BLUE PRINT FOR MODEL QUESTION PAPER -1

SUBJECT:PHYSICS (33) **CLASS: I P.U.C.**

UNIT	CHAPTER NUMBER	TOPICS (CHAPTERS)	NUMBER OF TEACHING HOURS	WEIGHTAGE OF MARKS	1 MARK	2 MARKS	3 MARKS	5 MARKS (THEORY)	5 MARKS (NUMERICAL PROBLEMS)
I	1	Physical world	2	2		✓			
	2	Units and measurement	4	3			✓		
II	3	Motion in a straight line	8	8	✓	✓			✓
	4	Motion in a plane	12	11	✓	✓	✓	✓	
III	5	Laws of motion	11	10		✓	✓		✓
IV	6	Work, energy and power	11	9	✓		✓	✓	
V	7	System of particles and rotational motion	12	11	✓			✓	✓
VI	8	Gravitation	9	8	✓	✓		✓	
VII	9	Mechanical properties of solids	5	4	✓		✓		
	10	Mechanical properties of fluids	5	4	✓		✓		
	11	Thermal properties of matter	10	8	✓	✓		✓	
VIII	12	Thermodynamics	8	7		✓			✓
IX	13	Kinetic theory	5	4	✓		✓		
X	14	Oscillations	8	7		✓		✓	
	15	Waves	10	9	✓		✓		✓
TOTAL			120	105	10	16	24	30	25

MODEL QUESTION PAPER-1

I P.U.C. PHYSICS (33)

Time: 3 hours 15 minutes **Max. Marks:70**

General instructions:

a) All parts are compulsory.
b) Answers without relevant diagram/ figures wherever necessary will not carry any marks.
c) Numerical problems solved without writing the relevant formulae carry no marks.

PART-A

I. Answer **all** the following questions: (**10 X1 =10)**

1. Define velocity.
2. What is a null vector?
3. What is the unit of measurement of energy used in our electricity bills?
4. Where is the centre of mass of a meter stick?
5. Name the natural satellite of earth.
6. What is hydraulic stress?
7. Why is the tip of the nib of a pen split?
8. Why some cooking pots have copper coating on the bottom?
9. State the law of equipartition of energy.
10. Define amplitude of a wave.

PART – B

II. Answer **any five** of the following questions: **(5 X2 =10)**

11. Name a fundamental force which has long range and a fundamental force which has short range of operation.
12. Distinguish between path length and displacement.
13. The position of a particle is given by $r = 3.0t\,\hat{i} + 2.0t^2\,\hat{j} + 5.0\,\hat{k}$ where *t* is in seconds and the coefficients have the proper units for *r* to be in metres. Find *v(t)* of the particle.
14. What is impulse and impulsive force?
15. State and explain Boyle's law.
16. What is reversible process? Give an example.
17. A planet has same mass as that of earth, but its radius is half that of earth. If the acceleration due to gravity on earth is 'g', what is the acceleration due to gravity on that planet.
18. Mention the expression for kinetic energy of a particle executing simple harmonic motion. Explain the terms.

PART – C

III. Answer **any five** of the following questions: **(5 X3 =15)**

19. Consider an equation $v=v_0+$ at, where v_o is the initial velocity, v is the final velocity, a is the acceleration and t is the time taken. Check whether this equation is dimensionally correct.
20. Derive an expression for centripetal acceleration.
21. Write any one disadvantage of friction. What are the different methods of reducing friction?

22. Differentiate between conservative force and non-conservative force with one example for each.
23. Find the force required to stretch a wire of area of cross section 2 X $10^{-4}m^2$ so that its length becomes 1.5 times original length. Young's modulus=3.6 X $10^{11}Nm^{-2}$.
24. State Pascal's law. Give two applications of Pascal's law.
25. Determine the molar specific heat at constant volume for a mono atomic gas molecule.
26. Give the theory of beats.

PART – D

IV. Answer **any two** of the following questions: **(2 X5 =10)**

27. What is a projectile? Derive the equation of path of a projectile.
28. Illustrate the law of conservation of mechanical energy in case of a ball dropped from a cliff of height H.
29. Define moment of inertia of a body. State and explain perpendicular axis theorem and parallel axis theorem of moment of inertia.

V. Answer **any two** of the following questions: **(2 X5 =10)**

30. Derive the expression for acceleration due to gravity at a point below the surface of earth. What is the value of acceleration due to gravity at the centre of the earth?
31. What is thermal radiation? Mention any four properties of thermal radiation.
32. Arrive at an expression for the time period of a simple pendulum.

VI. Answer **any three** of the following questions: **(3 X5 =15)**

33. On a two –lane road, Car A is travelling with a speed of 36kmph. Two cars B and C approach car A in opposite directions with a speed of 54 kmph each. At a certain instant, when the distance AB is equal to AC, both being 1km, B decides to overtake A before C does. What minimum acceleration of car B is required to avoid an accident?
34. A batsman deflects a ball by an angle of 45° without changing its initial speed which is equal to 54 kmph. What is the impulse imparted to the ball? If the time of contact between the ball and the bat is 0.01s, what is the average force exerted by the bat on the ball? (Mass of the ball is 0.15 kg.)
35. A rope of negligible mass is wound round a hollow cylinder of mass 3 kg and radius 40 cm. What is the angular acceleration of the cylinder if the rope is pulled with a force of 30 N? What is the linear acceleration of the rope? Assume that there is no slipping.
36. A steam engine delivers 5.4×10^8J of work per minute and services 3.6×10^9J of heat per minute from its boiler. What is the efficiency of the engine? How much heat is wasted per minute?
37. A train, standing at the outer signal of a railway station blows a whistle of frequency 400 Hz in still air. (i) What is the frequency of the whistle for a platform observer when the train (a) approaches the platform with a speed of 10 m s^{-1}, (b) recedes from the platform with a speed of 10 m s^{-1}? (ii) What is the speed of sound in each case? The speed of sound in still air can be taken as 340 m s^{-1}.

BLUE PRINT FOR MODEL QUESTION PAPER -2

SUBJECT: PHYSICS (33) **CLASS: I P.U.C.**

UNIT	CHAPTER NUMBER	TOPICS (CHAPTERS)	NUMBER OF TEACHING HOURS	WEIGHTAGE OF MARKS	1 MARK	2 MARKS	3 MARKS	5 MARKS (THEORY)	5 MARKS (NUMERICAL PROBLEMS)
I	1	Physical world	2	1	✓				
	2	Units and measurement	4	3	✓	✓			
II	3	Motion in a straight line	8	7		✓		✓	
	4	Motion in a plane	12	11	✓	✓	✓		✓
III	5	Laws of motion	11	10				✓	✓
IV	6	Work, energy and power	11	10		✓	✓	✓	
V	7	System of particles and rotational motion	12	11	✓	✓	✓		✓
VI	8	Gravitation	9	8	✓	✓		✓	
VII	9	Mechanical properties of solids	5	4	✓		✓		
	10	Mechanical properties of fluids	5	4	✓		✓		
	11	Thermal properties of matter	10	9	✓		✓		✓
VIII	12	Thermodynamics	8	7		✓		✓	
IX	13	Kinetic theory	5	4	✓		✓		
X	14	Oscillations	8	7		✓		✓	
	15	Waves	10	9	✓		✓		✓
TOTAL			120	105	10	16	24	30	25

MODEL QUESTION PAPER-2

I P.U.C. PHYSICS (33)

Time: 3 hours 15 minutes **Max. Marks:70**

General instructions:

a) All parts are compulsory.
b) Answers without relevant diagram/ figures wherever necessary will not carry any marks.
c) Numerical problems solved without writing the relevant formulae carry no marks.

PART-A

I. Answer **all** the following questions: **(10 X1 =10)**

1. What is physics?
2. Give the number of significant figures in 5.300×10^3.
3. What is the angle between velocity and acceleration at the peak point of a projectile projected for maximum range?
4. What is the use of mechanical advantage of a lever?
5. Name the experiment to measure the value of gravitational constant.
6. Which property of a body is responsible for regaining its shape and size when deforming force acting on it is removed?
7. Name the instrument used to measure atmospheric pressure.
8. What is absolute zero temperature?
9. Define mean free path.
10. What is the basis of the phenomenon of interference?

PART – B

II. Answer **any five** of the following questions: **(5 X2 =10)**

11. What is parallax? Mention its use.
12. A car is traveling with a uniform velocity of $30ms^{-1}$. The driver applies the breaks and the car comes to rest in 10seconds. Calculate the retardation.
13. Distinguish between scalars and vectors.
14. When is the work done negative? Give an example.
15. State the law of conservation of angular momentum. Illustrate with an example.
16. Mention the uses of polar satellites?
17. State and explain zeroth law of thermodynamics.
18. On an average a human heart is found to beat 75 times in a minute. Calculate its frequency and time period.

PART – C

III. Answer **any five** of the following questions: **(5 X3 =15)**

19. State and explain triangle law of vector addition.
20. Prove that for a particle in rectilinear motion under constant acceleration, the change in kinetic energy of the particle is equal to the work done on it by the net force?
21. Draw the stress verses strain graph for a metallic wire stretched up to fracture point. Define the terms proportional limit and fracture point.

22. Find the torque of a force $7\hat{i}+3\hat{j}-5\hat{k}$ about the origin. The force acts on a particle whose position vector is $\hat{i}-\hat{j}+\hat{k}$.
23. What is capillary rise? Write an expression for it. Explain the terms.
24. Write any three assumptions of kinetic theory of gases.
25. State and explain the law of thermal conduction.
26. Mention any three differences between standing waves and progressive waves.

PART – D

IV. Answer **any two** of the following questions: **(2 X5 =10)**

27. What is velocity – time graph. Derive the equation of motion: $v^2 - v_0^2 = 2ax$.
28. Derive the expression for maximum safe speed of a vehicle on a banked road in circular motion.
29. What is elastic collision? Obtain the expression for final velocities of two bodies undergoing elastic collision in one dimension.

V. Answer **any two** of the following questions: **(2 X5 =10)**

30. What is escape speed? Obtain the expression for escape speed. What is the value of escape speed for earth?
31. What is isothermal process? Obtain the expression for work done in an isothermal process.
32. What is simple harmonic motion? Derive an expression for velocity and acceleration in simple harmonic motion.

VI. Answer **any three** of the following questions: **(3X5 =15)**

33. A cricketer can throw a ball to a maximum horizontal distance of 100 m. How much high above the ground can the cricketer throw the same ball? And for how long the ball remains in the air in this case?
34. A stone of mass 0.25 kg tied to the end of a string is whirled round in a circle of radius 1.5 m with a speed of 40 rev./min in a horizontal plane. What is the tension in the string? What is the maximum speed with which the stone can be whirled around if the string can withstand a maximum tension of 200 N?
35. A solid cylinder of mass 20 kg rotates about its axis with angular speed 100 rad s^{-1}. The radius of the cylinder is 0.25 m. What is the kinetic energy associated with the rotation of the cylinder? Calculate the magnitude of angular momentum of the cylinder about its axis.
36. A brass rod of length 50 cm and diameter 3.0 mm is joined to a steel rod of the same length and diameter. What is the change in length of the combined rod at 250° C if the original lengths are at 40.0° C? Is there a 'thermal stress' developed at the junction? The ends of the rod are free to expand. (Co-efficient of linear expansion of brass = 2.0 x 10^{-5} K^{-1}, steel = 1.2x10^{-5} K^{-1}).
37. A wave travelling along a string is described by, *y (x, t)* = 0.005 sin (80.0 *x* – 3.0 *t)*, in which the numerical constants are in SI units (0.005 m, 80.0 rad m^{-1}, and 3.0 rad s^{-1}). Calculate (a) the amplitude, (b) the wavelength, and (c) the frequency of the wave. Also, calculate the displacement *y* of the wave at a distance *x* = 30.0 cm and time *t* = 20 s?

BLUE PRINT FOR MODEL QUESTION PAPER -3

SUBJECT: PHYSICS (33) **CLASS: I P.U.C.**

UNIT	CHAPTER NUMBER	TOPICS (CHAPTERS)	NUMBER OF TEACHING HOURS	WEIGHTAGE OF MARKS	1 MARK	2 MARKS	3 MARKS	5 MARKS (THEORY)	5 MARKS (NUMERICAL PROBLEMS)
I	1	Physical world	2	2	✓				
	2	Units and measurement	4	3	✓	✓			
II	3	Motion in a straight line	8	7		✓			✓
	4	Motion in a plane	12	11	✓	✓	✓	✓	
III	5	Laws of motion	11	9	✓		✓	✓	
IV	6	Work, energy and power	11	9	✓		✓		✓
V	7	System of particles and rotational motion	12	11	✓	✓	✓	✓	
VI	8	Gravitation	9	9	✓		✓		✓
VII	9	Mechanical properties of solids	5	4	✓		✓		
	10	Mechanical properties of fluids	5	5		✓	✓		
	11	Thermal properties of matter	10	8	✓	✓			✓
VIII	12	Thermodynamics	8	7		✓		✓	
IX	13	Kinetic theory	5	5				✓	
X	14	Oscillations	8	7		✓			✓
	15	Waves	10	9	✓		✓	✓	
TOTAL			120	105	10	16	24	30	25

MODEL QUESTION PAPER-3

I P.U.C. PHYSICS (33)

Time: 3 hours 15 minutes **Max. Marks:70**

General instructions:

a) All parts are compulsory.
b) Answers without relevant diagram/ figures wherever necessary will not carry any marks.
c) Numerical problems solved without writing the relevant formulae carry no marks.

PART-A

I. Answer **all** the following questions: **(10 X1 =10)**

1. Name the experiment which established the nuclear model of atom.
2. What is S.I. unit of luminous intensity?
3. Give an example for two dimensional motion.
4. Why don't action and reaction forces cancel each other?
5. A light body and a heavy body have the same momentum. Which one will have greater kinetic energy?
6. Give the expression for moment of inertia of a circular disc of radius R about its diameter.
7. What are geostationary satellites?
8. What is shear deformation?
9. How does melting point of ice changes with increase of pressure?
10. Give an example for a wave which can travel through vacuum.

PART-B

II. Answer **any five**of the following questions: **(5 X2 =10)**

11. Given the relative error in the measurement of the radius of a circle is 0.02, what is the percentage error in the measurement of its area?
12. What are the significance of velocity – time graph?
13. What is resolution of a vector? What is the x-component of a vector $\vec{A}$, that makes an angle 30^0 with x-axis.
14. Give the general conditions of equilibrium of a rigid body.
15. Write Stoke's formula for viscous drag force. Explain the terms.
16. What is meant by anomalous behaviour of water. What is its significance?
17. State and explain first law of thermodynamics.
18. What is periodic motion. Give an example

PART-C

III. Answer **any five**of the following questions: **(5 X3 =15)**

19. Derive the expression for time of flight of a projectile.
20. Arrive at the statement of principle of conservation of linear momentum from Newton's laws of motion.
21. Prove that potential energy stored in a spring is $\frac{1}{2}kx^2$, where k is the force constant of the spring and x is the change in length of the spring.
22. State Kepler's laws of planetary motion.

23. Prove that the centre of mass of a system moves with constant velocity in the absence of external force on the system.
24. State and explain Hooke's law. Define modulus of elasticity.
25. State Bernoulli's theorem. What are its applications?
26. What is Doppler effect. Write any two applications of Doppler's effect.

PART-D

IV. Answer **any two**of the following questions: **(2 X5 =10)**

27. Find the magnitude and direction of the resultant of two vectors $\vec{A}$ and $\vec{B}$ in terms of their magnitudes and angle θ between them.
28. State Newton's second law of motion and hence derive $\vec{F} = m\vec{a}$.
29. Define torque. Show that torque on a particle is equal to rate of change of its angular momentum.

V. Answer **any two**of the following questions: **(2 X5 =10)**

30. Using kinetic theory of gases derive an expression for finding the pressure of an ideal gas in terms of mean squared speeds of the molecules.
31. Describe Carnot's cycle and write the expression for its efficiency.
32. Derive the Newton's formula to find the speed of a longitudinal wave in an ideal gas. What is the Laplace correction to obtainthe speed of sound in air?

VI. Answer **any three**of the following questions: **(3 X5 =15)**

33. Two towns A and B are connected by a regular bus service with a bus leaving in either direction every T minutes. A man cycling with a speed of 20 km h–1 in the direction A to B notices that a bus goes past him every 18 min in the direction of his motion, and every 6 min in the opposite direction. What is the period T of the bus service and with what speed (assumed constant) do the buses ply on the road?
34. A person trying to lose weight(dieter) lifts a 10 kg mass, one thousand times, to a height of 0.5 m each time. Assume that the potential energy lost each time she lowers the mass is dissipated. (a) How much work does she do against the gravitational force? (b) Fat supplies 3.8 x 10^7 J of energy per kilogram which is converted to mechanical energy with a 20% efficiency rate. How much fat will the dieter use up?
35. Phobos is a satellite of the planet mars. Phobos has a period 7 hours, 39 minutes and an orbital radius of 9.4 X10^3km. calculate the mass of mars. Assume that earth and mars move in circular orbits around the sun, with martian orbit being 1.52 times the orbital radius of earth. What I the length of the martian year in days?
36. 'Thermacole' icebox is a cheap and efficient method for storing small quantities of cooked food in summer in particular. A cubical icebox of side 30 cm has a thickness of 5.0 cm. If 4.0 kg of ice is put in the box, estimate the amount of ice remaining after 6 h. The outside temperature is 45° C, and co-efficient of thermal conductivity of thermacole is 0.01 J s^{-1} m^{-1} K^{-1}. [Heat of fusion of water = 335 x 10^3 J kg^{-1}].
37. A spring balance has a scale that reads from 0 to 50 kg. The length of the scale is 20 cm. A body suspended from this balance, when displaced and released, oscillates with a period of 0.6 s. What is the weight of the body?