SUBJECT: PHYSICS

Question Bank for 10+1 students for subject of Physics is hereby given for practice. While preparing the questionnaire emphasis is given on the concepts, short answer type questions, numerical problems in accordance with the syllabus prescribed by Punjab School Education Board so that it can help students from the examination point of view. We hope that you might appreciate this question bank.

Suggestions, constructive criticism of the question bank is always welcome.

With Regards,

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10+1 (PHYSICS)

Time: 3 Hours

Theory: 70 Marks
Practical: 20 Marks
C.C.E.: 10 Marks
Total: 100 Marks

1. There will be one theory paper comprising of 26 questions.
2. Question no. 1 to 8 will be of one mark each.
3. Question no.9 to 16 will be of two marks each.
4. Question no. 17 to 23 will be of four marks each. There will be internal choice in any two questions.
5. Question no. 24 to 26 will be of six marks each. There will be100% internal choice in them.
6. Distribution of marks over different dimensions of the paper will be as follows:

LEARNING OUTCOMES	**MARKS**	**PERCENTAGE OF MARKS**
KNOWLEDGE	26	36%
UNDERSTANDING	30	44%
APPLICATION	14	20%
Total	**70**	**100%**

7. In the category of one (1) mark question there will be four (4) questions of the objective type such as Yes/No, tick/cross, fill in the blanks, multiple choice, true/false etc.
8. Use of un-programmable calculator is allowed. The log tables can be used.
9. Total weightage of numerical will be 20% i.e 14 marks. There will be three numerical of 2 marks each & 2 numericals of 4 marks each.

UNIT WISE DISTRIBUTION OF MARKS

UNIT	**TITLE**	**MARKS**
UNIT-I	Physical world and measurement	05
UNIT-II	Kinematics	07
UNIT-III	Laws of motion	07
UNIT-IV	Work, Energy & Power	07
UNIT-V	Motion of System of Particles & Rigid body	09
UNIT-VI	Gravitation	06
UNIT-VII	Properties of Bulk matter	12
UNIT-VIII	Thermodynamics	05
UNIT-IX	Behavior of perfect gas and kinetic theory of gases	05
UNIT-X	Oscillation & waves	07
Total Marks		**70**

SCHEMATIC DISTRIBUTION OF MARKS

UNIT	TITLE	1 MARK QUESTIO	2 MARKS QUESTIO	4 MARKS QUESTIO	6 MARKS QUESTIO	TOTAL MARKS
1	Physical world & measurement	1	2	-	-	05
2	Kinematics	1	1	1	-	07
3	Laws of motion	1	1	1	-	07
4	Work, Energy & Power	1	1	1	-	07
5	Motion of System Particles & Rigid body	1	1	-	1	09
6	Gravitation	-	1	1	-	06
7	Properties of matter	-	1	1	1	12
8	Thermodynamics	1	-	1	-	05
9	Behavior of Perfect gas & Kinetic theory of gases	1	-	1	-	05
10	Oscillation & waves	1	-	-	1	07
Total Questions		**08**	**08**	**07**	**03**	**26**
Total Marks		**08**	**16**	**28**	**18**	**70**

INSTRUCTIONS FOR PAPER SETTER

Note:

1. There will be one theory paper consisting of total 26 questions.
2. Question no.1 to 8 will be of 1 mark each. There will be 4 questions of the objective type such as yes/no, multiple choice questions, fill in the blanks.
3. Question no.9 to 16 will be of 2 marks each. There will be 3 numerical questions of 2 marks each.
4. Question no. 17 to 23 will be of 4 marks each. There will be two four marks questions of internal choice. Each of these questions will have one theory question & other part will be numerical from the same unit. These questions should not be lengthy.
5. Question No.24 to 26 will be 6 marks and there will be 100% internal choice in them. These questions must have two parts: part (a) will be of one mark and part (b) will be of 5 marks. Part (a) may cover any topic from same unit as of long 5 marks question of part (b).
6. Question paper should cover the entire syllabus.
7. No question or topic should be repeated in the question paper.
8. Questions in the paper can be asked only from mentioned PSEB syllabus. Questions from any topic which is not mentioned in the syllabus will be considered as out of syllabus question.
9. All 3 sets must be of equal standard and difficulty level questions.
10. At the end of each question, paper setter must write detailed distribution of marks of each sub-question.
11. Vague, many possible answer questions, confusing answer question etc. type of question will not be asked in the paper. One-mark questions, answer should be of one word or one line only.
12. Language used should be clearly understood & specific.
13. Time and length limit of paper should be kept in mind.
14. Time and length limit of paper should be kept in mind while setting the paper.

SYLLABUS (THEORY)

Unit I: Physical World and Measurement

Physics-scope and excitement; nature of physical laws; Physics, technology and society.

Need for measurement: Units of measurement; systems of units; SI units, fundamental and derived units. Length, mass and time measurements; accuracy and precision of measuring instruments; errors in measurement, significant figures.

Dimensions of physical quantities, dimensional formula and dimensional equation dimensional analysis and its applications.

Unit II: Kinematics

Frame of reference. Motion in a straight line: Position-time graph, speed and velocity.

Uniform and non-uniform motion, average speed and instantaneous velocity.

Uniformly accelerated motion, velocity-time, position-time graphs, relations for uniformly accelerated motion (graphical treatment).

Elementary concepts of differentiation and integration for describing motion, Scalar and vector quantities: Position and displacement vectors, general vectors and notation, equality of vectors, multiplication of vectors by a real number; addition and subtraction of vectors. Relative velocity.

Unit vector: Resolution of a vector in a plane - rectangular components. *Scalar and vector product of vectors.* Motion in a plane. Cases of uniform velocity and uniform acceleration-projectile motion. Uniform circular motion.

Unit III: Laws of Motion

Intuitive concept of force. Inertia. Newton's first law of motion; momentum and Newton's second law of motion; impulse: Newton's third law of motion. Law of conservation of linear momentum and its applications. Equilibrium of concurrent forces. Static and kinetic friction, laws of friction. Rolling friction, lubrication.

Dynamics of uniform circular motion: Centripetal force, examples of circular motion (vehicle on level circular road. vehicle on banked road).

Unit -IV: Work, Energy and Power

Scalar product, Work done by a constant force and a variable force; kinetic energy, work-energy theorem, power.

Notion of potential energy, potential energy of a spring, conservative forces: conservation of mechanical energy (kinetic and potential energies); non-Conservative forces, various forms of energy, motion in a vertical circle; elastic and inelastic collisions in one and two dimensions.

Unit-V: Motion of System of Particles and Rigid Body

Centre of mass of a two-particle system, momentum conversation and center of mass motion. Centre of mass of a rigid body; linear momentum of system of particles, vector product of two vectors, center of mass of uniform rod. Angular velocity and its relation with linear velocity.

Moment of a force, torque, angular momentum, conservation of angular momentum with some examples.

Equilibrium of rigid bodies, rigid body rotation and equations of rotational motion, comparison of linear and rotational motions; moment of inertia, radius of gyration.

Values of moments of inertia for simple geometrical objects (no derivation). Statement of parallel and perpendicular axes theorems and their applications. Kinematics of rotational motions about a fixed axis, dynamics of rotational motions about a fixed axis, angular momentum in case of rotation about a fixed axis, rolling motion.

Unit-VI: Gravitation

Kepler's laws of planetary motion. The universal law of gravitation.

Acceleration due to gravity and its variation with altitude and depth.

Gravitational potential energy; gravitational potential. Escape velocity, Orbital velocity of a satellite. Geo-stationary satellites. Energy of an orbiting satellite, Geo- stationary satellites and polar satellites, weightlessness.

Unit-VII: Properties of Bulk Matter

Elastic behavior, of solids, Stress-strain relationship, Hooke's law, Young's modulus, determination of Young's modulus of the material of a wire, shear, bulk modulus shear, modulus of rigidity, applications of elastics behaviors of materials, Poisson s-ratio; elastic energy.

Pressure due to a fluid column Pascal's law and its applications (hydraulic lift and hydraulic brakes). Effect of gravity on fluid pressure. Viscosity, Stokes' law, terminal velocity, Reynold's number, streamline and turbulent flow.

Critical velocity. Bernoulli's theorem and its applications. Surface energy and surface tension, angle of contact, excess of pressure, application of surface tension ideas to drops, bubbles and capillary rise, Detergents and surface tension.

Heat, temperature, measurement of temperature, ideal gas equation and absolute temperature, thermal expansion; thermal expansion of solids, liquids and gases, anomalous expansion, specific heat Capacity: Cp, Cv-colorimetry; change of state-latent heat.

Heat transfer-conduction, convection radiation and thermal Conductivity, *Qualitative idea of Blackbody radiation,* Newton's law of cooling and Stefan's law, Wein's displacement law, Green House effect.

Unit-VIII: Thermodynamics

Thermal equilibrium and definition of temperature (zeroth law of thermodynamics). Heat, work and internal energy. First law of thermodynamics. Specific heat capacity, thermodynamic state variables and equation of state, thermodynamic processes, Isothermal and adiabatic processes. Second law of thermodynamics: reversible and irreversible processes. Heat engines and refrigerators, Carnot engine.

Unit-IX: Behavior of Perfect Gas and Kinetic Theory

Molecular nature of matter, Equation of state of a perfect gas, work done on compressing a gas. Kinetic theory of ideal gases. Assumptions, concept of pressure. Kinetic energy and temperature;

rms, speed of gas molecules; degrees of freedom, law of equipartition of energy (statement only) and application to specific heat capacities of gases, solids and water: concept of mean free path, Avogadro's number.

Unit-X: Oscillations and Waves

Periodic and oscillatory motions, Periodic motion - period, frequency, displacement as a function of time. Periodicfunctions. Simple harmonic motion (S.H.M) and its equation; phase; oscillations of a spring-restoring force and force constant; energy in S.H.M.-kinetic and potential energies: some systems executing simple harmonic motion simple pendulum-derivation of expression for its time period: free, forced and damped oscillations (qualitative ideas only), resonance.

Wave motion. Longitudinal and transverse waves, speed of wave motion. Displacement-relation for a progressive wave. Principle of superposition of waves, reflection of waves, standing waves in strings and organ pipes, fundamental mode and harmonics, Beats, Doppler effect.

NOTE: -TOPICS GIVEN BELOW ARE IN PRESCRIBED SYLLABUS OF P.S.E.B. BUT NOT MENTIONED IN BOOK SURSCRIBED BY PSEB. SO THESE TOPICS ARE TO BE DONE WITH STUDENTS AND PAPER WILL INCLUDE THESE TOPICS AND QUESTIONS FROM THESE TOPICS ARE NOT CONSIDERD AS OUT OF SYLLABUS.

1. Motion in a vertical circle
2. Centre of mass of uniform rod
3. Poisson’-ratio; elastic energy
4. Terminal velocity
5. Qualitative idea of Blackbody radiation,
6. Stefan’s law, Wein’s displacement law, Green House effect.
7. Definition of temperature
8. Work done on compressing a gas
9. Avogadro’s number.

UNIT-I
PHYSICAL WORLD AND MEASUREMENT
1 Mark questions

1. Parsec is unit of (a) time (b) distance (c) frequency (d) angular acceleration.
2. The dimensions of surface tension is: (a) $[MLT^{-2}]$ (b) $[ML^{0}T^{-2}]$ (c) $[ML^{2}T^{-2}]$ (d) $[MLT^{-1}]$
3. Radar works on the principle of reflection of waves. True or false.
4. 1 Light year is equal to _____m.
5. The number of significant figures in $1.22 \times 10^{4}$is ____.
6. One parsec =_____ light years.
7. What does RADAR stand for?
8. Which types of waves are used in RADAR?
9. What does SONAR stand for?
10. Which types of waves are used in SONAR?
11. 1 fermi = _____ m.

2 Marks questions

1. What is physics? Why it is called exact science?
2. What is electromagnetic force and nuclear force?
3. What is standard unit? What are characteristics of standard unit?
4. What necessitated the selection of some fundamental units?
5. Distinguish between fundamental units and derived units.
6. Name the basic and supplementary units of SI?
7. Write any 5 rules and conventions of writing units.
8. Define light year, parsec and astronomical unit.
9. Why we use a platinum iridium alloy in making prototype meter and kilogram?
10. What are advantages of SI system?
11. How much larger than the nanosecond is microsecond?
12. How many angstroms are there in one nanometer?
13. The mass of an electron is 9.11×10^{-31} kg. How many electrons make one gram?
14. How many quintals are there in 2 gigagram?
15. How many light years are there in one parsec?
16. Express parsec and light year in terms of AU?
17. How much larger than a nanosecond is a millisecond?
18. What is difference between mN, Nm and nm?
19. Express 0.35Å in m and nm.
20. What is parallax and parallax angle?
21. How will find the distance of distant star using parallax method?
22. Explain the use of RADAR and SONAR.
23. Explain the triangulation method to find the distance of inaccessible object.
24. Explain how you will determine the radius of an atom by Avogadro's hypothesis.
25. Name the unit used to measure the size of a nucleus and measure it in meters.
26. Distinguish between mass and weight.
27. State the principle of homogeneity of dimensions. What are its uses?
28. What are limitations of dimensional analysis?
29. Can a quantity have units but still be dimensionless?
30. A body of mass m is moving in a circle of radius r with angular velocity ω. Find the expression for the centripetal force F acting on it using methods of dimensions.

31. Check the accuracy of relation $\tau = I\alpha$
32. If $x = a + bt + ct^2$, where x is meters and t is in seconds. What are the units of a, b, c?
33. What is meant by significant digits? State the rules of finding significant figures.
34. State the number of significant figures in the following:
    0.5032, 2.43×10^{24} kg, 3.000 m
35. Subtract 7.9×10^{-5} from 8.3×10^{-4} with due regard to significant figures.
36. What do you understand by absolute error and relative error?
37. A potential difference V= (20 ± 1) V is applied across a resistance R= (8±2) Ω. Find the value of current with limits of error.
38. A physical quantity P is given by $P = a^3b^2/cd^3$ the percentage error of measurement in a, b, c and d are 1%, 2%, 4% and 3% respectively. What is the percentage error in the quantity P ?

UNIT- II
KINEMATICS
1-Mark questions

1. Draw a position time graph for a stationary object.
2. The slope of position time graph represents ----------.
3. Draw a position time graph for motion with a positive acceleration.
4. Draw a position time graph for motion with a negative acceleration.
5. Draw a position time graph for motion with zero acceleration.
6. A boy completes a semicircle of radius 7 m in 5 seconds. The distance travelled by the boy is (a) 7 m (b) 10 m (c) 11m (d) 2 m.
7. The speedometer of the vehicle measure average speed. True/False
8. A projectile has a maximum range if projected at an angle of ……

2 Marks questions

1. Rest and motion are relative terms. Explain.
2. Distinguish between distance and displacement.
3. Distinguish between speed and velocity.
4. How will you represent uniform motion on position-time graph? What is use of such graph?
5. How will you represent uniform motion on velocity-time graph? What is use of such graph?
6. Show that area under velocity time graph for uniform accelerated motion represent distance travelled.
7. Derive the equation of displacement in the nth second of the motion.
8. Can a speed of a body change if its velocity is constant?
9. Can a velocity of a body change if its speed is constant? Give example.
10. Under what condition will the distance and displacement of moving object will have the same magnitude.
11. A car covers first half of the total distance with a speed of 72 km/h and second half with a speed of 36 km/h. find the average speed of the car.
12. A train 110 m long is moving with a velocity of 72 km h^{-1} Find the time it takes to cross the bridge 1 km long?
13. A car moving on a straight road with a speed of 72km/h is brought to rest after 100m. Calculate (i) acceleration of the car and (ii) time taken to come to rest.
14. A body moving with uniform acceleration describes 20m in 2^{nd} second and 30 m in 5^{th} second of its motion. Calculate the distance covered by it in 8^{th} second.
15. A body travels half the total distance in the last second during free fall. Find its height from the ground and the total time of free fall. (Ans: 57 m, 2.4 s).
16. Distinguish between scalar and vector quantities giving examples of each type.
17. Is a quantity which has a magnitude and direction always a vector? Give one example.
18. What is an essential condition for adding two vectors?
19. Can commutative law be applicable to vector subtraction?
20. Show that the flight of a bird be an example of composition of vectors?
21. What is meant by resolution of vectors? Can a vector be zero, if one of its components is not zero?
22. What is the angle between a 2N force and 3N force, so that their resultant is 4N?
23. Two equal forces are acting at a point with an angle of 60° between them. If the resultant force is equal to $20\sqrt{3}$N. Find the magnitude of each force.

24. Two forces have magnitude in the ratio 5: 12. If the angle between them is 90^o, they give the resultant of magnitude 26 N. Find the magnitude of resultant force if the angle between them is changed to 120^o.
25. At what angle do the two vectors of magnitude A+B and A-B act so that their resultant is $\sqrt{A^2 + B^2}$.
26. A man can jump on moon six times as high as on earth. Why?
27. A ball is thrown straight upward. What is its velocity and acceleration at the top?
28. Show that there are two possible angles of projection for obtaining the same range.
29. While firing, one has to aim a little above the target and not exactly on the target. Why?
30. The horizontal range of a projectile is $4\sqrt{3}$ times its maximum height. Find the angle of projection.
31. Find the angle of projection for a projectile motion whose range R is 4 times the maximum height H.
32. Derive the relation between linear and angular velocity?
33. A flywheel is making 60 r.p.m. Calculate the linear speed of the point on its rim. The radius of the wheel is 3m.
34. A body is projected from the top of a 73.5 m high hill with a velocity of 19.6 m /s in the upward direction making an angle of 30 ° with the horizontal. Find the time of flight, range and its downward velocity when it strikes the ground. (Ans: 5 s, 84.9 m, 39.2 m /s downwards)
35. A stone is projected with a velocity of 19.6 m / s and at 30 ° to the horizontal. Calculate (i) range, (ii) total time of motion and (iii) maximum height. (Ans: (i) 33.95 m, (ii) 2 s, (iii) 4.9 m)
36. A football player kicks a football in the direction making an angle of 45 ° with the horizontal. The initial velocity of the ball in that direction is 50 m/s. Find (a) the horizontal displacement, (b) the maximum height attained and (c) the time of flight. (Ans: (a) 256 m, (b) 63.8 m, (c) 7. 2 s).
37. What should be the initial velocity of a football kicked at an angle of 45 ° with horizontal to pass just touching the top of a pole of 0.8m height kept at 1 m distance from initial position? g = 9.8 m /s ^{2}. (Ans: 7 m / s)
38. A bomber flying upwards at an angle of 60 ° with the vertical releases a bomb at an altitude of 800 m. The bomb strikes the ground 20 seconds after its release. Find (a) the velocity of the bomber at the time of release of the bomb, (b) the maximum height attained by the bomb and (c) the horizontal distance travelled by the bomb before it strikes the ground. g = 10 m / s ^{2}. (Ans: (a) 120 m / s, (b) 980 m, (c) 2078 m).
39. A stone is projected from the ground in a direction making an angle of 22.5 ° with the horizontal. It falls on the ground at a distance of 102 m. Find the initial velocity of the stone, maximum height attained and the time of flight. (Ans: 14 m / s, 1.4 m, 1.09 s).
40. Height of a tower is 39.2 m. A body is allowed to fall from the top of the tower. At the same time, another body is projected vertically upwards with velocity 19.6 m / s from its bottom. Where and when will they meet? g = 9.8 m / s ^{2}. (Ans: at 19.6 m from the bottom of the tower, after 2 s)

4 Marks questions

1. Derive the equations of motion: $v = u + at, v^2 - u^2 = 2aS,$ $s = ut + \frac{1}{2}at^2$

2. How will you represent uniform accelerated motion on position-time and velocity-time graph? What are uses of such graphs?
3. State triangle law of vector addition. Find out the angle between the resultant vector and the vector A when two vectors A =3m is acting towards east and vector B=4m is acting towards the north east.
4. Rain is falling vertically with a speed of 35 ms^{-1} . a woman rides a bicycle with a speed of 12ms^{-1} in east to west direction. What is the direction in which she should hold her umbrella?
5. State and prove parallelogram law of vectors and discuss the special cases.
6. Show that the path followed by a body projected horizontally from the top of tower with a uniform speed is parabolic.
7. A projectile is fired at an angle 'ɵ' with horizontal, derive expression for max. height, time period and range. At what angle range is maximum?
8. A projectile is fired at an angle 'θ 'with vertical, derive expression for max. height, time period and range.
9. A car is moving along a straight line say OP. it moves from O to P in 18 s and returns from P to O in 6 s. what are the average velocity and average speed of the car in going from O to P and return back from P to O.

UNIT- III
LAWS OF MOTION
1-Mark questions

1. Is force needed to keep a body moving with uniform velocity?
2. Define linear momentum.
3. What is inertia?
4. If the rate of change of momentum of a body is 10 $kgms^{-1}$. What is the force acting on the body?
5. The physical quantity which is equal to the change in momentum of the body is known as (a) force (b) acceleration (c) impulse (d) reaction .
6. The dimensional formula for impulse is (a) $[MLT^{-1}]$ (b) $[MLT^{-2}]$ (c) $[ML^{-1}T]$ (d)[$ML^{-2}T$] .
7. Action and reaction do not cancel each other . True/False .
8. Sliding friction is ……. (smaller/greater) than the rolling friction .

2 Marks questions

1. Why do we call the Newton's first law as the law of inertia?
2. State Newton's law of motion.
3. Why do we fall forward, when a moving bus suddenly stops? Explain.
4. No force is required to move a body with a constant velocity. Explain.
5. We hit the carpet with a stick to remove dust particles. Explain.
6. Why a horse cannot pull a cart and run in the empty space?
7. Why an athlete runs some steps before taking the jump?
8. What is the importance of Newton's second law of motion? Explain.
9. Bodies of larger mass need greater initial effort to put them in motion. Why?
10. It is easier to pull than to push a body. Explain.
11. Show that it is easier to pull a lawn roller than to push it.
12. A cricketer player lowers his hands while taking a catch. Why?
13. Why wheels are provided with mudguards?
14. Why shockers are used in cars and scooters?
15. Why does a heavy rifle not kick as strongly as a light rifle using same cartridges?
16. A stone when thrown on a glass window smashes the window pane to pieces, but a bullet from the gun passes through making a clean hole. Why?
17. Why chinaware and glassware are wrapped in paper or straw pieces before packing?
18. Action and reaction are equal and opposite. Why cannot they cancel each other?
19. Friction is self-adjusting force. Why?
20. What is relation between coefficient of friction and angle of friction?
21. What is relation between coefficient of friction and angle of repose?
22. Why is friction a non-conservative force?
23. If the coefficient of friction is 1, calculate the angle of friction?
24. Why wheels are made circular?
25. Why do we slip on a rainy day?
26. Why it is difficult to walk on sand?
27. Smoother the surface, lesser is the friction. Comment.
28. Polishing a surface beyond a certain limit may increase friction. Why?
29. Automobile tyres have generally irregular projections over their surfaces. Why?
30. Explain, how friction helps in walking.
31. Sand is thrown on tracks covered with snow in hilly areas. Why?

32. Proper inflation of tyres saves fuel. Explain.
33. Why it is difficult to move a cycle along a road with brakes on. Explain.
34. How does lubricants help in reducing friction?
35. Explain, any three methods of reducing friction.
36. Moon is continuously revolving around the earth without falling towards it. Why?
37. The outer rail of a curved railway track is generally raised over the inner. Why?
38. A bucket containing water is rotated in vertical circle. Explain, why the water does not fall?
39. A train moves on an unbanked circular bend of rails. Which rail will wear out faster?
40. Explain why the pilot of the aeroplane does not fall down, while looping a loop?
41. Passenger is thrown outwards when a bus takes a circular turn. Why?

4 Marks questions

1. State Newton's second law of motion. Define the SI unit of force. Show that Newton's second law of motion is real law of motion.
2. What is impulsive force? Prove that impulse is equal to the change in momentum.
3. What are concurrent forces? Obtain the condition for the equilibrium of three concurrent forces?
4. What is friction? State the laws of limiting friction. What are factors on which the force of friction depends?
5. What are advantages and disadvantages of friction? How does lubrication help in reducing friction?
6. Friction is a necessary evil, comment. Mention some methods of reducing friction.
7. Derive the expression for ' v ' velocity attained by the rocket after time t.
8. Derive an expression for the apparent weight of a person in a lift when (a) the lift is moving up with acceleration (b) moving down with acceleration (c) moving up with acceleration (d) moving down with deceleration (e) moving up or down with constant velocity.
9. What is banking of roads? Why it is necessary? Obtain an expression for the angle of banking of a curved road?
10. Why does a cyclist bend inward while negotiating a curve? Explain with diagram.
11. What provides the necessary centripetal force to a vehicle moving along a leveled circular road. With the help of a neat diagram, explain it. Also obtain the expression for the maximum velocity, with which the vehicle can be moved without skidding.
12. A rubber ball of mass 100 g falls from a height of 1 m and rebounce to a height of 40 cm . Find the impulse as the average force between the ball and ground if time during which they are in contact was 0.1 s .
13. A body is rolling on the ground with a velocity of 1 ms^{-1} . After travelling a distance of 5 m it comes to rest . Find the coefficient of friction. (take g = 10 ms^{-2}) .
14. A horizontal force of 11.76 N is applied to a 1500 g block which rests on a horizontal surface . If the coefficient of friction 0.3 . Find the acceleration produced in the block . (take g = 9.8 ms^{-2})

UNIT-IV
WORK, POWER AND ENERGY
1-Mark questions

1. What is condition for two vectors to be perpendicular?
2. What is work done by a person in holding a 15-kg suitcase, while waiting for a bus for 18 minutes?
3. How many ergs are there in one joule?
4. How many joules are there in 1 MeV?
5. How many joules are there in 1 kWh?
6. How many watts are there in 1horse power?
7. State the principle of conservation of energy.
8. Power is a vector quantity . True/False
9. 1eV = …….. J .
10. Gravitation force is conservative force . True/ False
11. The dimensional formula for work is (a) $[MLT^{-2}]$ (b) $[ML^2T^{-2}]$ (c) $[ML^2T]$ (d) $[ML^2T^{-1}]$.
12. If the velocity of the body becomes double its kinetic energy will become (a) twice (b) half (c) four times (d) one-fourth .

2- Marks questions

13. Under what conditions work done by force is zero?
14. Define work . Define the SI unit of work . 2
15. Show that $\vec{A} . \vec{A} = A^2$
16. A coolie is moving on a level road while carrying a bag on his head.
    Is there any work done by coolie and why?
17. What is amount of work done by a force when a body is moving in
    a circular path?
18. Friction is non-conservative force. why?
19. What is spring constant of a spring?
20. What is perfectly inelastic collision?

4 - Marks questions

1. Define scalar product of two vectors. Give its two properties.
2. When is work done by the force is negative? Give condition for work to be positive?
4. Prove work-energy theorem for a variable force.
5. What are conservative forces? Give its properties.
6. Distinguish between conservative and non-conservative forces.
7. Define kinetic energy. Derive expression for it.
8. State and prove work energy theorem.
9. A light body and a heavy body have the same momentum which of the two bodies will have greater kinetic energy and why?
10. A light body and a heavy body have the same kinetic energy which of the two bodies will have greater momentum and why?
11. The momentum of a body increases by 20%. What is the percentage increase in kinetic energy?
12. How does the kinetic energy of an object change, if its momentum is doubled?
13. How does the momentum of an object change, if its kinetic energy is doubled?
14. Derive an expression for potential energy of a stretched string.
15. A spring is cut into two equal halves. What is the spring constant of each portion?
16. A ball of mass 10g moves with a velocity of 100 ms^{-1}. Calculate its K.E. How much uniform force will stop it in 10s?
17. Show that the total mechanical energy of a body falling freely under gravity is conserved.
18. What are the two types of collision? Explain them.

19. Throwing mud on the wall is an example of perfectly inelastic collision. Explain.
20. Explain, how fast-moving neutrons can be quickly slowed down by passing through water on heavy water.
21. Two bodies of equal mass are moving in one dimension with velocities u_1, u_2 have elastic collision, derive the expression for final velocities after collision.
22. Prove that when two bodies of equal masses undergo elastic collision in one dimension, their velocities are just interchanged.
23. Two bodies of masses M_1 and M_2 are moving with velocities u_1 and u_2. After the collision, they stick together. What is the nature of the collision? How can the final velocity of the two be calculated ?

UNIT-V

MOTION OF SYSTEM OF PARTICLES AND RIGID BODY

1-Mark questions

1. Define cross product of two vectors.
2. What is condition for two vectors to be parallel?
3. What do you mean by center of mass?
4. What do you mean by rigid body?
5. Can Centre of mass of a body lie outside the body?
6. What is radius of gyration?
7. Define angular momentum.
8. What is SI unit of angular momentum.
9. State the law of conservation of angular momentum.
10. If polar ice melts , days will be shortened . True/ False
11. Angular momentum is (a) polar vector (b) axial vector (c) scalar vector (d) none of these .
12. The angular momentum of a moving body remains constant if (a) net external force is zero (b) net external torque is not applied (c) net pressure is applied (d) net external torque is applied .

2 Marks questions

1. Give the properties of cross product of two vectors.
2. If $\vec{A} = -2\hat{\imath} + 3\hat{\jmath} - 4\hat{k}$ and $\vec{B} = 3\hat{\imath} + 4\hat{\jmath} - \hat{k}$ find $\vec{A} \times \vec{B}$ $\vec{A} \times \vec{B}$.
3. If $|\vec{A} \times \vec{B}| = |\vec{A}.\vec{B}|$ Then find the angle between $\vec{A}$ and $\vec{B}$.
4. Which physical quantities are represented by the following? (a) rate of change of angular momentum. (b) linear momentum times perpendicular distance from the axis of rotation.
5. State theorem of perpendicular axis and the theorem of parallel axes.
6. Distinguish Centre of mass and Centre of gravity
7. The moments of inertia of two rotating bodies A and B are I_A and I_B ($I_A > I_B$) and their angular momenta are equal. Which one has greater kinetic energy?
8. Explain why the speed of whirlwind in a tornado is alarmingly high?
9. Why is a wrench with long handles preferred to unscrew a nut?
10. Why does handles are provided on the door at the maximum distances from thee hinges?
11. Why are there two propellers in a helicopter?
12. Most of the mass of a flywheel is concentrated at the rim. Why?
13. Explain if the ice on the polar caps of the earth melts, how will it affect the duration of the day?
14. How will you distinguish between a hard-boiled egg and raw egg by spinning it on a table top?
15. The angular velocity of revolution of the earth around the sun increases, when it comes closer to the sun, why?
16. A cat is able to land on its feet after a tail. Why?
17. State the law of conservation of angular momentum and explain it with an example.

6- Marks questions

1. (a) Derive the relation L=I w for a rigid body.
   (b) Define torque and angular momentum and derive relation between them.
2. (a) What is moment of inertia of a rod of mass, length l about an axis perpendicular to it through one end?
   (b) What is the moment of inertia of a ring about a tangent to the circle of the ring?
3. Derive the relation $\omega = \omega_0 + \alpha t$, $\theta = \theta_0 + \omega_0 + \frac{1}{2}\alpha t^2$, $\omega^2 = {\omega_0}^2 + 2\alpha(\theta - \theta_0)$

4. (a) Derive an expression for the position vector of the Centre of mass of a system consisting of two particles.
   (b) Define radius of gyration. On what factor does it depend.

UNIT-VI

GRAVITATION

2-Marks questions

1. State the universal law of gravitation. What is value of 'G' on the surface of Venus?
2. What is acceleration of gravity? At what height value of g is zero?
3. Why is Newton's law of gravitation known as universal law?
4. What is difference between g and G?
5. What is the work done by the force of gravity on a satellite moving round the earth? Justify your answer?
6. Why does a freely falling body experience weightlessness?
7. Distinguish between gravity and force of gravitation.
8. Escape velocity is different for different planets. Explain why?
9. A body weighs more on poles than on equator. Why?
10. Explain, why a tennis ball bounces higher on hills than in plains.
11. Explain why one can jump higher on the surface of moon than on the earth.
12. Moon has no atmosphere. Why?
13. Why does hydrogen escape faster from earth's atmosphere than oxygen?
14. Air friction increases the velocity of the satellite. Explain.
15. What is difference between ordinary and geostationary satellite?
16. Why does an astronaut in space feel weightlessness?
17. Which is greater, the attraction of the earth for 1 kg of iron or attraction of 1 kg iron for the earth? Why?
18. What is the weight of a body at the center of the earth?
19. At what place on the earth, the value of g (a) does not change (b) changes maximum changes maximum due to its rotational motion?
20. What is meant by gravitational field strength?
21. Define gravitational potential. Can a gravitational potential have positive value?
22. Why do different planets have different escape velocities?
23. Name two factors, which determine whether a planet has an atmosphere or not.
24. Does the orbital velocity of a satellite depend upon its mass? What is a parking orbit?

4 Marks questions

1. What is acceleration due to gravity? How does value of g vary with depth?
2. Explain the variation of acceleration due to gravity with altitude.
3. Derive expression for gravitational potential.
4. What is gravitational potential energy? Derive expression for it.
5. Give the principle of launching a satellite. Derive an expression for orbital velocity of satellite revolving around earth.
6. Derive an expression for time period and energy of satellite revolving around earth.
7. What do you understand by gravitational potential energy of a body? Derive expression for it. What is its value when masses are infinite distance apart?
8. Define escape velocity and derive an expression for the escape velocity of a body on the surface of earth.
9. State the Kepler's law of planetary motion.
10. Deduce Newton's law of gravitation from Kepler's laws.
11. How far away from the surface of earth does the acceleration due to gravity becomes 4% of its value on the surface of the earth? Radius of earth=6400 km.
12. What are geostationary satellites? What are conditions for satellite to be geostationary?
13. What are polar satellites? What are its uses?
14. The escape velocity for a body at earth's surface is 11.2 km /s. If mass of Jupiter is 318 times that of Earth and its radius is 11.2 times that of Earth, then find the escape velocity of the same object on Jupiter. (Ans: 59.7 km / s, note: the phrase 'the same object' is unnecessary)
15. If the earth were entirely made of iron with a uniform density 7.86×10^{3}kg /m ^{3}, what would be the value of acceleration due to gravity on its surface? Radius of the earth $=6.37\times 10^{6}$m (Take G = 6.67×10^{-11} Nm ^{2}/kg ^{2}). (Ans: 13.98 m /s^{2})
16. A sphere of mass 40 kg is attracted by second sphere of mass 15 kg when their Centre are 2 m apart with a force equal to 10^{-3} dyne. Calculate the constant of gravitation. (Ans: 6.67×10^{-11} Nm ^{2} / kg ^{2})
17. The earth's mass is 90 times that of moon and their diameters are in the ratio 4: 1. What is the value of g on moon? g on earth = 9.8 m / s ^{2}) (Ans: 1.74 m /s ^{2})
18. What is the value of g at a height equal to the radius of the earth? At what altitude above the earth's surface would the numerical value of g be half of that at the surface? Radius of the earth = 6400 km. (Ans: 2.45 m / s ^{2}, 2650 km)
19. The mass of the moon is 7.36×10^{22} kg and its radius is 1.74×10^{6}m What is the escape velocity from the surface of the moon? ($G = 6.67 \times 10^{-11}$ N m ^{2} / kg ^{2}). (Ans: 2.38 km / s)

UNIT - VII
PROPERTIES OF BULK MATTER
2 Marks questions

1. What is elastic after effect? What is elastic fatigue?
2. Steel is more elastic than rubber, why?
3. Why springs are made of steel and not of copper?
4. Why do spring balances show wrong reading after long use?
5. Can a mountain have infinite height? Give reason.
6. Why crystalline solids have sharp melting point?
7. Marching troops are asked to break the steps, while crossing the bridge, why?
8. What is value standard atmospheric pressure? Which instrument is used to measure pressure?
9. Why it is difficult to bare footed on a road covered with edged pebbles?
10. Why are sleepers used below the rails? Explain.
11. Why is mercury preferred over water as a barometric substance?
12. Define surface tension. What do you mean by surface energy?
13. Why rain drops are spherical?
14. Small insects can move on the surface of water. Why?
15. What is critical temperature in surface tension?
16. Define angle of contact. On what factors does it depend?
17. It is easier to spray water in which some soap is dissolved. Why?
18. Why it is easier to wash clothes in hot water soap solution?
19. Why two holes are made to empty an oil tin?
20. Why hot coffee tastes better than cold coffee?
21. Why do we prefer cotton clothes in summer?
22. Why pins and nails have pointed ends?
23. Why does an air passenger prefer a ball pen over a fountain pen?
24. Why the tip of the nib of a pen is split?
25. How detergents clean dirty clothes?
26. Why is sand drier than clay?
27. How water remain cool in earthen pot?
28. Tea in thermos flask remains hot for a long time. Why?
29. Define coefficient of viscosity. How does viscosity of a liquid vary with temperature?
30. What is Reynolds's number?
31. Define critical velocity?
32. Why machine parts are jammed in winter?
33. Why two streamlines cannot cross each other?
34. Distinguish between streamline and turbulent flow of a liquid.
35. Establish equation of continuity of an ideal liquid flow.
36. Explain why still water runs deep?
37. Why do dust particles generally settle down in a closed room?
38. Why the blood pressure in human is greater at feet than at the brain?
39. Define thermal conductivity. Is the process of conduction possible in gases?
40. At what temperature is the Fahrenheit scale reading equal to half that of the Celsius scale?
41. Can a substance contract on heating? Give an example.
42. Why water is considered unsuitable for use in thermometers?
43. Why is invar used for making pendulum of clocks?
44. During a certain wind storm, light roofs are blown off. Why?
45. Why are ventilators provided near the roof of the house?
46. Distinguish between temperature and heat.
47. Explain why are cloudy nights warmer than clear nights?
48. Woolen clothes keep our body warm in winter. Why?
49. Why is a new quilt warmer than an old one?
50. Why the pipes carrying steam should have loops?

51. Distinguish between the process of conduction and convection.
52. Write two properties of thermal radiations.
53. Why water is preferred in hot water bottles used for fomentation?
54. Why metallic utensils are provided with wooden handles?

4-Marks questions

1. Find stress, strain and Young's modulus of elasticity in the case of a wire 1.5 m long and 1 sq. mm in cross-section, if it increases by 1.55 mm in length when a weight of 10 kg is suspended from it.
2. Calculate the energy spent in spraying a drop of mercury of 1cm radius into 10^6 droplets, all of same size. Surface tension of mercury is $55\times10^{-2}Nm^{-1}$.
3. Derive Stoke's law by the method of dimensions.
4. What are similarities and dissimilarities between solid friction and viscosity?
5. Define Young's modulus, bulk modulus and modulus of rigidity.
6. What do you mean by (i) ductile materials (ii) brittle materials and (iii) elastomers.
7. State Pascal's law and explain any one application. (Hydraulic brakes, hydraulic lift, hydraulic press)

6-Marks questions

1. State Hooke's law of elasticity. Draw stress vs. strain for a wire subjected to gradually increasing tension and explain the various points of the curve. (Elastic region, proportional limit, elastic limit, plastic region, yield point and breaking point).
2. Derive an expression for excess pressure inside a liquid drop and a soap bubble on account of surface tension.
3. Define capillarity. Derive an expression for the rise of liquid in a capillary tube.
4. Define terminal velocity and derive expression for it. Why do the clouds float in air?
5. By giving assumptions, state and prove Bernoulli's theorem. What are its limitations?
6. State Bernoulli's principle. Deduce an expression for the volume of the liquid flowing per second through the wider tube of a venturimeter.
7. State Torricelli's theorem and prove it. (Derive an expression for velocity of efflux).
8. Define coefficient of linear, superficial and cubical expansion. Establish relation between them.

UNIT - VIII
THERMODYNAMICS
1-Mark questions

1. What is an isochoric process?
2. What is an isobaric process?
3. State second law of thermodynamics.
4. State Zeroth law of thermodynamics
5. What is a heat engine?
6. State Carnot's theorem.
7. State the conditions for two bodies to be in thermal equilibrium.
8. Is rusting of iron is reversible process?
9. What is critical temperature?
10. Can efficiency of ideal heat engine be 100%?
11. State Carnot's theorem .
12. First law of thermodynamics is the law of conservation of (a) mass (b) linear momentum (c) energy (d) angular momentum .
13. Change in internal energy of the system in a cyclic process is (a) positive (b) negative (c) zero (d) may be positive or negative .
14. Efficiency of heat engine is always less than 1 . True / False .
15. The thermodynamic process in which pressure and volume of the system change at constant temperature is called …….

4 Marks questions

1. (a) Why C_p is greater than C_v?
   (b) If an inflated tire bursts the air escaping out is cooled. Why?
2. What are limitations of the first law of thermodynamics?
3. Can specific heat of a gas be (i) zero (ii) infinite, and (iii) negative? Explain.
4. What is a PV diagram? What does the area between the PV curve and the volume axis signify?
5. What is a cyclic process? Show that the work done in a cyclic process is equal to the area enclosed by the loop representing the cyclic process.
6. Why gases have two principal specific heat capacities? Define them
7. Show for an ideal gas $C_p - C_v = R/J$ Derive Meyer's relation)
8. State the three laws of thermos dynamics (Zeroth law, first law and second law)
9. Apply first law of thermodynamics to (a) isothermal process
   (b) adiabatic process
10. Derive an equation for the work done in an isothermal process and draw the P-V indicator diagram.
11. State first law of thermodynamics and apply it to an isothermal process.
12. Define adiabatic change. Derive expression for work done during an adiabatic change.
13. Define isothermal change. Derive expression for work done during an isothermal change.
14. Explain the construction and various operations involved in a Carnot's heat engine with neat labeled diagram.
15. Draw Carnot's cycle and write expression for efficiency of a Carnot's heat engine. On what factors does the efficiency of a Carnot engine depend?
16. Define the coefficient of performance of a heat pump. (refrigerator) and obtain a relation for it in terms of temperature T_1 and T_2 .
17. A sample of gas (y = 1.5) is compressed adiabatically from a volume of 1600 cm^3 to 400 cm^3. If the initial pressure is 150 kPa, what are the final pressure and how much work is done on the gas in the process?
18. State and prove Dulong-Pettit's law.

UNIT - IX

BEHAVIOUR OF PERFECT GAS AND KINETIC THEORY OF GASES

1-Mark questions

1. What is temperature at which molecular motion ceases?
2. What is mean free path?
3. What is degree of freedom?
4. State the law of equipartition of energy?
5. What is an ideal gas?
6. Degree of freedom of a mono atomic gas molecule is (a) three (b) five (c) six (d) seven .
7. Average kinetic energy of a molecule of a gas is directly proportional to (a) pressure of the gas (b) volume of the gas (c) temperature of the gas (d) mass of the gas .
8. The molecular motion ceases at absolute zero temperature . True/ False
9. Kinetic energy of an ideal gas is …… (directly/inversely) proportional to temperature .
10. The ratio of specific heats C_p / C_v for a diatomic gas is (a) 5/3 (b) 9/7 (c) 7/9 (d) 7/5 .

4 Marks questions

1. (a) Explain how evaporation causes cooling.
   (b) Why there is practically no atmosphere on the surface of the moon?
2. (a) On driving the scooter for a long time, the air pressure in the tyres slightly increases. Why?
   (b) When a gas is suddenly compressed, temperature of a gas rises. Why?
3. State Boyle's law and Charles's law. Why they are not applicable for all real gases at all temperatures?
4. What is the basic assumption of kinetic theory of gases?
5. On their basis, derive an expression for the pressure exerted by an ideal gas.
6. Show that r.m.s speed of the molecules of a gas is directly proportional to the square root of the absolute temperature of the gas.

UNIT -X
OSCILLATIONS AND WAVES
1 Mark questions

1. Which properties of a medium are responsible for propagation of waves through it?
2. What is range of frequency of audible sound?
3. Can two persons hear each other on moon?
4. Will a pendulum clock gain or lose time, when taken to the top of the mountain?
5. Why pendulum clocks are not suitable for spaceships?
6. Why does sound travel faster in steel than in air?
7. On what factors do the frequency of tuning fork depends?
8. What is Doppler Effect?
9. What is red shift?
10. The phenomenon of sound propagation in air is (a) isothermal process (b) adiabatic process (c) isobaric process (d) isochoric process .
11. The distance between two consecutive antinodes is (a) $3\lambda/4$ (b) $\lambda/4$ (c) $\lambda/2$ (d) λ .
12. Two aeroplanes are moving towards each other , one of them blows a horn the person in the other plane hears the sound . The apparent pitch (d) becomes infinite (b) becomes zero (c) decreases (d) increases .
13. During thunderstorm light is seen much earlier than the sound is heard . True/ False .
14. Audible range of frequencies is between ..... Hz and …….

6 Marks questions

1. Show that the oscillations of a simple pendulum are simple harmonic. Distinguish between damped and undamped oscillation.
2. (a) What are beats? How are they produced?
   (b) How can beats see in darkness? Explain
3. What is a simple harmonic motion? State its characteristics.
4. Distinguish between free, forced, and resonant oscillation with illustration.
5. (a) State and explain superposition of waves.
   (b) What are nodes and antinodes?
6. (a) What are the characteristics of progressive waves?
   What is difference between interference, beats and standing waves?
7. What is effect of density and temperature on velocity of sound?
8. Define wave motion. Give the characteristics of wave motion.
9. Deduce an expression for the total energy of a system executing S.H.M. Draw the energy curve.
10. What do you mean by standing wave? Deduce an expression for the nodes and antinodes of a standing wave. Explain displacement, velocity, acceleration, and time period of a simple harmonic motion. Find relation between them.
11. What are stationary waves? Discuss the characteristics of stationary waves.
12. Give the graphical representation of (i) displacement (ii) velocity (iii) acceleration of a particle executing SHM. mention the differences between them.
13. (a) Why and how Laplace corrected Newton's formula for velocity of sound in gas?
    (b) Explain why transverse mechanical waves cannot be propagated in liquids and gases?
14. Show that the motion executed by the bob of a pendulum in S.H.M. Derive expression for time period.
15. Show that the motion of loaded spring is simple harmonic motion. Find the expression for time period.

Max. Marks : 70 **Class XI** **Time : 3 Hours**

PHYSICS SAMPLE QUESTION PAPER-1

1. Light year is unit of distance . True/ False
2. Define uniform acceleration ?
3. Sliding friction is ……. (smaller/greater) than the rolling friction .
4. Work done is a vector quantity . True / False
5. Define radius of gyration .
6. Define molar specific heat of gas at constant volume .
7. Degree of freedom of a mono atomic gas molecule is (a) three (b) five (c) six (d) seven .
8. The phenomenon of sound propagation in air is (a) isothermal process (b) adiabatic process (c) isobaric process (d) isochoric process. 1×8 = 8
9. SI is a rational system of unit explain ?
10. Define dimensional variable quantity with one example .
11. A car goes from place A to B at 60 km/h and returns from B to A at 120 km/h.
    calculate average speed of the car?
12. Find if $\vec{A}$ and $\vec{B}$ are perpendicular to each other , if $\vec{A} = 3\hat{i} + 2\hat{j} - 6\hat{k}$ and $\vec{B} = 4\hat{i} + 3\hat{j} + 3\hat{k}$.
13. What is power ? Write expression for it .
14. Explain the term moment of inertia .
15. State Newton's law of gravitation .
16. State Young's modulus of elasticity . 2×8 = 16
17. Derive an expression for a body distance travelled in n^{th} second .
18. On their basis, derive an expression for the pressure exerted by an ideal gas.
19. State Newton's third law of motion .

    or

    A rubber ball of mass 100 g falls from a height of 1 m and rebound to a height of 40 cm . Find the impulse as the average force between the ball and ground if time during which they are in contact was 0.1 s .

20. Prove that work done is change in kinetic energy .
21. Define escape velocity . Derive an expression for it .

    Or

    How far away from the surface of earth does the acceleration due to gravity becomes 4% of its value on the surface of the earth? Radius of earth=6400 km.

22. Why are ventilators provide near the roof of a house .
23. Why C_p of a gas greater than C_v . 4×7 = 28
24. Define centre of mass . Derive expression for it for a system of two particles . 1, 5

    or

    Define angular momentum . Discuss about its physical significance . 1,5
25. State and prove Bernoulli's theorem . 1 , 5

    or

    Define capillary tube . Discus about ascent formula . 1,5

26. Define wave motion . Discuss about its types with diagram . 1,5

or

Prove when a body is in uniform circular motion it possesses S.H.M . 1,5

Max. Marks : 70 **Class XI** **Time : 3 Hours**

PHYSICS SAMPLE QUESTION PAPER-2

1. Astronomical unit is the unit of distance . True/ False
2. Define uniform velocity ?
4. The dimensional formula for impulse is (a) $[MLT^{-1}]$ (b) $[MLT^{-2}]$ (c) $[ML^{-1}T]$ (d)$[ML^{-2}T]$.
4. Power is a vector quantity . True / False
5. Define moment of inertia .
6. Define molar specific heat of gas at constant pressure .
7. Degree of freedom of a diatomic gas molecule is (a) three (b) five (c) six (d) seven .
8. The phenomenon of sound propagation in air is (a) isothermal process (b) adiabatic process (c) isobaric process (d) isochoric process.

$1\times8 = 8$

9. SI is a coherent system of unit explain ?
10. Define dimensional constant quantity with one example .
11. A car goes from place A to B at 40 km/h and returns from B to A at 60 km/h. Calculate average speed of the car?
12. Find if $\vec{A}$ and $\vec{B}$ are perpendicular to each other , if $\vec{A} = 3\hat{i} + 2\hat{j} - 6\hat{k}$ and $\vec{B} = 4\hat{i} + 3\hat{j} + 3\hat{k}$.
13. Friction is non-conservative force. why?
14. Explain why the speed of whirlwind in a tornado is alarmingly high?
15. A body weighs more on poles than on equator. Why?
16. Why it is difficult to bare footed on a road covered with edged pebbles?

$2\times8 = 16$

17. Derive an expression for a body distance travelled in n^{th} second .
18. What is the basic assumption of kinetic theory of gases?
19. State Newton's third law of motion .

Or

A horizontal force of 11.76 N is applied to a 1500 g block which rests on a horizontal surface . If the coefficient of friction 0.3 . Find the acceleration produced in the block . (take g = 9.8 ms^{-2}).

20. Prove that work done is change in kinetic energy .
21. Define orbital velocity . Derive an expression for it .

Or

How far away from the surface of earth does the acceleration due to gravity becomes 25% of its value on the surface of the earth? Radius of earth=6400 km.

22. Why are ventilators provide near the roof of a house .
23. Why C_p of a gas greater than C_v .

$4\times7 = 28$

24. (a) Derive the relation L=I w for a rigid body.
    (b) Define torque and angular momentum and derive relation between them.

2, 4

or

Define angular momentum. Discuss about its physical significance. 1, 5

25. State and prove Bernoulli's theorem.

1, 5

or

State Hooke's law of elasticity. Draw stress vs. strain for a wire subjected to gradually increasing tension and explain the various points of the curve. (Elastic region, proportional limit, elastic limit, plastic region, yield point and breaking point).

1, 5

26. (a) Why and how Laplace corrected Newton's formula for velocity of sound in gas?

(b) Explain why transverse mechanical waves cannot be propagated in liquids and gases?

3, 3

or

Show that the motion executed by the bob of a pendulum in S.H.M. Derive expression for time period.

6