b) zero (c) maximum (d) minimum

xxv) Entropy is a measure of,

(a) internal energy of the system (b) order of the system
(c) disorder of the system (d) PE of the system

xxvi) Temperature of –273 ^{0}C will be on Kelvin scale as,

(a) 273 K (b) 373 K (c) –273 K (d) 0 K

xxvii) The difference of the molar specific heats of a gas C_P and C_V is equal to,

(a) $\frac{C_P}{C_V} = R$ (b) $C_P + C_V = R$ (c) $C_P - C_V = R$ (d) $\frac{C_V}{C_{P\,V}} = R$

xxviii) No entropy change takes place in a,

(a) isobaric process (b) isothermal process
(c) adiabatic process (d) isochoric process

xxix) In reversible process, the entropy,

(a) decreases (b) increases (c) remains constant (d) none of these

ANSWERS

Chap 1

i	**d**
ii	**b**
iii	**b**
iv	**a**
v	**d**
vi	**b**
vii	**c**
viii	**d**
ix	**d**
x	**b**
xi	**c**
xii	**d**
xiii	**d**
xiv	**c**
xv	**d**
xvi	**b**
xvii	**c**
xviii	**d**
xix	**b**
xx	**a**
xxi	**b**
xxii	**d**
xxiii	**c**
xxiv	**c**
xxv	**c**
xxvi	**c**
xxvii	**d**
xxviii	**b**
xxix	**a**
xxx	**b**
xxxi	**a**

Chap 2

i	**d**
ii	**c**
iii	**b**
iv	**c**
v	**c**
vi	**d**
vii	**b**
viii	**b**
ix	**c**
x	**c**
xi	*
xii	**a**
xiii	**d**
xiv	**c**
xv	**d**
xvi	**c**
xvii	**d**
xviii	**c**
xix	**a**
xx	**c**
xxi	**a**
xxii	**c**
xxiii	**b**
xxiv	**b**
xxv	**a**
xxvi	**a**
xxvi	**b**
xxviii	**b**
xxix	**b**
xxx	**b**

Chap 3

i	**d**
ii	**a**
iii	**d**
iv	**d**
v	*
vi	**b**
vii	**b**
viii	**d**
ix	**b**
x	*
xi	**a**
xii	**c**
xiii	**b**
xiv	**a**
xv	**d**
xvi	**b**
xvii	**d**
xviii	**b**
xix	**b**
xx	**c**
xxi	**d**
xxii	**c**
xxiii	**b**

Chap 4

i	**d**
ii	**d**
iii	**d**
iv	**d**
v	**a**
vi	**c**
vii	**d**
viii	**b**
ix	**b**
x	**c**
xi	**a**
xii	**b**
xiii	**d**
xiv	**b**
xv	**a**
xvi	**d**
xvii	**a**
xviii	**d**
xix	**c**
xx	**a**

Chap 5

i	**d**
ii	**a**
iii	**c**
iv	**a**
v	**b**
vi	**c**
vii	**b**
viii	**d**
ix	**b**
x	**c**
xi	**d**
xii	**d**
xiii	**c**
xiv	**c**
xv	**c**
xvi	**c**
xvii	**b**
xviii	**c**
xix	**b**
xx	**b**
xxi	**a**
xxii	**b**
xxiii	**d**
xxiv	**b**
xxv	**a**
xxvi	**a**

Chap 6

i	**b**
ii	**c**
iii	**a**
iv	**c**
v	**a**
vi	**c**
vii	**a**
viii	**b**
ix	**a**
x	**c**
xi	**b**
xii	**b**
xiii	**c**
xiv	**d**
xv	**b**
xvi	**c**

* **2** (xi)- 22°

* **3** (v)- uniform velocity
* **3** (x)- 5000 N

Chap 7

i	**c**
ii	**d**
iii	**d**
iv	**a**
v	**b**
vi	**c**
vii	**a**
viii	**a**
ix	**b**
x	**c**
xi	**a**
xii	**b**
xiii	**d**
xiv	**a**
xv	**a**
xvi	**a**
xvii	**b**
xviii	**a**
xix	**d**
xx	**c**
xxi	**d**
xxii	**b**
xxiii	**c**
xxiv	**b**

Chap 8

i	**d**
ii	**b**
iii	**d**
iv	**d**
v	**a**
vi	**c**
vii	**d**
viii	**c**
ix	**a**
x	**b**
xi	**a**
xii	**c**
xiii	**c**
xiv	**c**
xv	**c**
xvi	**c**
xvii	**b**
xviii	**a**
xix	**d**

Chap 9

i	**c**
ii	**d**
iii	**a**
iv	**c**
v	**b**
vi	**b**
vii	**d**
viii	**c**
ix	**c**
x	**c**
xi	**a**
xii	**a**
xiii	**b**
xiv	**d**
xv	**c**
xvi	**d**
xvii	**b**
xviii	**b**
xix	**a**
xx	**a**
xxi	**c**
xxii	**b**
xxiii	**d**
xxiv	**a**
xxv	**b**

Chap 10

i	**b**
ii	**c**
iii	**a**
iv	**b**
v	**c**
vi	**c**
vii	**a**
viii	**a**
ix	**c**
x	**c**
xi	**c**
xii	**a**
xiii	**c**
xiv	**c**
xv	**a**
xvi	**b**
xvii	**d**
xviii	**d**
xix	**b**
xx	**c**
xxi	**d**
xxii	**b**
xxiii	**b**
xxiv	**a**
xxv	**c**

Chap 11

i	**c**
ii	**c**
iii	**a**
iv	**b**
v	**b**
vi	**a**
vii	**b**
viii	**b**
ix	**a**
x	**b**
xi	**c**
xii	**c**
xiii	**d**
xiv	**a**
xv	**d**
xvi	**b**
xvii	**d**
xviii	**c**
xix	**d**
xx	**a**
xxi	**a**
xxii	**b**
xxiii	**c**
xxiv	**c**
xxv	**c**
xxvi	**d**
xxvi	**c**
xxviii	**c**
xxix	**c**