XI PHYSICS

20 YEARS PAST PAPERS

THE SCOPE OF PHYSICS

OBJECTIVES → 1990-2011

1. The dimension of G is:
   *$ML^{-2}T^3$ *$M^{-1}L^{-2}T^3$
   *$M^{-1}L^3T^{-2}$ *$M^{-1}L^2T^2$
2. The number of significant figures in 2.05×10^6 is:
   (* 1 * 2 * 3 * 4 *6)
3. The number of significant figures in 2.500×10^6 is:
   (* 7 * 2 * 3 * 4 *6)
4. Which one of the following was written by Ibn-Al- Haitham?
   (* Kitab ul Manazir * Kitab ul Qanoon Al Masoodi * Al-Shifa)
5. The number 860.040 has:
   (* 3 Significant figures * 4 S.F * 5 S.F * 6 S.F)
6. The author of Al-Qanoon Fil Tib was:
   (* Al Razi * Ibne Sina * Omer Khayyam)
7. Candela is the unit of:
   (* Luminous Intensity * Force * Mass * Velocity)
8. The famous book of astronomy 'Kitab-al-Qanoon Al Masoodi' was written by
   (* Al Beruni * Al Battani * Al masoodi * Al Kindi)
9. Law of reflection and reflection are given by:
   (*Al Razi *Al Beruni * Ibn Al Haitham * Ibne Sina)
10. Kitab Ul Manazir was written by Al Razi.
11. Give the name of three Muslim scientists who made remarkable contribution in the field of Physics.
12. Pinhole Camera was designed by Ibn- Al – Haitham.
13. Kitab Ul Manazir was written by Ibn Al Haitham.
14. Screw & lever were invented by
    (*Newton *Al- Farabi *Archimedes *Galilo Galiei)
15. Ibn Al Haitham gave the Laws of Reflection
16. Al Beruni measured the circumference of Earth.
17. Ibne Sina Is famous in the field of medicine.
18. Kitab Al Qanoon Fil Tib was written by Ibne Sina.
19. Omer Khayyam was the only man known to Bertrand Russel who was both a poet and a mathematician.
20. Kitab Al Qanoon Fil Tib was a book on Philosophy.
21. The number of significant figure of 7.050×10^{-2} is:
    (*2 *3 *4 *6)
22. Kitab-ul-manazir is written by:
    (*Ibn-e-sina *Ibn-ul-Haitham *Al-Razi *Al-Beruni)
23. The dimension of angular momentum is:
    *$L^2 M^2 T^2$ *$L^2 M^2 T$ *$L^2 M T$ *$L^2 M T^{-1}$

QUESTION:

1. Name three Muslim Scientists. (1994)

CHAPTER # 2

SCALARS AND VECTORS

OBJECTIVES → 1990-2011

1. If $\overline{A}.\overline{B} = 0$, $\vec{A} \times \vec{B} = 0$ and $\vec{A} \neq 0, vector\ \vec{B}$ is:
   *equal to $\vec{A}$ *perpendicular to $\vec{A}$
   *parallel to $\vec{A}$ *zero
2. Two forces equal in magnitude but opposite in direction and not acting on the same line constitute:
   *a couple *power
   *a circle *a force
3. The area of a parallelogram formed by two vectors A and B is given by |A x B|.
4. A vector that can be displaced parallel to it and is applied at any point is known as free vector.
5. k. (i x j) is equal to one.
6. If A.B=0 and A x B=0 and A≠0, the vector B is zero.
7. If a.b=0 and a≠0, b≠0 then the vectors are perpendicular
8. When |A+B|=|A-B| the angle between the vectors A and B is 90^o.
9. The dot product of a unit vector i and k is zero
10. If a vector quantity is dividing by its magnitude, the vector obtained is called unit vector.
11. Two forces of the same magnitude F make an angle of 180^o with each other. Their resultant is zero.
12. jxj=zero
13. Dot product of two unit vectors acting on same direction is zero. (False)
14. Null vector acts in a particular direction. (False).
15. Vector in any given direction whose magnitude is called a unit vector.
16. If A and B is two vectors then:
    *A.B=B.A *A.B= -B.A *A.B= -A.B
17. If A and B is two vectors then:
    *A.B=B.A *A.B= -B.A *A x B=B x A
18. If the vector addition of two vectors of magnitude 3 units and 4 units has a resultant of 5 units, then the angle between those two vectors is:
    *O degree *45 degrees * 90 degrees
19. A free vector is one which can change its direction.
20. If A.B= 0 and A x B= 0, then
    *A and B are parallel to each other.
    *A and B are perpendicular to each other
    *At least A or B is a null vector.
21. A vector in any given direction whose magnitude is one is called_____.
22. If A and B is two vectors, which of the following is correct:-
    (A.B=B.A, AxB= BxA, A.B = - B.A)
23. If a null or zero vectors is multiplied by a finite number it gives a _____.
    (Unit vector, zero vectors)
24. If a vector is divided by its magnitude, a _____ vector is obtained.
    (Zero, unit)
25. The component of a vector is its _____ value in a given direction.
    (Effective, ineffective)
26. Torque is the vector product of displacement vector and _____ vector. (Momentum, force)
27. If A.B=0 and A x B=0 and A≠0, the vector B is:
    *equal to A *zero *perpendicular to A *parallel to A

THEORETICALS

1. Can the magnitude of resultant of two vectors of the same magnitude be equal to the magnitude of either of the same vectors? Explain mathematically. (2011)
2. Prove that power is scalar product of force and velocity. (2011)
3. Two forces F_1 and F_2 are acting on a point making angles θ_1 and θ_2 with positive x-axis respectively. Derive the expression for the magnitude of the resultant force and its direction with respect to the positive x-axis. (2011)
4. Define the product of two vectors. Show that:
   A. (B+C) =A.B +A.C. (2009) (2007)
5. Can the resultant of two vector of the same magnitude be equal to the magnitude of either of the vector? Give mathematical reason of your answer. (2009)

6. For what value of p are the two vectors A= i-pj+3k & B= 3i+2j-4k perpendicular to each other. (2009)
7. Describe the addition of two vectors by rectangular component method. (2006)
8. Define the following: (2005)
   1. Unit vector 2. Position vector 3. Free vector (2005)
9. How many methods of addition of vectors are given in your book? Write their names. Describe the addition of two vectors A_1 and A_2, making angles Θ_1 and Θ_2, with +ve x-axis respectively by rectangular components method. (2004)
10. Define vector product of two vectors and show that (AxB) = - (BxA) (2003) (Pre med 2003)
11. Show that (AxB) = - (BxA). (Pre-eng 2003)
12. Show that A. (B+C) =A.B+A.C (pre-med 2002)
13. Explain the addition of two vectors by rectangular components method. Calculate the resultant force. (Pre-med 2002)
14. F_1 & F_2 are two vectors which act at a point and make angles Θ_1 and Θ_2 respectively with x axis .Find an expression only for the magnitude of their resultant using rectangular component method (2000)
15. If A and B represent the adjacent sides of parallelogram. Show that |AxB| represents area of the parallelogram. (2002)
16. What are dot products and cross product? Give their properties and examples. (1999)
17. Prove that A.B =B.A, AxB= - (BxA), and A . (B+C) = A.B + A.C (1999)
18. Describe the addition of vectors by rectangular components method (1998)
19. Prove that $|A \times B|^2 + (A.B) = A^2B^2$ (1998)
20. Using the law of vector product prove the 'law of Sines' for a plane triangle of sides a, b, c. (1996)
21. Define addition of vectors by rectangular components method (1996)
22. Define vector product of two vectors. If vectors A and B are inclined at an angle of 0 degree with respect to each other, show that A x B= -B x A (1995)
23. Define vector product of two vectors. If vectors A and B are inclined at an angle of 0 degree with respect to each other, show that A x B= -B x A (1995)
24. Explain commutative and distributive law for dot product. (1994)
25. If $A= A_1 i + A_2 j + A_3 k$, $B = B_1 i + B_2 j + B_3 k$ then prove that $A.B=A_1B_1 + A_2B_2 + A_3B_3$ (1994)
26. What are vector and scalar quantities? (1993)
27. Two forces F_1 and F_2 are acting at a point making an angle 'Θ'. Assuming that F_1 vector is along x-axis, find the magnitude and direction of the resultant force by resolving them into their rectangular components? (1993)
28. Define the Scalar Product of two vectors. What are the properties of Scalar Product? Give at least one example of scalar product. (1992)
29. What do you understand by dot product and cross product of two vectors? Explain. Give at least one example of each product. (1991)
30. Will the value of a vector quantity change if its reference axes are changed? Explain. (1991)
31. Show that the cross product of a vector is not commutative $-B \times A = A \times B$ and prove that the magnitude of cross product of two vectors gives the area of parallelogram.(2010)

NUMERICALS

1. Determine a unit vector perpendicular to the plane of $\vec{A} = 2\hat{\imath} - 6\hat{\jmath} - 3\hat{k}$ and $\vec{B} = 4\hat{\imath} + 3\hat{\jmath} - \hat{k}$. (2011)
2. If one of the rectangular components of force 50N is 25N; find the value of the other. (2010)
3. Determine the unit vector perpendicular to the plane containing A and B if A=2i-3j-k and B=i+4j-2k. (2006)
4. Find the angle between A=2y+2j-k and B=6i-3j+2k. (2005)
5. Two forces of equal magnitude are acting at a point. Find the angle between the forces and the magnitude of the resultant is also equal to the magnitude of either of these forces. (2003 pre eng)
6. Find the area of a parallelogram if it two sides are formed by the vectors A=2y-3j-k and B=i+4j-2k (2003 pre med)
7. If P=2i-2j+3k and Q=3i+3j+3k,find a unit vector perpendicular to the plane containing both P and Q .If P and Q formed the side of a parallelogram. Find the area of the parallelogram. (2002 pre med)
8. An object moves along a straight line from (3, 2, 6) to (14, 13, 9) when a uniform force F= 4i + j + 3k acts on it. Find the work done and the angle between the force and displacement. (2001)
9. If A=3i+j-2k,B=-i+3j+4k.Find |A+B| and angle b\w A and B (2000)
10. Determine a unit vector perpendicular to the plane containing A and B if A = 2i -3j-k, B =i+4j-2k. (1999)
11. Calculate the work done by a force given by F=3i+4j+5k in displacing a body from the position 'A' to the position 'B'. The position vectors of A and B are $r_{A=}$2i+5j+2k and r_B=7i + 3j + 5k. (1999)
12. If one of the rectangular components of a force of 100N is 50 N. Find the other component. (1998)
13. Define unit and null vectors. Two vectors have magnitudes 4 and 5 units. The angle between them is 30▫.Taking the first vector along x-axis, calculate the magnitude and direction of the resultant. (1997)
14. Given that A=i + 2j + 3k and B=2i+4j-k, find (1997)
    (i) |3A-B| (ii) A x B (iii) The angle between A and B.
15. If two vectors A x B are such that |A|=3, |B|=2 and |A-B|=4, evaluate (1) A.B and (2) |A+B|. (1995)
16. If A= i + j and b=2i-j+3k, find a unit vector parallel to A-2B. (1995)
17. Given r_1 = 2i – 2j + k, r2 = 3i 4j – 3k and r_3 = 4i + 2j +2k: find the magnitude of the following vectors:-

(i) r_3 (ii) $r_1 + r_2 + r_3$ (iii) $2r_1 - 3r_2 - 5r_3$ (1994)

18. Calculate the work done by a force given by $F=6i + 8j + 10k$ in displacing a body from the position A to the position B. The position vectors of A and B are:-
$r_a = 4i + 7j + 4k$ and $r_b = 9i + 5j + 7k$. (1994)

CHAPTER # 3

MOTION

OBJECTIVES → 1990-2011

1. The acceleration of a body moving a frictionless plane inclined at 30°C will be:
   *4.9m/s^2 *9.8m/s^2
   *98m/s^2 *10m/s^2
2. Light year is the unit of:
   *time *Energy
   *Intensity *Distance
3. A one kilogram stone, falling freely from a height of 10m, strikes the ground with a velocity of:
   *14m/s * 10m/s
   *98m/s *19.6m/s
4. The momentum of a body _____ and its kinetic energy becomes ____ times when its velocity is doubled.
5. The product of mass and velocity is called _____.
6. The motion of a parachute descending with a parachute is a free fall motion. True/false
7. Friction is a self adjusting force:
   * It increases indefinitely with the external force
   * It does not increase indefinitely with the external force
   * Remains Constant
8. A body remains at rest or continues its state of motion until and unless it is acted upon an:
   * a force * an unbalanced force * a force equal to the weight of the body
9. The objects falling freely to the earth fall in the same direction.
10. Whenever the average and instantaneous velocities of a body are equal, the body is said to have Uniform velocity.
11. A rain drop continues to fall with a uniform velocity when its weight is balanced by:
    * Air Friction * Air friction and up thrust * Up thrust.
12. When a body is thrown vertically upwards, it is a case of:
    * Free fall motion * Projectile motion * under gravity motion
13. In an elastic collision momentum is conserved but not the energy. (True/False)
14. The S. I unit of momentum is N-sec.
15. As a result of unbalanced force the body moves with:
    *Uniform acceleration * Uniform speed * Variable acceleration * Uniform Velocity
16. When a body is placed on a frictionless inclined plane, the force by which the body slides down is equal to $F = mg\sin\theta$.
17. In an elastic collision energy is conserved but not the momentum. (True or False)
18. In an inelastic collision momentum is conserved but not the energy. (True/false)
19. When a constant force is applied on a body it moves with:
    *Const Speed * Constant velocity * Constant Acceleration * None
20. The rate of angular momentum is called:
    * Acceleration *force *torque *power
21. If a light object collides elastically with a massive body which is at rest, the light object will be:
    *rebound with the same velocity *be stopped
    * rebound with the twice velocity *cause the massive body to move
22. A bullet is fired form a rifle, the rifle recoils freely.
    State whether the kinetic energy of the refill is:
    (i) Greater than (ii) equal to (iii) less than that of the bullet
23. Stokes law holds good for:
    *The bodies of all shaped *motion through non-viscous medium
    *Motion through vacuum *motion through viscous medium
24. How many meters will a 20 kg ball, staring from rest, fall freely in one second?
    *19.6m *9.8m *4.9m *4.0m

THEORETICALS

1. Two bodies of unequal masses are attached to the ends of a string which passes over a frictionless pulley. If one body moves vertically and the second body moves horizontally on a smooth horizontal surface, derive the expressions foe the tension in the string and the acceleration of the bodies. (2011)

2. It is observed that all bodies sliding down a frictionless inclined plane have same acceleration. How does it happen? Explain. (2011)
3. It is observed that all bodies sliding down a frictionless inclined plane have the same acceleration. How does it happen? Explain. (2010)
4. Define elastic collision. (2010)
   Two spherical bodies of masses m_1 and m_2 moving with the initial velocities u_1 and u_2 collide elastically in one dimension. Derive the expression for their final velocities.
5. Two unequal masses connected by a string passing over a frictionless pulley moving vertically. Find the expressions for the Tension 'T' in the string and the acceleration 'a' of the system. (2009)
6. It is observes that all bodies slides down a frictionless inclined plane have the same acceleration. How does it's happen? Explain. (2009)
7. State and prove the Law of Conservation of Linear Momentum (2007)
8. Derive an expression for the acceleration of a body of mass "m" moving down a plane of inclination "θ" having the friction "f". (2006)
9. Give the difference between elastic collision and inelastic collision. Two spheres of unequal masses A and B moving with the initial velocities u_1 and u_2 in the same direction collide elastically. Derive the relation of final velocity V_2 of the body. (2006)
10. Two unequal masses are suspended from the two ends of a string passing over a frictionless pulley in such a way that both the bodies hang vertically.
11. Derive the relation for the acceleration produced in the bodies and the tension produced. (2005)
12. Prove that all bodies slide with the same acceleration on a frictionless plane. (2004)
13. Give the difference between elastic collision and inelastic collision. Two spheres of unequal masses A and B moving with the initial velocities u_1 and u_2 in the same direction collide elastically. Derive the relation of final velocity V_2 of the body. (2006, 2004)
14. State and Prove the Law of Conservation of Momentum. (2003 pre-med)
15. Two unequal masses are suspended from the two ends of a string passing over a frictionless pulley in such a way that both the bodies hang vertically.
16. Derive the relation for the acceleration produced in the bodies.
    (2003 pre-eng,2003 pre-med.)
17. A body is placed on an inclined plane. Find out the expression for its downward acceleration both in the presence and absence of friction. (2003 pre-eng,)
18. Give the definition of force on the basis of Newton's First Law of Motion. Starting with F=ma, prove that force is also given by the rate of change of momentum. (2003 pre-med)
19. Two bodies of unequal masses (M & m) connected to the ends of a string passing over a frictionless pulley, move vertically. Derive an expression to show that acceleration is half of acceleration due to gravity if M=3m. (2003 pre-med)
20. A block of mass "m" is pulled up on a smooth inclined plane with a constant force "F" obtains an expression for the acceleration of the block if the force of friction between the block is "f". (2002 pre-eng.)
21. State and Prove the Law of Conservation of Momentum. (2002 pre-eng.)
22. A body is placed on an inclined plane. Find out the expression for its downward acceleration both in the presence and absence of friction. (2002 pre-eng)
23. State and Prove the Law of Conservation of Momentum. (2001)
24. Two masses m_1 and m_2 are attached with the ends of a string which passes over a frictionless pulley such that the mass m_2 is placed on a smooth horizontal surface and the mass m_1 moves vertically downwards. Calculate the acceleration of the system. (2001)
25. Two bodies of unequal masses (M & m) connected to the ends of a string passing over a frictionless pulley, move vertically. Derive an expression to show that acceleration is half of acceleration due to gravity if M=3m. (2000)
26. Two spherical bodies of different masses moving with different velocities along same line collide elastically with one another. Find expression for the final velocity of only one of the bodies after collision. (2000)
27. Derive an expression for acceleration of a body of mass "m" moving down with a plane inclination having friction "f". (2000)
28. Define Linear and Angular Momentum. Also state and prove Law of Conservation of Linear Momentum. (1999)
29. Two bodies of unequal masses attached to the ends of a string pass over a frictionless pulley such that the bodies move vertically. Find the acceleration of the system and tension in the string. (1998)
30. Explain displacement, velocity and acceleration showing the difference between a uniform and a non – uniform velocity and acceleration by graphical method. (1994)
31. Write down the equations of uniformly accelerated rectilinear motion. Which is the most common example of a uniformly accelerated motion? What is the 'free fall' method? (1994)
32. Explain Momentum and Law Of conservation of Momentum. (1994)
33. Define Elastic Collision in one dimension. (1994)
34. Two bodies having different masses and moving with different velocities have an elastic collision in one dimension. Calculate their final velocities after collision. What will happen if?
    The masses of two bodies are equal?
    The masses of the two bodies are equal one of them is at rest? (1994)
35. Two masses M and m are attached to the two ends of a string passing over a frictionless pulley, such that they move vertically. Supposing M > m find the acceleration of the system and tension in the string. (1993)
36. Define Momentum and give its S.I unit. 'The momentum of a moving body is

The quantity of motion present in it'. Comment (1992)
37. State and prove Law of Conservation Of Momentum. (1992)
38. Two bodies A and B of unequal masses m_1 and m_2 collide elastically in one dimension. If U_1 and U_2, V_1 and V_2 are the velocities of the body before and after collision. Derive the expression for their final. (1991)
39. State Newton's First Law of Motion and gives the definition of force on the basis of this Law. (1991)
40. Two unequal masses connected by a string passing over a frictionless pulley moving vertically. Find the expressions for the Tension 'T' in the string and the acceleration 'a' of the system. (1991)
41. Define Linear Momentum. Give its unit in M.K.S system. State and prove the Law of conservation linear Momentum. (1990)
42. Which of Newton's Laws are involved in rocket propulsion? (1990)

NUMERICALS

1. A wooden block having 10 kg mass is suspended by a long cord that can swing as a pendulum. A 50gm bullet is fired which lodges itself into the block. Due to the impact, the centre of gravity of the block is raised by 10 cm. What was the initial speed of the bullet? (2011)
2. A helicopter weighs 3290 N: (2010)
   a) Calculate the force on it if it is ascending vertically at the rate of 2 m/sec2
   b) What will be the force on the helicopter if it is moving up vertically with the constant speed of 4m/sec?
3. A 150 gm bullet is fired from a 15 kg gun with a speed of 1000 m/s. What is the speed of the recoil of the gun? (2007)
4. A 100gm golf ball moving with a velocity of 20 m/s collides with a 8kg steel ball at rest. If the collision is elastic, compute the velocities of both the balls after collision. (2006, 2004)
5. A car starts from rest and moves with a constant acceleration. During the 5^{th} second of its motion it covers a distance of 36 m; calculate:
   -I- The acceleration of the car.
   -II- The total distance covered by the car during this time. (2003)
6. 5gm bullet is fired from 15kg gun with a speed of 1500m/s. What is the speed of the recoil of the gun? (2003 pre-med.)
7. A machine gun fires 20 bullets per second into a target. Each bullet weight 10gm and has a speed of 1500m/s; find the force necessary to hold the gun in position. (2002 pre-eng.)
8. Two blocks of masses 10.2kg and 4.5kg are attached to the ends of a string which passes over a frictionless pulley in such a way that the block of mass 10.2kg lies on a horizontal surface and the other block hangs vertically. Find the acceleration of the system and the tension in the string. (2001)
9. A motor car is moving up a slope of 30^o with a velocity of 72 km/hr. suddenly the engine fails. How much distance will the car move before coming to rest? Assume friction to be negligible. (2000)
10. 5 gm bullet is fired into a 10 kg wooden block that is suspended by a long chord so that it can swing as a pendulum. If the block is displaced so that its center of gravity rises by 10 cm, what is the speed of the bullet? (1999)
11. A 100 gm bullet is fired into a 12 kg block which is suspended by a long chord. If the bullet is embedded in the block and the block rises by 5 cm, what was the speed of the bullet? (1997)
12. Two bodies A and B attached to the ends of a string passing over a frictionless pulley such that the masses hang vertically. If the mass of on body is 96 kg. (1997)
    (i) Find the mass of the second body which moves downward with an acceleration of 0.2 m/sec^2 . (1998)
    (ii) The tension in the string [g= 9.8 m/sec^2] 1998)
13. A boy throws a ball upward with a speed of 25 m / sec. On its way down it is caught at a point 5m above the ground. How fast was it coming down at this point? How long did the trip take? (1996)
14. A minibus starts moving from the position of rest at a bus stop with a uniform acceleration. During the 10^{th} minute of its motion it covers a distance of 95 meters. Calculate its acceleration and total distance covered in 10 minutes. (1994)
15. Small metal sphere of 50 gm is suspended by a light string. As it oscillates the sphere is 0.75 m from the ground at its highest point and 0.75m at its lowest point. Find its maximum speed and maximum momentum. (1993)
16. A stone is thrown vertically upwards. It takes 30 sec to return to the ground. How high does the stone go? (1991)
17. Ball of mass 0.5 kg and moving with a speed of 2 m/sec, strikes the with a rigid wall in a direction perpendicular to the wall and is reflected back after a perfectly elastic collision. If during the collision the ball remains in contact with the wall for 0.5 second. Calculate the average force exerted on the ball by the wall. (1990)
18. A helicopter of mass 3×10^3 Kg rises vertically with the constant speed of 25m/sec .What is the resultant force acting on the helicopter? (2002 pre eng)

CHAPTER # 4

MOTION IN TWO DIMENSIONS

OBJECTIVES → 1990-2011

1. When the angular velocity of a disk increases, angular acceleration α and angular velocity ω are:
   *Parallel *Non-parallel
   *Perpendicular *Non of these
2. The direction of projectile becomes horizontal at the top because____.
3. The effect of resistance is such that the projectile_____.
4. Because of air resistance the time of flight _____.
5. At maximum height the vertical velocity of a projectile is ____.
6. When a particle moves in a circle, the angle between its linear and angular velocity is always: (* 90 * 100 * 45 * none)
7. The physical quantity which produces angular acceleration is called:
   (* Centripetal force * Centrifugal Force * Torque)
8. The angular speed of second hand of watch is:
   (* 1 rad * π/3 rad *π rad)
9. One radian is equal to _____degrees.
10. Every point on a rotating body has the same:
    (* Linear Velocity * Angular Velocity * Angular momentum)
11. There is no difference between rotatory circular motions. (T/ F)
12. The range of Ghori Missile is
    (* 1500 km * 1000 km * 2000 km)
13. Maximum height of the projectile depends on:
    (* angle of projection * velocity of projection * both)
14. The unit of angular velocity is
    (* meter/sec * Radian/sec * deg / sec * none)
15. When a body moves along in a circle with a uniform speed then changes take place in it's:
    (*Angular Velocity * Linear velocity * Angular Acceleration * none)
16. When a body moves along a projectile path, which component of its velocity does not change? (* horizontal * vertical)
17. The angle between centripetal and tangential acceleration is:
    (* 90 * 180 * 0 * 45)
18. If a projectile is fired is launched at angle of 45^o with the velocity of 100 m /sec, it hits the target. It will have double the range if its velocity is:
    (* 141.4 m/sec * 200 m/sec * 1173.2 m/sec * 400m /sec)
19. If r is the radius of the circular path of a particle, it's linear and angular velocities are:
    (* 45^o *55^o * 10^o * 70^o)
20. The angular acceleration of a body moving along a circle is:
    (* $4T^2r/ \pi^2$ * $4\pi^2r/T^2$ * $4Tr^2/ \pi^2$ * $4\pi^2r/T$)
21. The rate of change of a angular momentum is:
    (* Force exerted by the body * force exerted on the body * torque * Angular acceleration)
22. A body with an increasing velocity along a circle. It possesses:
    (* Tangential Acceleration * Centripetal Acceleration * Both * none)
23. The unit of angular momentum is:
    (* Joule sec * Newton sec * Joule meter * Newton meter)
24. Due to presence of air resistance the total time of the flight of the projectile:
    (* Remains same * Decreases * increases * becomes zero * none)
25. A projectile is fired with an initial velocity of 90 m /sec to hit the ground level target. Its max horizontal range will be:
    (9.2 m * 826.5 m * 413 m * 81 m)
26. In projectile motion the body moves with:
    * Constant vertical component of velocity. * Constant horizontal component of velocity
    * Both changing horizontal and vertical components of velocity
    * Horizontal component changing but vertical component of velocity constant.
27. The motion of a curved path when one component of velocity is constant and the other is variable is called:
    *Variable motion * projectile motion * vibratory motion * Circulatory motion
28. When a body moves with constant velocity in a circle its:
    *Velocity is changing * its acceleration is zero
    * Its acceleration is increasing * its velocity is uniform
29. The angle between centripetal and tangential accelerations is:

(* 0^o * 90^o * 180^o * 45^o)

30. If r is the radius of the circular path of a particle, its linear and angular acceleration are related by:
(a =a x r a = r x α a = ar)

31. A projectile is thrown at an angle of 30^0 with the horizontal having a certain n initial velocity. ii will have the same range if thrown with the same velocity as before at an angle of:
*45^o *60^o *75^o *15^o

32. A cyclist cycling around a circular racing track skids because:
*The centripetal force upon him is less than the limiting friction.
*The centripetal force upon him is greater than the limiting friction.
*The centripetal force upon him is equal than the limiting friction.
*None of the above.

33. The horizontal range of projectile depends upon:
*The angle of projection. *The velocity of thee projection
*'g' at the place *All of them.

THEORETICALS

1. In the game of cricket, why is it easy to catch a ball of high trajectory? (2011)
2. What is projectile motion? A shell is fired with a velocity V_o at an angle θ with the horizontal to target at the ground level. Derive the expressions for: i) Total time of flight ii) Horizontal range. (2011)
3. At what points will the speed of projectile be maximum? Calculate the range of the projectile? (2010)
4. Define centripetal acceleration and derive its formula? (2010)
5. Define Projectile motion. A shell is fired upward at an angle "θ" with the horizontal with the speed "v_o". Find: -I-The time taken by it to reach the maximum height. -II- The horizontal range, the maximum horizontal range. (2006, 2004, 2002 pre-med, 1998, 1995, 1990)
6. Derive an expression for centripetal force and centripetal acceleration. (2006)
7. Define Centripetal force. Prove that: $a_c = v^2/r$ (2005, 2003 pre- Med, 2001, 1996)
8. State and explain the law of Conservation of angular momentum for a particle. (2002 pre-eng, 1999)
9. Define Projectile motion. A shell is fired upward at an angle "θ" with the horizontal with the speed "v_o". Find: -I-The time taken by it to reach the maximum height. -II- The horizontal range. (2002 pre-eng)
10. Describe Projectile motion. Explain the changes in vertical and horizontal components of the velocity. (2000)
11. In a game of cricket a ball of high trajectory is easy to catch. Explain it. (1995)
12. Define Angular Momentum. (1999, 1997)

NUMERICALS

1. Calculate the centripetal acceleration and centripetal force on a man whose mass is 80kg when resting on the ground at the equator. The radius of the earth is 6.4×10^6m. (2011)
2. A mortar shell is fired at a target 800m away with a velocity of 100 m/sec. Find the max. Possible values of launch angles. (2009)
3. Calculate centripetal acceleration and centripetal force on man whose mass is 8kg who is resting on the ground at the equator given that the radius of earth is $6.4x10^6$m and the earth complete its rotation in one day. (2006)
4. What is the take-off speed of a locust if its launching angle is 55^o and its range is 0.8m? (Sin 110^o=0.9397) (2005)
5. Two possible angles to hit a target by a mortar shell fired by an initial velocity of 98m/sec are 15^o and 75^o. Calculate the range of projectile and the minimum time required to hit the target. (2004)
6. A player throws a ball at an initial velocity of 36m/sec. Calculate the maximum distance reached by the ball, assuming the ball is caught at the same height at which it was released. If he wishes to throw the ball half the maximum distance in the shortest possible time, compute the angle of elevation. (2002 pre- med)
7. An artillery cannon is pointed upward at an angle of 35^o with respect o the horizontal and fires a projectile with an initial velocity of 200 m/sec. If the air resistance is negligible find the (i) maximum height reached by the projectile (ii) The range of the projectile. (1998)
8. A string 1m long would break when its tension is 69.6 N. find the greatest speed at which the ball of mass 2 kg can be whirled with the string in a vertical circle. (1996)
9. A mortar shell is fired at a ground level target 490m away with a velocity of 98 m/sec. Find the two possible values of launch angles. Calculate the minimum time to hit the target. (1995)
10. A projectile is fired with the horizontal velocity of 300 m/sec from the top of a cliff 100m high (i) How long will it take to reach the ground (ii) How far from the foot of the cliff will it strike the ground? (1990)
11. A 12 kg gun mounted on wheels shoots a 100gm projectile with a muzzle velocity of 1800 m/sec at an angle of 60^o above the ground; find the horizontal recoil velocity of the gun? (1990)

CHAPTER # 5

TORQUE ANGULAR MOMENTUM & EQUILIBRIUM

OBJECTIVES → 1990-2011

1. The rate of change of angular momentum with respect to time is:
   *Force *Angular velocity
   *Angular acceleration *Torque

2. A body is said to be in equilibrium if it is at rest or in moving with _____.
3. For the transnational equilibrium the net force acting on the body must be _____
4. For the rotational equilibrium, the net torque acting on a body must be _____.
5. According to the first condition of equilibrium the algebraic sum of all forces acting on a body must be equal to_____.
6. The magnitude of the torque must be equal to the product of magnitude of force & its_____.
7. The unit of torque in SI system is_____.
8. The clock wise torque is taken as_____ torque.
9. If the line of action of the two forces acting on the body are not same, then the body in the_____ equilibrium.
10. The physical quantity, which tends to rotate the body, is called _____.

11. The angular momentum of a body is conserved if the net _____ on it is zero.
12. _____ is define as time rate of change of angular momentum.
13. A body is said to be in _____ equilibrium if the net force on it is zero.
14. The angular momentum L of a partial is given in terms of m, v, r & θ is as L =_____.
15. The angular momentum is associated with_____ motion.
16. The total angular momentum of a system of partial is_____ if the net external torque on the system is zero.
17. The time rate of charge of angular momentum of a body is equal to the _____.
18. The center of the mass of the system of the partials:
    *always concedes with the center of the gravity.
    *never always coincides with the center of the gravity.
    * coincides with the center of gravity of in a uniform gravitational field.
    * coincides with the center of gravity of in a non-uniform gravitational field.
19. Both center of mass & the center of the gravity are at the same point in a uniform gravitational field. (T/F).
20. Two forces acting along the same line but opposite in direction constitute a:
    *Couple *Power *Torque *Inertia.
21. The rate of change of angular momentum.
    *Couple *Power *Torque *Inertia.
22. A body in equilibrium:
    *Always at rest *moving with constant acceleration
    *moving with constant velocity *moving with constant variable velocity
    *moving with variable acceleration
23. Torque is defined as the time rate of change of:
    *Angular momentum *Angular velocity
    *Linear velocity *Angular acceleration

THEORETICALS

1. Define couple. Show that the magnitude of the moment of a couple is given by τ=Fd. Where the symbols have their usual meaning. (2008)
2. State & explain conditions of equilibrium. (2006) (2005) (2000)
3. Define torque & angular momentum. (2003 pre-eng)
4. Define torque & give its unit. (2002 pre-eng)
5. State & prove law of conversation of angular momentum. (1999)
6. Define center of mass. (1998)

NUMERICALS

1. A uniform ladder having length 'ℓ' and weighing 50 N, rests against a smooth vertical wall. If the coefficient of friction between the ladder and the ground is 0.40, find the minimum angle θ, such that the ladder may not slip. (2011)
2. A uniform ladder of length L and weight 50 N rests against a smooth vertical wall. If the coefficient of friction between the ladder and the ground is 0.40, find the minimum angle such that the ladder may not slip. (2010)
3. A 15m ladder weighing 350N rest against a smooth vertical wall at a pt of 12m above the ground. The center of the gravity is 1/3 way up. a boy of mass 47 kg climbs half way up the ladder. Calculate the reaction exerted by the wall & the ground. (2009, 2002 med)
4. A ladder of length "L" and weight 200N rest against a smooth vertical wall at an angle of 50^{o}.The center of gravity of the ladder is "0.4L" from the base. How large a force of friction must exist at the base of the ladder? If it is not to slip? What is the necessary co-efficient of static friction? (2003 pre-eng)
5. A ladder rests against a smooth wall making an angle of 60^{0} with the ground. The ladder weights 200N & its center of gravity is at 1/3 of its length from the base. Determine, The frictional force which prevents the ladder from slipping. The coefficient of the static friction. (1996)

CHAPTER # 6

GRAVITATION

OBJECTIVES → 1990-2011

1. If one moves up from the surface of the earth to distance equal to the radius of the earth the value of acceleration due to gravity will be:
   *1/2 g *1/4 g
   *2 g *4 g
2. A body possesses potential energy only when it exists in the earths or some other body's gravitational field. (True)
3. An astronaut in an aircraft experiences weightlessness because the earth's gravitational force ceases o act on him. (False)
4. The moon is freely falling to the earth. (False)
5. Weight of a body depends on the altitude of location as well as on the motion of the frame of reference. (True)
6. If a man goes to a height equal to the radius of earth from its surface, his weight relative to that on the earth would be
   (* One fourth * One half * Remain the same)
7. If the distance between the centre of the body and centre of the earth increases, the value of 'g'.
   (* increases * decreases * remains constant)
8. If the radius of the earth were to shrink, it's mass remaining the same. The acceleration due to gravity on the earth's surface would
   (* decrease * Increase * Remain same)
9. The force of attraction acts along the ____ of the two interacting bodies.
10. The motion of an air force soldier descending via parachute is a free fall motion. (True)
11. Work done in a gravitational field is independent of the path followed. (True)
12. Weightlessness in aircraft is overcome by creating artificial gravity. (True)
13. Difficulties in eating and drinking in spacecraft can be removed by spinning the aircraft about its own axis. (true)
14. Weight of a body at the centre of earth becomes zero. (True)
15. The weight of an object orbiting around the earth in a satellite is zero
    (* Zero * Actual weight * Less than actual weight * greater than actual)
16. The ocean tides are caused by gravitational force exerted on earth by:
    (* moon * sun * both the sun and moon * Jupiter)
17. The dimensions of G are:
    (* $M^{-1}L^{3}T^{-2}$ * $M^{-1}L^{-2}T^{-3}$ * $M^{-3}L^{3}T^{-2}$ * none of these)
18. How much height does a freely falling body of mass 10 Kg lose in 2sec?
    (* 9.8 m * 19.6 m * 20 m * 199 m)
19. I the radius of the moon was to shrink and its mass would remain the same the acceleration due to gravity on it will:
    (* Increase * Decrease * Remains same * none of these)
20. If a man goes to a height equal to the radius of the earth from its surface, his height relative to that of earth will become
    (* half * same * twice * One fourth)
21. The absolute P.E of a body of mass 'm' in the earth's gravitational field is given by:
    (* GM_em / r * GM_em / r^2 * $- Gm / r^2$ * GmM_e / R_e^2)
22. Above the surface of the earth, if we go to a distance equal to double the radius of the earth, the value of 'g' will become:
    (* One ninth * One fourth * One fifth * one half)
23. The apparent weight of a person standing in an elevator , which is moving down with uniform acceleration will :
    (* same * less than the actual * greater than the actual * none)
24. The apparent weight of a body in a satellite orbiting around the earth is:
    (* Zero * same * greater * lesser)
25. The weight of a body depends on the altitude of location as well on the motion of frame of reference. (True)
26. Difficulties in eating and drinking in aircraft is removed by spinning the aircraft around its own axis. (True)
27. Weight of a body at the center of the earth is Zero. (True)
28. A man goes up to height from Earth's surface equal to the radius of the Earth. His weight relative to the Earth's surface would be:
    *became ½ *became double *remain same *became ¼
29. If we go up through the surface of the earth to a distance equal to the radius of earth, the value of 'g' will become:
    *One - fourth *one – eighth *one – ninth *double

THEORETICALS

1. How is weightlessness experienced in a satellite overcome? Explain. (2011)
2. How artificial gravity is created in an orbiting space craft? Derive the relevant expression. (2006)
3. Discuss the variation in "g" with depth. (Derive the mathematical expression. (2006, 1999, 1997, 1996)
4. What is weightlessness in satellites orbiting round the earth? Show that a block suspended from the ceiling of an elevator suddenly breaks? (2005, 99, 98, 96)
5. Discuss the variation in the value of "g" with depth? (2003 pre-eng)
6. Discuss the variation in "g" with altitude or depth. (Derive the mathematical expression) (2001, 1999, 1996, 1995, 93, 2007)
7. State and explain Newton's Law of Gravitation. Derive an expression for the variation of 'g' with depth. (1997, 95, 93, 90)
8. Why two books lying on a table do does not move towards each other due to gravitational attraction? (1997)
9. Write a short note on artificial gravity. (1997)
10. Distinguish between 'G' and 'g'. (1993)
11. Write down the unit of 'G'. (1990)
12. With the help of Newton's Law of Gravitation prove that the value of acceleration due to gravity at point above the surface of the earth is inversely proportional to the square of the distance of the point from the centre of the earth. (1990)

NUMERICALS

1. Show by calculation why the acceleration due to the gravity at the centre of the earth is zero. Also calculate the mass of the earth. (2010)
2. At what distance from the center of the earth does the value of "g" become half of the value it has on the surface of the earth? (2005)
3. At what depth from the surface of the earth is the value of acceleration due to gravity one-fourth of the value at the surface of the earth? (2004)
4. The planet Jupiter of mass $2x10^{27}$kg revolves around the sun of mass $2x10^{30}$kg in a circular orbit of radius $7.8x10^{11}$cm; calculate the gravitational force between them and the orbital speed of Jupiter. (2003 pre-med)
5. The planet Jupiter has a mass 314 times that of earth. Its radius is 11.3 times large than that of the earth. Find the acceleration due to gravity on the surface of Jupiter. (2002 pre-eng)
6. The radius of moon is 27% the earth's radius and its mass is 1.2% of the earth's mass. Calculate the acceleration due to gravity on the surface of the moon. How much does a 980 N body weigh there? (2002 pre-med, 1997)
7. Find how deep from the surface of the earth a point is where acceleration due to gravity is half the value on the earth's surface. (1995)
8. At what distance from the centre of the earth does the gravitational acceleration have one third the value that it has on the surface? (1993)
9. The earth's radius is about $6.4 \times 10^{6+}$ m. An object that has he mass of 20 kg is taken to a height of 1.6×10^{6} m above the ground? ($G=6.67 \times 10^{-11}$ Nm^2/kg^2 , $M_e=6 \times 10^{24}$ kg)
    i. What is the mass of an object at this height?
    ii. How much does the object weigh at this height? (1990)

CHAPTER # 7

WORK, POWER & ENERGY

OBJECTIVES → 1990-2011

1. If the speed of moving body is halved, its Kinetic Energy becomes
   *one fourth *half
   *Three times *four times
2. The work done by a conservative force along a path is:
   *positive *negative
   *zero *none of these
3. The momentum of a body becomes ____ when its kinetic energy becomes _____ when its Kinetic Energy is doubled.
4. Joules / Sec = 1 ____.
5. 1 h.p = ____ft-lb / sec
6. Work done in a gravitational field is independent of the path. (True/ false)
7. A body possesses potential energy only when it exists in the earths or some other body's gravitational field. (True/False)
8. One Kilo Watt hour is equal to _____ J.
9. The Absolute P.E of a body of mass 'm' in the Earth's Gravitational Field is given by:
   * $-GM_em/r$ * GM_em/r * $-GM_em/r^2$ * $-GM_em/R_e^2$
10. Which of he following is a unit of Power?
    * Kilowatt * Kilowatt hour * Horse Power * ft lb /sec
11. Watt hour is the unit of:
    * Force * Acceleration * Energy * Velocity
12. One horse power is equal to:
    * 400 watt * 500 Watt * 746 watt * 70 watt
13. Kilo watt hour is the unit of:
    * Energy * Power * Acceleration * Momentum
14. Power is equal to:
    * F.d / t * F x d / t * F. F / t * F x F / t
15. If the mass and speed both are doubled, the kinetic energy of the moving body:
    *Increases 8 times * Increases 4 times * Increases 6 Times * Remains same
16. The dot product of force and velocity is called as:
    * Power * velocity * Momentum * Energy
17. The Work done by a conservative field around a closed path is:
    * Positive * negative * Zero * None
18. Dimension of K.E is:
    *1/2 ML^2T^{-2} *ML^2T^{-2} *$1/2ML^2T^2$ *MLT^{-1}
19. When a body moves vertically upward, the work done will be:
    *Positive * negative *zero *maximum

THEORETICALS

1. Establish Work Energy equation. (2010, 2005, 1994, 1996, 1997, 1999)
2. Define Work. Give its S.I. Units. Establish Work-Energy equation for a freely falling body in a gravitational field. (2004)
3. Define Conservative Field. Prove that the gravitational field is a conservative field. (2003 pre-med, 2003 pre-eng, 2001, 2000)
4. Explain the term "Work" and give its dimensions and three of its units. (2002 pre-med., 1992)
5. Define the term Potential energy and Kinetic Energy. A body of mass "m" is projected up in the air vertically in the earth's gravitational field with a velocity "v" it attains a height "h". Establish a relation for the kinetic energy possessed by the body. (2003 pre-eng., 1993)
6. What is Energy? State and explain the law of conservation of energy. Give its two examples. (1994, 1999)
7. Define Absolute Gravitational Potential Energy. (1998)
8. Define Absolute Potential Energy and derive the expression for the absolute potential at the Earth's Surface and at a height 'h'? (1992)
9. Define Work and Energy. (1992)

NUMERICALS

1. A water pump is needed to lift water through a height of 2.5 m at a rate of 500 gm/minute. Find its minimum power in Horse power. (2011)
2. A water pump is needed to lift water through a height of 2.5 meters at the rate of 500gm/minute. What will be the minimum horse power of the pump? (2010)
3. A ball of mass 100gm is thrown up in air vertically and reaches a height of 9.8m. Calculate the velocity with which it is thrown and its initial Kinetic energy. (Neglect air friction and take $g=10m/sec^2$)
4. Calculate the work done by a given force $F = 6i + 8j + 10k$ in displacing a body from the position A to the position B. The position vectors of A and B are: $r = 4i + 7j + 4k$ and $r = 9i + 5j + 7k$ (1994)
5. Calculate the work done by a given force $F = 3i + 4j + 5k$ in displacing a body from the position A to the position B. The position vectors of A and B are:
   $r_a = 2i + 5j + 2k$ and $r_b = 7i + 3j + 5k$.

CHAPTER # 8

WAVE MOTION & SOUND

OBJECTIVES → 1990-2011

1. Earthquake waves are the example of:
   *Audio waves *Infrasonic waves
   *Ultrasonic waves *Shock waves
2. The wave theory of light cannot explain:
   *polarization *Photoelectric effect
   *Interference *Diffraction
3. Electromagnetic waves consist of oscillating electric and magnetic fields, both are:
   *Parallel to each other *Perpendicular to each other
   *Non-parallel to each other *None of these
4. This is compression wave:
   *Light wave *X-rays
   *Sound waves *Radio waves
5. If two tuning forks of frequencies 256 Hz and 260 Hz are sounded together, the number of beats per second will be:
   *3 *4
   *5 *6
6. Pitch depends upon:
   * Frequency *loudness * time period *distance
7. The velocity of sound in space:
   *332m/sec *344m/sec * 320m/sec *zero
8. Which of the following does not exhibit simple harmonic motion?
   *A hanging spring supporting weight *the balance wheel of the watch.
   *The wheel of an automobile *the string of the violin
9. Beats are produced due to:
   * Diffraction * Interference * Polarization * Refraction
10. Which of the following represents longitudinal waves:
    * Light waves * Sound Waves * Radio Waves * X rays.
11. The distance between two consecutive nodes of a stationary wave is:
    *λ/2 * λ * λ/4 * none
12. If two tuning forks with frequencies 256Hz & 262 Hared sounded together, the beat frequency will be:
    *3 *4 *5 *6
13. SI unit of intensity of sound is:
    *watt/m^2 *decibel *weber *diopter
14. The maximum number of beats per second a that a human ear can detect is:
    * 5 * 7 * 3 * 4
15. One sone at 1000 Hz is:
    * 60 dB * 40 dB * 30 dB * 100 dB
16. The earth quake waves are the example of:
    * Audible waves * Infrasonic Waves * Shock Waves * Ultrasonic Waves
17. If the bob of a vibrating simple pendulum is detached from its mean position, its path will be:

    * a parabola * a straight line * a hyperbola * Circle
18. Human beings can hear sound waves having frequency:
    * 5 Hz * 5000 Hz * 25000 Hz * 50000 Hz.
19. The velocity of sound in a gas increases with:
    * Temperature * Loudness * Frequency * pressure
20. Frequency, which are multiples of fundamental frequency are called:
    *Harmonics *overtone *Beat frequencies *Nodal frequencies *Doppler frequency
21. Which of the following is not the property of fundamental frequency:
    * Interference * Diffraction * Polarization * refraction
22. Sone is the unit of:
    * Intensity level * Intensity of sound * Pitch of sound * Quality of sound.
23. If the mass of a simple pendulum is doubled its time period will be:
    * Doubled * halved * triples * remains constant
24. The value of elastic restoring force incase of spring:
    * Kx * - Kx * ½ Kx
25. The frequency of second's pendulum:

* 1 Hz * 2 Hz * 0.5 Hz

26. The pitch of sound depends upon:
* Velocity * intensity * frequency.
27. Which of the following is a compressional wave?
* Light wave * sound Wave * Radio Wave
28. If two tuning forks of frequencies 250 and 260 Hz are sounded together, the number of beats will be:
* 3 * 4 * 5
29. The unit of intensity level of sound is:
* Watt * Joule * Decibel * Dioptre
30. Super sonic waves have frequency more than:
* 20 Hz * 2000 Hz * 5000 Hz * 20000 Hz
31. When to exactly similar waves travel in a medium in opposite direction, they produce:
* Standing Waves * resonance * Beats * Diffraction
32. The intensity level of a sound of intensity 10^{-12} watt/m^2 in a bell is:
* Two * three * Zero * one
33. The time period of a simple pendulum depends upon its:
* Length * mass * amplitude * temperature.
34. The physical quantity related to loudness of sound is:
* Frequency * Quality * Wave length * intensity
35. An object performing simple harmonic motion. Its kinetic energy is maximum at its:
* mean position * extreme position * at any point * none
36. When two vibrating bodies have slightly different frequencies, they produce:
* Echo * Beats * resonance * polarization
37. Which of the following property of sound is affected by change in temperature:
*amplitude * Frequency * Wavelength * Intensity
38. If the tension in a string is made four times, the speed of transverse waves will be:
* halved * doubled * four times * the same
39. Beats are produced due to the superposition of two waves of the same frequency. (T/F)
40. The tension of the stretched string is increased 4 times the speed of the transverse wave in it will be increased:
*4 times *8times *2times *16 times
41. The velocity of sound has max. Value in:
*solid *liquid *gasses *free space
42. A body executes a simple harmonic motion if:
*a=k.x *v=-k.x *a= -k.x *a= $-k.x^2$

THEORETICALS

1. For simple harmonic motion, will the time period change or not, by doubling the mass of the bob attached to:
a) Elastic spring? b) Inelastic spring? Explain. (2011)
2. A particle is in a state of uniform circular motion. Prove that its projection along one of its diameters executes simple harmonic motion. (2011)
3. What is Doppler's effect? Explain this effect analytically when the source is moving away from a listener at rest. Write three applications of Doppler's effect. (2011)
4. Define simple harmonic motion and prove that for a small amplitude of vibration of the motion of a simple pendulum is simple harmonic motion also derive the formula for its time period. (2010)
5. What are Doppler effects? Explain this effect analytically when the source of sound moves away from the listener rest. Write three applications of Doppler effects (2009).
6. What is the difference b/w interference & beat of sound waves? Elaborate it (2009)
7. A sonomter wire of length 1m, when plucked at the center, vibrates with the frequency of 250 Hz. Calculate the wavelength & speed of waves in the wire. (2009)
8. A wire hangs from a dark high tower so that the upper end is not visible .how can we determine the length of the wire. (2009)
9. Mention Newton's fault in the formula for speed of sound, Describe Laplace's correction in it. (2006)(2002 medical)(2002 engineering)(2000, 1992, 1994, 1997)
10. Prove that motion of the projection of a particle in uniform circular motion is Simple harmonic on one of the diameter of the reference circle. (2006)(2003 engineering) (2003 Medical)(2001)
11. Consider a spring mass system to show that its energy will remain constant through its motion. (2006)
12. Derive the formula for apparent frequency heard by a stationary listener when the source of sound is moving towards the listener. (2006)
13. Discuss the variation in the pitch of sound when a source of sound moves towards a stationary listener. (2005)(2003 engineering)
14. What are beats? How they are produced? Obtain an expression for the beat frequency. (2005)(2003 engineering)(2002 medical)

15. What are stationary waves? On what factors does the frequency of stationary waves in a stretched string depend? (2005)
16. Define SHM and simple pendulum, Prove that for simple amplitude of vibration, the motion of a simple pendulum/spring is Simple harmonic. (2005, 1993, 1995)
17. Drive an expression for instantaneous velocity, Time period and max velocity of projection of a particle moving with the uniform velocity on the circumference of the circle. (2004, 1999, 1992)
18. What is the effect of temperature on speed of sound? Derive a formula showing relation b/w speed of sound and absolute temperature of the medium. (2004)(2000)
19. What are stationary waves? A string of length "l" is stretched b/w two hooks. Find the frequency of the stationary waves produced in a string when it is vibrating in one loop, two loops, three loops and "n" loops. (2004)(2002 engineering)(2001)
20. Define: (2004)
    -i- Intensity of sound –ii- Loudness –iii- Intensity level –iv- Quality of sound
21. State the laws of transverse vibrations of a stretched string in a sonometer.(2003 pre-engg)
22. Derive an expression for the time period/frequency of a simple pendulum. (2003 medical, 1997, 1991)
23. Distinguish b/w musical sound and noise. (2003 medical)
24. What is Doppler's effect? Derive the expressions for the apparent frequency when an observer moves towards and away from the stationary source. (2003 medical)(2001, 1999, 1998)
25. Show that the motion of a simple pendulum is Simple Harmonic. (2002 medical, 2002 engineering, 2000, 1991)
26. How standing waves are produced. Give their characteristics. (2002 medical, 1999)
27. Define Simple Harmonic Motion. Derive an expression for the acceleration of a body attached with a spring lying on a smooth horizontal surface executing simple harmonic motion. (2002 engineering)(2000)
28. Name the characteristics of a musical sound, Define intensity of sound, loudness of sound and intensity level. Write down Weber Frechner Law. (2001, 1993)
29. Give the characteristics of simple harmonic motion. (1991, 1992, 1997)
30. Calculate the intensity of faintest audible sound when $I_0 = 10^{-12}$ Watt / m^2. (1993)
31. Laws of vibration of a stretches spring (one, two and three loop vibration). (1994, 1996, 1999)
32. What will be the trajectory of a bob of a vibrating simple pendulum after it has got suddenly detached from the thread while passing through its mean position? (1995)
33. What are shock waves? Explain. (1995)
34. Note on sonometer (1994)
35. A particle is moving with a uniform speed along the circumference of a circle. Show that the motion of the projection along one end of its diameter is simple Harmonic. (1992)
36. Explain the Newton's Law for speed of sound in a material medium. (1992)
37. Differentiate b/w intensity and loudness of sound. How are they related? (1992)
38. Define and explain intensity level, describe its units. (1992)
39. Write a note on 'Doppler's Effect', 'Ultrasonic', Pitch and quality. (1991)

NUMERICALS

1. A note of frequency of 500 Hz is being emitted by an ambulance moving towards a listener at rest. If the listener detects a frequency of 526 Hz, calculate the speed of the ambulance. Speed of sound in 340 m/s at that moment.) (2011)
2. If the tension in the string is doubled, what will be the effect of on the speed of thee standing wave in the string. (2010)
3. A string 2 m long and mass 0.004kg is stretched horizontally by passing one of its end over a pulley and the string is attached with one kg mass it to vertically. Find the speed of the transverse wave o n the string and the frequency of the fundamental and fifth harmonic at which the string will vibrate. (2010)
4. A simple pendulum completes one vibration in 8 seconds on the surface of the earth. Find the time period on the surface of the moon where the acceleration due to the gravity is one sixth that of the earth. (2010)
5. A time period of a simple pendulum is 2 seconds on the surface of the earth. Find its time period on the surface of the moon where the acceleration due to gravity is one sixth that on earth. (2009)
6. A note of frequency 500 Hz is being emitted by an ambulance moving towards a listener at rest. If the listener detects a frequency of 526 Hz . Calculate the speed of ambulance. Take the speed of sound at room temperature to be 340 m/s. (2009)
7. How would the weight of the body vary as it taken from the Earth to the Moon / what will the effect on its mass. (2009)
8. A time period of a simple pendulum is 2 seconds on the surface of the earth. Find its time period on the surface of the moon where the acceleration due to gravity is one sixth that on earth. (2009)
9. A note of frequency 500 Hz is being emitted by an ambulance moving towards a listener at rest. If the listener detects a frequency of 526 Hz . Calculate the speed of ambulance. Take the speed of sound at room temperature to be 340 m/s. (2009)
10. How would the weight of the body vary as it taken from the Earth to the Moon / what will the effect on its mass. (2009)

11. Find the length of second's pendulum on planet Jupiter where value of "g" is 2.63times the value of "g" on the earth. (2006)(2000)
12. A car has its siren surrounding 2 KHz tone. If the frequency heard by a stationary listener is 2143 Hz, find the speed with which it approaches stationary listener. (2005)
13. In a sonometer a wire of length 1m when plucked at the centre vibrates with a frequency 250 Hz, calculate the wave length and the speed of the waves in the wires. (2005)
14. The period of oscillation of a body of mass 25gm attached to a spring, vibrating on a smooth horizontal surface, when it is displaced 10cm to the right of its extreme position, the period of vibration is 1.57sec and the velocity at the end of the displacement is 0.4m/s. Determine the spring constant, total energy and amplitude. (2004)
15. A standing wave is established in a 2.4m long string fixed at both ends. The string vibrates in 4 segments when driven at 200 Hz. Determine the wavelength and the fundamental frequency. (2004)
16. A source of sound and a listener are moving towards each other with velocities which are 0.5times and 0.2time the speed of sound respectively. If the source is emitting 2khz tone, calculate the frequency heard by the listener. (2003 engineering)
17. A string 2m long and of mass 0.004kg is stretched horizontally by passing one end over a pulley and attaching a 1kg mass to it, find the speed of the transverse waves on the string and the frequency of the second harmonic. (2003 engineering)
18. A mass at the end of a spring oscillates with simple harmonic motion with a period of 0.40sec; find the acceleration when the displacement is 4.0cm. (2003 medical)
19. Two cars are moving straight to each other from opposite directions with the same speed. The horn of one is blowing with the frequency is 3000hz and is heard by the people in the other car with the frequency of 3400hz,find the speed of the cars if the speed of sound in air is 340m/s. (2003 medical)
20. Calculate the speed of sound in air at S.T.P. What will be the speed of sound at 37^oC. (Density of air= $1.29kgm^{-3}$, γ for air= 1.42, 1atm= $1.01x10^5N/m^2$) (2002 medical)
21. A 2m long string with mass 0.004kg is stretched horizontally by passing one end over a pulley and attaching a 1kg mass to it. Find the speed of the transverse waves in the string and the frequency of the fifth harmonic. (2002 medical)
22. A body hanging from a spring is set into motion and the period of oscillation is to be 0.8sec. After the body has come to rest, it is removed. How much shorter will the spring when it comes to rest. (2002 engineering)
23. Compute the acceleration due to gravity on the surface on the moon when a simple pendulum 1.5m long makes 100 vibrations in 605seconds. (2002 engineering)
24. The frequency of a string is 125 Hz, when it is vibrating in 5 segments (nodes at both ends). Calculate the frequency when the string vibrates in three and four segments. What is the speed of the wave in it if the length of the string is 0.80m? (2001)
25. An ambulance has a siren producing sound waves on a bus stop. If the frequency heard by the listener is 2150 Hz; find the speed of the ambulance. (Speed of sound in air is 340m/s) (2001)
26. Find the speed of sound in air at 0^oC. Given γ=1.4 for air, molecular mass of air M=0.0288kg/mole; R=8.314J/mole.K. (2000)
27. A standing wave is established in 110 m long string fixed at both ends. The string vibrates in four segments when driven at 110 Hz. Determine the wavelength and the fundamental frequency. (1999)
28. A car has been sounding a 4 KHz tone. What frequency will be detected by a stationary listener as the car approaches him at 50 Km/hr? (The speed of sound=1200 Km/Hr) (1999)
29. Calculate the speed of sound waves in air at atm. Pressure P = 1.01×10^5 N/m^2, taking γ = 1.40 and ρ = 1.2 Kg/m^3. (1998)
30. A car has a siren sounding 2 KHz tone. What frequency will be detected by a stationary listener as the car is approaching him at 80 km/h. (speed of sound in air=1200 km/hr) (1998)
31. A body of 0.5 Kg is attached to a spring is displaced from its equilibrium position and released. If the spring constant is 50 N/m. Find the (i) Time Period (ii) The frequency. (1998)
32. Calculate the length of seconds pendulum at a place where g = 10.0 m/sec^2. (1997)
33. A guitar string has a linear density of 7.16 g/m and is under tension of 152 N. The fixed supports of the string are 89.4 cm apart. If it vibrates in three segments, calculate the speed, wave length and the frequency of the standing wave. (1996)
34. A source of sound and a listener are moving towards each other with velocities which are 0.5 and 0.2 times the speed of sound respectively. If the source is emitting 2 Khz tone. Calculate the frequency heard by the listener. (1995)
35. Calculate the length of seconds pendulum on the surface of moon where the acceleration due to gravity is 0.617 times that on the earth. (1995)
36. A stationary wave is set in a 1.5 m long string fixed at both ends. The string vibrates in 4 segments when driven by a frequency of 100 Hz. Calculate the Wave length and the fundamental frequency. (1994)
37. A simple pendulum completes 4 vibrations in 8 seconds on the surface of the earth. Find its time period on the surface of the moon where the acceleration due to gravity is one sixth that on earth. (1993)
38. Find the velocity of sound in a gas in which two waves of wave lengths 0.80 m and 0.81 m produce 5 beats per second. (1992)
39. A mass of 4 kg is attached to a spring. The spring is stretched by 0.98 m. Calculate the period of oscillation of the mass when it is given a small displacement. (1991).

CHAPTER # 9

NATURE OF LIGHT

OBJECTIVES → 1990-2011

1. In young double slit experiment, the condition for the constructive interference is that the path difference must be
   *An odd multiple of the half wavelength
   *An odd multiple of the whole wavelength
   *An intregal multiple of the half wavelength
   *An even number of the half wavelength
2. Which of the following phenomena cannot be explained by the wave theory?
   *Interference *Diffraction *Photoelectric Effect.
3. In Newton's ring, the central spot is always:
   *Dark *Bright *Red.
4. The structure of a crystal can be studied with the help of _____ of X-rays.
   *Interference *Diffraction *Polarization.
5. The phenomenon of _____ proves that light waves are transverse in Nature.
   *Reflection *Refraction *Interference *Polarization.
6. When light (White) passes through thin film, colors are formed due to:
   *Diffraction of light *Interference of light *Dispersion of light
   *Both Interference and Dispersion of light.
7. Photo electric effect proves that light consists of:
   *Particles *Waves
8. Polarization of light due to tourmaline crystals takes place b/c of:
   *Reflection *Selective absorption *Refraction.
9. When both the point source and the screen are placed at finite distance from the diffracting obstacle the phenomenon is called:
   *Fresnel Diffraction *Fraunhoffer diffraction.
10. Diffraction of light is a special type of:
    *Reflection *Refraction *Interference *Polarization.
11. In Michelson interferometer semi-silvered plate is used to obtain:
    *Dispersion *Phase coherence *Monochromatic light *Unpolarized light.
12. Which of the following is not an electromagnetic wave?
    *X-rays *Radio waves *Ultra-violet rays *Alpha-rays.
13. The condition for interference in thin films is reversed b/c of
    *Small thickness *Refraction *Phase reversal *Diffraction.
14. Which of the following demonstrates the transverse nature of light wave:
    *Interference *Polarization *Diffraction *Refraction.
15. Light process:
    *Transverse Nature *Electromagnetic character *Dual nature *All of these.
16. The evidence of transverse nature of light is provided by:
    *Polarization *Diffraction *Interference *Dispersion.
17. In this film, destructive interference occurs when path difference is:
    *An odd multiple of half wave length *Only an even multiple of wave length.
    *An integral multiple of wave length *None of the above.
18. The number of lines ruled per centimeter on a diffraction grating is 4000. Its grating element is:
    *2.5×10^{-1}m *2.5×10^{-6}m *4×10^{3}m *4×10^{5}m.
19. The transverse nature of light can be verified by:
    *Interference *Diffraction *Polarization *Refraction.
20. Electro magnetic wave consist of oscillatory electric field and magnetic field. Both fields are:
    *Parallel to each other *Parallel to the direction of propagation.
    *Perpendicular to each other *None of these.
21. The bending of light around the obstacle is called:
    *Polarization *Interference *Diffraction *Refraction.
22. Light year is the unit of:
    *Time *Energy *Intensity *Distance.
23. The appearance of colors in soup bubbles is due to
    *Polarization *Diffraction *Reflection *Interference.

24. In thin film interference the position of constructive interference and destructive interference are interchanged due:
*Phase coherence *Phase reversal *Diffraction *Interference.
25. The characteristics property of light which doesn't change with medium is:
*Frequency *Wavelength *Velocity.
26. Which of the following Phenomenon cannot be explained by wave theory?
*Interference *Diffraction *Photoelectric Effect.
27. The condition for the interference in a thin film is reversed b/c of:
*Small thickness *Phase reversal *Refraction.
28. Colors in thin film of soap are due to:
*Refraction of light *Diffraction of light. *Interference of light *Scattering of light.
29. Which property of light is used to determine the concentration of any optically active substance such as sugar?
*Interference *Dispersion *Diffraction *Polarization.
30. The wave theory of light can't explain:
*Polarization *Photoelectric effect *Interference *Dispersion.
31. If 2000 lines/cm. ruled on a grating, its grating element is:
*5×10^{-4} m *5×10^{-6} m *5×10^{-6} m *5×10^{-7} m.

THEORETICALS

1. Why are X-rays not diffracted by diffraction grating or thin films? (2011)
2. Describe Young's double slit experiment. Derive the relevant expression and the formula for fringe spacing. (2011)
3. What is the diffraction of the light and what is the diffraction grating? Derive an expression for the wavelength of light by diffracting grating?(2010)
4. What is interference of light? Give the difference of Fresnel's and fraunhoffer's diffraction? (2010)
5. Why did Newton's formula for the speed of sound in air foil? Who corrected the formula? Describe the discrepancy & give the corrected formula. (2009)
6. A parallel beam of the X rays is diffracted by a crystal. The 1^{st} order max is obtained when the glancing angle of incidence is 6.6^0 . If the distance b/w the atomic planes of the crystal is $2.8A^o$. Calculate the wavelength of the radiation. (2009)
7. What is Diffraction Grating? How is it used to determine the wave length of sodium light? Derive the relevant mathematical expression. (2007)
8. Give the construction of Michelson's interferometer. Draw a neat diagram. How can it to use to determine the wave length of light? (2004)
9. Differentiate b/w interference and diffraction pattern. (2003 eng)
10. What are Newton's rings? Derived an expression for the wave length of the light used in Newton's ring. (2003 med)
11. Describe the construction and working of the Michelson's interferometer. (2002 med)
12. Differentiate b/w Fresnel and Fraunhoffer diffraction, constructive and destructive interference. (2002 med)
13. What is diffraction grating? Derive an expression for the determination of the wavelength of a monochromatic source by diffraction grating. (2001)
14. Explain how Young's double slit experiment proves that interference effect takes place incase of light. (2000)
15. What is Newton's Ring? Give experimental arrangement for producing Newton's Rings? (1999)
16. Write short notes on any two of the Following:- (1999)
    a) Compound Microscope.
    b) Polarization of light.
    c) Michelson Interferometer.
    d) Combination of thin lenses.
17. What is interference of light? (1998)
18. What is the difference b/w Fresnel & Fraunhoffer Diffraction? Explain describe a diffraction grating. How can it be used to determine the wave length of sodium light? (1996)
19. What is interference of light? (1995)
20. Describe young's double-slit experiment for demonstrating the phenomenon of interference of light. Derive the expression for the fringe spacing? (2009, 1995)
21. What is Newton's Ring? They prove an important property of light. What is this property? (1994)
22. Show how Newton's Rings can be used to find the radius of curvature of a lens? (1994)
    Write short notes on any two of the following: - (1993)

(a) Diffraction Grating. (b) Polarization of light. (c) Defects of lenses. (d) Compound Microscope.

23. What do you mean by Interference of light? Give the conditions of interference of light waves? (1992)
24. Discuss Young's double-slits? Experiment measure the wave Length of light? (1992)
25. What is Diffraction Of light? How does differ from Interference?(1991)
26. Describe a Diffraction grating for the determination of the wave length of light? (1991)
27. What is Interference of light? (1990)
28. Describe Young's double-slit experiment for the Constructive Interference &Destructive Interference of the two waves. Also calculate the spacing b/w the two consecutive bright and dark Fringes? (1990, 2006, 2005, 2002 eng)

NUMERICALS

1. If the diffraction grating produces first order spectrum of light of wavelength 6×10^{-7}m at an angle of 20^o from the normal, calculate the number of lines per mm. (2011)
2. The green light of a wavelength 5400 A^o is diffracted by a grating2000 lines/cm. compute the angular deviation of the order image. Is the 10^{th} order image possible? (2010)
3. If the radius of the 14^{th} bright Newton's ring is 1 mm and the radius of curvature of the lens is 125mm, calculate the wavelength of the light. (2010)
4. If the diffraction grating produces a first order spectrum of light of wave length $6*10^{-7}$ m at an angle of 20^o from the normal. Calculate the number of lines / mm. (2007)
5. A green light of wave length 5400 A^o is diffracted by a grating having 2000 lines/cm . Find the angular deviation. (2005)
6. X-ray wave length 1.54 A^O are diffracted by a crystal whose planes are 2.81 A^o apart . Find the glancing angle for the first order. (2004)
7. When light of the wave length 6000 A^o falls grating, it produces a second order spectrum at an angle of 30^o from the normal, Find the grating element and the number of lines/mm ruled on it. (2003 eng)
8. If the diameter of the 10^{th} bright Newton's ring is 0.005 m when light of wave length 5893 A^o is used. What is the radius of curvature of the Plano convex lens? Also calculate the thickness of the air film corresponding to this ring. (2003 med)
9. If the radius 12^{th} dark Newton's ring is 1 mm when the light of wave length 5890 A^o is used what is the radius of curvature of the lower surface of the lens used? (2003 eng)
10. 271 fringes pass a reference point when the moveable mirror of the Michelson's interferometer is moved by 0.08 mm. (2002. med)
11. In a double slit experiment the separation of the slits is 1.8 mm and the fringe spacing is 0.3 mm at a distance of 1200 mm from the slits. (2002. engg.)
12. How much should the moveable mirror of the Michelson's interferometer be moved in order to observe 400 fringes with reference to a point? The wave length of the light used is 5890A^o. (2002 eng)
13. When light of 5400 A^o falls normally on a grating is produced at 10^o from the normal. Find the number of lines/m on a grating. (2001)
14. Interference fringe were produced by light coming from slits 0.3 mm apart. If five occupied 1.75 mm on a screen at 200 mm from the slits. Find the wave length of the light. (2000)
15. If the radius of 14^{th} Newton's ring is 1.00mm when the light of wave length 5.89×10^{-7}m is used. What is the radius of curvature of the lower surface of the lens used. (1999)
16. How many fringes will pass a reference point if the moveable mirror of the Michel's interferometer is moved by 0.08 mm? The wave light used is 5800 A^o. (1998)
17. Green light of wave length 5400 A^o is diffracted by a diffraction grating having 2000 lines/cm Compute the angular deviation of the third order image. (1998)
18. If the radius of 14^{th}ring is 1.0mm and the radius of curvature of the lens 126mm .Calculate the WAVE LENGTH of light. (1997)
19. Red lights falls normally on a diffraction grating ruled 4000 lines/cm and the seconds order image is diffracted 34^o from the normal. Compute the wave length of red light in angstroms. (1996)
20. Interference fringes were produced by two slits on a screen 0.8 m from them when the light 5.8×10^{-7} m was used .If the separation b/w and the fifth bright fringe 2.5mm. Calculate the separation of the two slits. (1995)
21. If the radius of the 10^{th} ring is 0.5mm when the light of 6.00×10^{-7} m is used .What is the radius of curvature of the lens used? (1994)
22. A diffraction grating produces deviation of 12^o in the second order with the light of wave length 4160 A^o. Find the grating element and the number of lines/cm on the grating. (1991)

CHAPTER # 10

GEOMETRICAL OPTICS

OBJECTIVES → 1990-2011

1. The magnifying power of a lens of focal length 25 cm is:
   *1/2 *1
   *zero *2
2. By using adjustable aperture of a lens we can reduce the defect of the lens which is called:
   *Astigmation *chromatic aberration *Spherical aberration *none of them
3. If the power of a converging lens is 4 diopters, what is the focal length of the lens?
   *20 cm * 25cm *10 cm *50cm
4. The Power of a convex lens of focal length 5 cm is:
   *1 Diopter *5 Diopter *20 Diopter *0.2 Diopter.
5. A student is wearing glasses of power 2.5 Diopter. This corresponds to the focal length of:
   *25 cm *60 cm *50 cm *40 cm.
6. Two convex lenses of the same focal length f are kept touching each other. The focal length of the combination will be:
   *F *0.5 f *2 f *2f +2.
7. The power of the convex lens of focal length 50 cm is
   *1/2 Diopter *2 Diopter *1/50 Diopter *50 Diopter.
8. An astronomical telescope when focused for infinity with $f^0 = 60$ cm. and $f^c = 3$ cm. has its length equal to:
   *63 cm *20 cm *57 cm *180 cm.
9. The characteristics property of light which doesn't change with the medium is:
   *Frequency *Wave length *Velocity
10. A defect of eye called myopia can be corrected by using the:
    *Convex lens *Concave lens *Bifocal lens.
11. A monochromatic beam of light is entering from one medium into another. The property which remains unchanged is:
    *Amplitude *Velocity *Frequency *Wave length.
12. The dispersion of white light after passing through a prism is due to:
    *Different Intensities *Different Amplitude
    *Different Temperature *Different Wave length.
13. The magnifying power of a magnifying glass of focal length 25 cm is:
    *½ *1 *Zero *2
14. If a single convex lens is placed close to the eye. It is being used as:
    *Compound Microscope *Telescope. *Simple Microscope. *Spectroscope.
15. The unit of power of a lens is
    *Watt *Joule *Diopter *Newton.
16. If an Object is placed at 2F of a convex lens. The Image will be formed at
    *2F *4F *3F *F.
17. Chromatic aberration is caused by:
    *Reflection *Dispersion *Refraction.
18. The power of concave lens of focal length 50cm is:
    *0.5 Diopter *-2 Diopter *2 Diopter.
19. The defect of lens which can be easily corrected by reducing its aperture is known as:
    *Spherical Aberration *Astigmatism *Chromatic Aberration *Hypermetropia
20. Two thin convex lenses each of focal length 10 cm are placed in contact with each other. Their equivalent focal length will be:
    *20 cm *10 cm *5 cm *100 cm.
21. If a single lens is placed close to an eye, it is used as a:
    *Compound microscope *Spectroscope *Telescope *Simple microscope.
22. Light year is a unit of:
    *Energy *Time *Distance *Intensity
23. In Galilean telescope, the final image formed is:
    *Real & Inverted *Virtual & Inverted *Real & Erect *Virtual & Erect
24. If an Astronomical telescope has an objective of focal length 90 cm. and the focal length of its eyes piece is 10 cm. the length of the telescope will be:
    *9 cm *100 cm *80 cm *None of these.
25. If an object is placed at the focus of a converging lens its image will be formed at _____.

26. In a compound microscope the eye piece is used on a _____

NUMERICALS

1. Two converging lenses of focal lengths 30 cm and 60 cm are placed in contact. What is the focal length of this combination? Calculate the power of the combination in dioptres. (2011)
2. A magnifying glass produces an image of magnification 6. What is the power of the lens? What is the best position of the object if a watch maker holds the same lens close to his eye to se the damaged spring of the watch? (2010)
3. What is the magnifying power of an astronomical telescope focused at infinity, when the power of its objectives & eye piece lenses are 2 diopter & 20 diopter respectively? (2009)
4. A convex lens of 4 diopter is in close combination with a concave lens of power 2 diopter. Find the resultant power & the focal length of the combined lens system. (2009)
5. If the magnification of a telescope is 11 and its length is 120 cm. Determine the focal length of its objective and eyepiece when the telescope is focused for infinity. (2007)
6. A compound microscope has an objective of focal length 10 mm and a tube 100 mm long. An image is produced at 250 mm from the eyepiece when the object is 12 mm from the objective. What is the angular magnification? (2006)
7. A magnifying glass of what power should be used to obtain an image of magnifying 6? (2006, 2004)
8. A compound microscope has an objective and eyepiece of focal length 1 cm and 5 cm respectively. The object is located at the distance of 1.05 cm from the objective and forms an image 4.17 cm close to the eyes piece, find the separation of the lenses and the magnifying power of the microscope. (2003 med)
9. A telescope has the objective and eyepiece lenses of power 2.0 and 20.0 diopter respectively. What is the magnifying power of the telescope if tit is focused for infinity? (2002 med)
10. A microscope has the objective 10 mm focal length and the eye piece of focal length 25 mm. Find the magnification produced when an object is placed at a distance of 10.5 mm from the objective. (2001)
11. Find the distance at which an object should be placed in front of a convex lens of focal length 20 cm. to obtain an image of double its size? (1997)
12. In a compound microscope, the focal lengths of the objective and eye piece are 0.8 cm. and 2.5 cm. respectively. The real image formed by the objective is 16 cm. from it. Determined the magnifying power of the microscope if the eye is held close to the eye piece and the image is formed at 25 cm. from the eye piece? (1996)
13. The length of a compound microscope is 30 cm. The focal length of the objective is 0.25 cm. And that of the eye piece is 10 cm. Calculate its magnifying power if the final image is formed at a distance of 250 mm. from the eye piece? (1994)
14. If the magnifying glass produces an image of magnification 6, what is the power of the lens? What is the best position of the object if the watch maker holds a same lens close to his eye to see the damaged spring of a watch? (1993)
15. The Magnifying power of microscope is 30 and the magnifying power of the object is 10. Find the magnifying power of the eye piece? (1991)
16. What is the magnifying power of an astronomical telescope having 1.0 Diopter objective and a 20.0 diopter eye-piece .Also find the length of the telescope? (1990).

THEORETICALS

1. With the help of a neat diagram, describe the construction and working of a compound microscope. Derive the formula for its magnification. (2011)
2. What is magnifying power? Give its formula. With the help of a diagram describe the construction and working f an astronomical telescope and derive the formula for its magnification. (2010)
3. Why do thick lenses posses chromatic & spherical aberration? Suggest remedies for the rectification of these defects. (2009)
4. Draw the labeled diagram of astronomical telescope focused for infinity and obtains an expression for its magnifying power. (2007, 2005, 2002 med)
5. With the help of ray diagram explain the working of a simple microscope. Derived the relation for its magnifying power. (2006, 2004)
6. What are the defect in lens and how they are removed? (2005, 2003 med)
7. Explain Chromatic and Aberration in lenses and tell how can be reduced? (2002 eng, 2001)
8. Obtain the thin lens formula for the convex lens. (2002 med)

9. Write short note on: (2000)
   (a) Astronomical telescope (b) Magnifying glass. (c) Diffraction grating. (d) Michelson's interferometer.
10. Derive an expression for the radius of curvature of the lens used in the arrangement? (1999)
11. Write notes on any two of the following:- (1998)
    (a) Astronomical Telescope. (b) Polarization of light. (c) Defocus of lenses. (d) Thin lens formula.
    (e) Magnifying glass.
12. Two thin lenses of focal lengths, f^1 and f^2 are placed in contact. Derive a formula for the focal length of the combination? (1997, 2003 eng)
13. Describe with the help of neat diagram, the construction and working of a compound microscope and hence derive the expression for its magnifying power? (1996, 2006, 2003eng, 2003 med, 2001, 2009)
14. Write notes any two of the following: (1995)
    a) Interference in Thin Films.
    b) Thin lens formula for Convex & Concave lenses.
    c) Astronomical Telescope.
    d) Diffraction Grating.
15. What is visual angle? Explain the principle of magnifying glass. Calculate its magnifying power? (1994)
16. With the help of a ray diagram calculate the magnifying power of a compound microscope? (1994, 2007)
17. Define Diopter. A lens has a power + Diopter. What do you no about the lens? (1993)
18. Describe with the help of a ray diagrammed the image formed by a magnifying glass and drive an expression for its magnification? (1993)
19. Write short note on any two of the following :- (1992)
    a) Wave front and Huygens's Principle.
    b) Defects of lenses.
    c) Polarization of lens.
    d) Astronomical Telescope.
20. What is Visual Angle? Define Magnifying power of an optical instrument? (1990)
21. Describe the construction and working of an Astronomical Telescope. Draw the neat ray diagrammed when the final image is formed. (1990)
    a) At the least distance of distinct vision.
    b) At infinity.
    c) Obtain an expression for its Magnifying power.