M M A HIGHER SECONDARY SCHOOL-PAPPANADU
PLUS ONE PHYSICS VOLUME-1 (QUESTION BANK)

UNIT - 1 NATURE OF PHYSICAL WORLD AND MEASUREMENT

SHORT ANSWER QUESTIONS (BOOK BACK):

1. Briefly explain the types of physical quantities. (Pg-7)
2. How will you measure the diameter of the Moon using parallax method? (Pg-14)
3. Write the rules for determining significant figures. (Pg-28)
4. What are the limitations of dimensional analysis? (Pg-34)
5. Define precision and accuracy. Explain with one example. (Pg-19)

ADDITIONAL QUESTIONS:

1. What is measurement? (Pg-7)
2. Define Physical quantity. Write its example. (Pg-7)
3. Define unit. What are its types? (Pg-8)
4. Distinguish between fundamental and derived units? (Pg-8)
5. What is the f.p.s system? (Pg-8)
6. What is the c.g.s system? (Pg-8)
7. What is the m.k.s system? (Pg-8)
8. What are the advantages of SI system? (Pg-8)
9. Define SI standard for length. (Pg-9)
10. Define SI standard for mass. (Pg-9)
11. Define SI standard for time. (Pg-9)
12. Name the SI unit for electric current and give a definition for it. (Pg-9)
13. What is the SI unit of temperature and define it. (Pg-9)
14. Define one mole. (Pg-9)
15. What is meant by one candela? (Pg-9)
16. Define one radian. (Pg-11)
17. Define steradian. (Pg-11)
18. What is macrocosm and microcosm.? (Pg-11)
19. What is the principle of screw gauge? Write its least count. (Pg-12)
20. What is parallax? (Pg-13)
21. What is parsec? Write the value of parsec. (Pg-16)
22. Define light year. (Pg-16)
23. Define astronomical unit. (Pg-16)
24. What is called error? (Pg-818)
25. What are systematic errors? (Pg-20)
26. How to minimize the systematic error? (Pg-20)
27. What is personal error? (Pg-20)
28. What are least count errors? How is it minimized? (Pg-20)
29. What are Random errors? How is it minimized? (Pg-20)
30. What are Gross errors? How is it minimized? (Pg-21)
31. What is absolute error? (Pg-22)
32. What is mean absolute error? (Pg-22)
33. What is relative error or fractional error? (Pg-22)
34. What is percentage error? (Pg-22)
35. Explain an error in the sum of two quantities? (Pg-23)
36. Explain an error in the difference of two quantities? (Pg-24)
37. Explain an error in the product of two quantities? (Pg-24)
38. Explain an error in the division or quotient of two quantities? (Pg-25)
39. Explain an error in the power of a quantity? (Pg-26)
40. What is General rule? (Pg-26)
41. Define significant figure or digits. (Pg-27)
42. Explain arithmetical operations with significant figures? (Pg-29)
43. Define dimensions. (Pg-29)
45. Define dimensional constant and dimensionless constant. (Pg-32)
46. Define dimensional variable and dimensionless variable. (Pg-32)
47. Write principle of homogeneity of dimensions. (Pg-32)
48. What are the uses of dimensional analysis? (Pg-32)
49. Check the correctness of the equation $1/2mv^2 = mgh$ using dimensional analysis method. (Pg-33)

LONG ANSWER QUESTIONS (BOOK BACK):

1. i) Explain the use of screw gauge and vernier caliper in measuring smaller distances.(Pg-12)
   ii) Write a note on triangulation method and radar method to measure larger distances. (Pg-13,15)
2. Explain in detail the various types of errors. (Pg-20,21)
3. What do you mean by propagation of errors? Explain the propagation of errors in addition and multiplication. (Pg-23,24)
4. Write short notes on the following.
   a) Unit (Pg-8) b) Rounding - off (Pg-27,28) c) Dimensionless quantities (Pg-32)
5. Explain the principle of homogeneity of dimensions.What are its uses? Give example.(Pg-32)

ADDITIONAL QUESTIONS:

1. Explain the conversion of physical quantity from one system of units to another with the examples. (i) Convert 76 cm of mercury into Nm^{-2} using the method of dimension. (ii) If the value of universal gravitational constant in SI is 6.6×10^{-11} Nm^2 kg^{-2} then find its value in CGS System? (Pg-32,33)
2. What do you mean by propagation of errors? Explain the propagation of errors in difference and division or quotient of two quantities. (Pg-24,25)
3. Explain error analysis? (Pg-22)
4. Obtain an expression for the time period T of a simple pendulum. The time period T depends on (i) mass 'm' of the bob (ii) length 'l' of the pendulum and (iii) acceleration due to gravity g at the place where the pendulum is suspended. (Constant $k = 2\pi$) (Pg-34)
5. The force F acting on a body moving in a circular path depends on mass of the body(m), velocity (v) and radius (r) of the circular path. Obtain the expression for the force by dimensional analysis method. (Take the value of k=1) (Pg-*)

UNIT – 2 KINEMATICS

SHORT ANSWER QUESTIONS (BOOK BACK):

1. Explain what is meant by Cartesian coordinate system? (Pg-42)
2. Define a vector. Give examples (Pg-46)
3. Define a scalar. Give examples. (Pg-46)
4. Write a short note on the scalar product between two vectors. (Pg-53)
5. Write a short note on vector product between two vectors. (Pg-55)
6. How do you deduce that two vectors are perpendicular? (Pg-56)
7. Define displacement and distance. (Pg-60)
8. Define velocity and speed. (Pg-66)
9. Define acceleration. (Pg-73)
10. What is the difference between velocity and average velocity. (Pg-66)
11. Define a radian? (Pg-88)
12. Define angular displacement and angular velocity. (Pg-89)
13. What is non uniform circular motion? (Pg-92)
14. Write down the kinematic equations for angular motion. (Pg-94)
15. Write down the expression for angle made by resultant acceleration and radius vector in the non-uniform circular motion. (Pg-93)

ADDITIONAL QUESTIONS:

1. What is Kinematics? (Pg-42)
2. Define frame of reference. (Pg-42)
3. What is meant by Right handed Cartesian co-ordinate system? (Pg-42)
4. What is point mass? (Pg-43)
5. Define linear motion. Give an example. (Pg-43)
6. Define circular motion. Give an example. (Pg-43)
7. Define rotational motion. Give an example. (Pg-44)
8. Define vibrational motion. Give an example. (Pg-44)
9. What is meant by motion in one dimension? (Pg-45)
10. What is meant by motion in two dimensions? (Pg-45)
11. What is meant by motion in three dimensions? (Pg-45)
12. Define magnitude of a vector. (Pg-46)
13. What is meant by equal vectors? (Pg-46)
14. Define parallel and anti-parallel vectors. (Pg-46,47)
15. Define unit vector.(Pg-47)
16. What is meant by Orthogonal unit vectors? (Pg-47)
17. State triangular law of addition. (Pg-48)
18. Explain components of A vector? (Pg-50)
19. How are two vectors expressed in a Cartesian system? Explain the addition and subtraction using components. (Pg-51)
20. Write a note on multiplication of vector by a scalar. Give example. (Pg-52)
21. Give the properties of the components of vectors? (Pg-53)
22. Write a note on position vector? (Pg-58)
23. Explain displacement vector in Cartesian co-ordinate system? (Pg-60)
24. Explain differential calculus with an example. (Pg-61)
25. Explain Integral calculus with an example. (Pg-62)
26. Define average velocity and average speed. (Pg-66)
27. What is retardation? (Pg-73)
28. What is instantaneous velocity? (Pg-66)
29. Define momentum. (Pg-68)
30. What is called relative velocity. (Pg-70)
31. Distinguish between average acceleration and instantaneous acceleration? (Pg-73)
32. Write the kinetic equations for linear motion. (Pg-77)
33. Define free fall. (Pg-78)
34. What is meant by projectile?.Give examples. (Pg-81)
35. Give some examples for projectile motion. (Pg-81)
36. Define Time of flight.(Pg-82)
37. What is Horizontal range? (Pg-83)
38. Define maximum height. (Pg-85)
39. Define horizontal range. (Pg-86)
40. Define Time of flight. (Pg-86)
41. Define angular acceleration. (Pg-88)
42. Define Uniform circular motion. (Pg-91)
43. Write the assumptions need to study about the projectile motion. (Pg-81)
44. Define average velocity and represent it graphically. (Pg-66)
45. Obtain an expression for the area of triangle in terms of the cross product of vectors representing the two sides of the triangle. (Pg-57)
46. What does the slope of 'position-time' graph represent? Which physical quantity is obtained from it? (Pg-69)
47. Define the term relative velocity. How can it be obtained vectorially, When the two objects with uniform velocities move in same direction? (Pg-70)
48. Write the expression for the magnitude and direction of the relative velocity. (Pg-71)
49. Derive the expression for a resultant velocity of the projectile at any instant when a projectile is fired horizontally? (Pg-83,84)
50. Derive the relation between linear velocity and angular velocity? (Pg-90)
51. Find the expressions tangential acceleration? (Pg-90,91)

LONG ANSWER QUESTIONS (BOOK BACK):

1. Explain in detail the triangle law of addition. (Pg-47,48)
2. Discuss the properties of scalar and vector products. (Pg-53,56,57)
3. Derive the kinematic equations of motion for constant acceleration. (Pg-76)
4. Derive the equations of motion for a particle (a) falling vertically (b) projected vertically. (Pg-77,78,80)
5. Derive the equation of motion, range and maximum height reached by the particle thrown at an oblique angle θ with respect to the horizontal direction. (Pg-81-84)
6. Derive the expression for centripetal acceleration. (Pg-91,92)
7. Derive the expression for total acceleration in the non uniform circular motion. (Pg-92,93)

ADDITIONAL QUESTIONS:

1. Define the term motion and explain the different types of motion. (Pg-43,44)
2. Explain motion in one,two and three dimensions. (Pg-45)
3. Explain the subtraction of vectors. (Pg-49,50)
4. Find horizontal range and time of flight projectile in horizontal projection? (Pg-82,83)
5. A man moving in rain holds an umbrella inclined to the vertical though the rain drops are falling vertically. Why? (Pg-71)
6. Derive an expression for the centripetal acceleration of a body moving in a circular path of radius 'r'

with uniform speed? (Pg-91,92)

UNIT - 3 LAWS OF MOTION

SHORT ANSWER QUESTIONS (BOOK BACK):

1. Explain the concept of Inertia.Write two examples each for inertia of motion, inertia of rest and inertia of direction. (Pg-106,107)
2. State Newton's second law. (Pg-109)
3. Define one newton. (Pg-109)
4. Show that impulse is the change of momentum. (Pg-133,134)
5. Using free body diagram, show that it is easy to pull an object than to push it. (Pg-140)
6. Explain various types of friction. Suggest a few methods to reduce friction. (Pg-136)
7. What is the meaning by 'pseudo force'? (Pg-153)
8. State the empirical laws of static and kinetic friction. (Pg-137,139)
9. State Newton's third law. (Pg-110)
10. What are inertial frames? (Pg-108)
11. Under what condition will a car skid on a leveled circular road? (Pg-151)

ADDITIONAL QUESTIONS:

1. State Newton's First law. (Pg-106)
2. Define Inertia of rest, motion and direction. (Pg-107)
3. What is free body diagram? What are the steps to be followed for developing free body diagram? (Pg-114)
4. State the law of conservation of total linear momentum. (Pg-131)
5. Define impulse. (Pg-133)
6. What is the role of air bag in a car? (Pg-135)
7. Define frictional force. (Pg-136)
8. What is meant by static friction? (Pg-136)
9. What is meant by kinetic friction? (Pg-139)
10. Define Angle of Friction. (Pg-141)
11. Define Angle of repose. (Pg-142)
12. What are the applications of angle of repose? (Pg-143)
13. How does the rolling wheel's work in suitcase? (Pg-144)
14. Where does the friction force act? (Pg-145)
15. How did the ball bearing reduce kinetic friction? (Pg-145)
16. What is the reason for force changes the velocity of the particle? (Pg-147,148)
17. Define Centripetal force. (Pg-148)
18. How is the centripetal force act in whirling motion? (Pg-148)
19. How did the car move on circular track? (Pg-149)
20. What is called banking of tracks? (Pg-152)

LONG ANSWER QUESTIONS (BOOK BACK):

1. Prove the law of conservation of linear momentum. Use it to find the recoil velocity of a gun when a bullet is fired from it. (Pg-130,131,132)
2. What are concurrent forces? State Lami's theorem. (Pg-129)
3. Explain the motion of blocks connected by a string in i) Vertical motion ii) Horizontal motion. (Pg-126-128)
4. Briefly explain the origin of friction. Show that in an inclined plane, angle of friction is equal to angle of repose. (Pg-136,142)
5. State Newton's three laws and discuss their significance. (Pg-106,109,110,111)
6. Explain the similarities and differences of centripetal and centrifugal forces. (Pg-156)
7. Briefly explain 'centrifugal force' with suitable examples. (Pg-153,154)
8. Briefly explain 'rolling friction'. (Pg-144)
9. Describe the method of measuring angle of repose. (Pg-142)
10. Explain the need for banking of tracks. (Pg-152)
11. Calculate the centripetal acceleration of Moon towards the Earth. (Pg-150)
12. Explain centrifugal force due to rotation of the earth? (Pg-155)

ADDITIONAL QUESTIONS:

1. Explain particle moving in an inclined plane find i) acceleration ii) speed of the sliding object using free body diagram? (Pg-122,123)
2. How will you confirm Newton's third law by the way of two bodies in contact on a horizontal surface? (Pg-124,125)
3. Write the salient features of Static and Kinetic friction. (Pg-140)
4.Briefly explain what are all the forces act on a moving vehicle on a leveled circular road? (Pg-150)

UNIT - 4 WORK, ENERGY AND POWER

SHORT ANSWER QUESTIONS (BOOK BACK):

1. Explain how the definition of work in physics is different from general perception. (Pg-167)
2. Write the various types of potential energy. Explain the formulae. (Pg-176)
3. Write the differences between conservative and Non-conservative forces. Give two examples each. (Pg-182)
4. Explain the characteristics of elastic and inelastic collision. (Pg-194)
5. Define the following a) Coefficient of restitution (Pg-200) b) Power(Pg-190) c) Law of conservation of energy (Pg-183) d) loss of kinetic energy in inelastic collision. (Pg-199)

ADDITIONAL QUESTIONS:

1. Explain Work done. (Pg-167,168)
2. When does work done becomes zero? (Pg-168)
3. Define Work done by a constant force? (Pg-170)
4. Define Work done by a variable force? (Pg-172)
5. Give the graphical representation of the Work done by a variable force? (Pg-173)
6. Define Energy, Kinetic energy and potential energy. (Pg-173)
7. Write the significance of kinetic energy in the work – kinetic energy theorem. (Pg-175)
8. Define Work – kinetic energy theorem. (Pg-175)
9. Define elastic potential energy. (Pg-178)
10. Define Conservative force. (Pg-181)
11. Define Non-conservative force. (Pg-182)
12. Define Average power. (Pg-190)
13. Define Instantaneous power. (Pg-191)
14. Define unit of power or watt? (Pg-191)
15. What is meant by collision? (Pg-193)
16. Distinguish between Elastic Collision and Inelastic Collision? (Pg-193)

LONG ANSWER QUESTIONS (BOOK BACK):

1. Explain with graphs the difference between work done by a constant force and by a variable force.

(Pg-170,172)
2. State and explain work-energy principle. Mention any three examples for it. (Pg-174,175)
3. Arrive at an expression for power and velocity. Give some examples for the same.(Pg-192)
4. Arrive at an expression for elastic collision in one dimension and discuss various cases. (Pg-194)
5. What is inelastic collision? In which way it is different from elastic collision. Mention few examples in day to day life for inelastic collision. (Pg-193,198-200)

ADDITIONAL QUESTIONS:

1. Deduce the relation between momentum and kinetic energy. (Pg-175)
2. Explain the potential energy near the surface of the earth? (Pg-176,177)
3. Explain elastic potential energy with spring mass system? (Pg-178,179)
4. Write a note on Force- displacement graph for a spring? (Pg-179)
5. Write a note on Potential energy-displacement graph for spring? (Pg-180)
6. What is conservative force? State how it is determined from potential energy? (Pg-181)
7. State and prove the law of conservation of energy. (Pg-183)
8. Derive an expression for the velocity of the body moving in a circle and also find a tension at the bottom and the top of the circle. (Pg-187-190)
9. Explain Coefficient of restitution(e)? (Pg-200)

UNIT -5 MOTION OF SYSTEM OF PARTICLES AND RIGID BODIES

SHORT ANSWER QUESTIONS (BOOK BACK):

1. Define center of mass. (Pg-209)
2. Find out the center of mass for the given geometrical structures.(Pg-*)
 a) Equilateral triangle - Lies in center b) Cylinder - Lies on its central axis
 c) Square Lies in center - lies at their diagonals meet
3. Define torque and mention its unit. (Pg-217)
4. What are the conditions in which force can not produce torque? (Pg-219)
5. Give any two examples of torque in day-to-day life. (Pg-217)
6. What is the relation between torque and angular momentum? (Pg-226)
7. What is equilibrium? (Pg-227)
8. How do you distinguish between stable and unstable equilibrium? (Pg-228)
9. Define couple. (Pg-230)
10. State principle of moments. (Pg-231)
11. Define center of gravity. (Pg-231)
12. Mention any two physical significance of moment of inertia. (Pg-234)
13. What is radius of gyration? (Pg-237)
14. State conservation of angular momentum. (Pg-247)
15. What are the rotational equivalents for the physical quantities, (i) mass and (ii) force? (Pg-250)
16. What is the condition for pure rolling? (Pg-256)
17. What is the difference between sliding and slipping? (Pg-254)

ADDITIONAL QUESTIONS:

1. What is rigid body? (Pg-208)
2. Define Point Mass. (Pg-209)
3. State the rule which is used to find the direction of torque. (Pg-217)
4. When will a body have a precession? (Pg-222)
5. When a rigid body is said to be in mechanical equilibrium? (Pg-227)
6. State Parallel axis theorem. (Pg-239)
7. State Perpendicular axis theorem. (Pg-240)
8. Give the scalar relation between torque and angular acceleration. (Pg-224)
9. Give the relation between rotational kinetic energy and angular momentum. (Pg-249)
10. Obtain an expression for the power delivered by a torque. (Pg-250)
11. What are the conditions for neutral equilibrium? (Pg-228)
12. Explain the principle of moments? (Pg-230,231)
13. Write the principles used in beam balance and define Mechanical advantage. (Pg-231)
14. Find the expression for radius of gyration. (Pg-237,238)
15. Derive an expression for work done by torque. (Pg-248)
16. Write the comparison of translational and rotational quantities? (Pg-250)

LONG ANSWER QUESTIONS (BOOK BACK):

1. Explain the types of equilibrium with suitable examples. (Pg-228)
2. Explain the method to find the center of gravity of a irregularly shaped lamina. (Pg-231)
3. Explain why a cyclist bends while negotiating a curve road? Arrive at the expression for angle of bending for a given velocity. (Pg-232,233)
4. Derive the expression for moment of inertia of a rod about its center and perpendicular to the rod. (Pg-234,235)
5. Derive the expression for moment of inertia of a uniform ring about an axis passing through the center and perpendicular to the plane. (Pg-236)
6. Derive the expression for moment of inertia of a uniform disc about an axis passing through the center and perpendicular to the plane. (Pg-236,237)
7. Discuss conservation of angular momentum with example. (Pg-246,247)
8. State and prove parallel axis theorem. (Pg-239)
9. State and prove perpendicular axis theorem. (Pg-240)
10. Discuss rolling on inclined plane and arrive at the expression for the acceleration.(Pg-256)

ADDITIONAL QUESTIONS:

1. Derive an expression for the position vector of the center of mass of particle system. (Pg-209)
2. Derive an expression for the center of mass of two point masses. (Pg-210,211)
3. State in the absence of any external force the velocity of the center of mass remains constant. (Pg-214,215)
4. Define Torque and derive its expression. (Pg-217)
5. Explain torque about an axis? (Pg-221)
6. Obtain the relation between torque and angular acceleration. (Pg-224)
7. Discuss the pure rolling and find the condition for rolling without slipping and sliding. (Pg-252)
8. Write an expression for the kinetic energy of a body in pure rolling. (Pg-255)

PREPARED BY: M.Tamizharasan.M.Sc.,B.Ed.,
PGT in PHYSICS,

M M A HR SEC SCHOOL- PAPPANADU,
THANJAVUR DT.