BLUE PRINT FOR MODEL QUESTION PAPER – 3

Class : I PUC **Subject : PHYSICS (33)**

BLUE PRINT

Unit	Chapter Number	TOPICS (CHAPTERS)	Number of teaching Hours	Weightage of marks	1Mark	2 Marks	3 Marks	5 Marks (Theory)	5 Marks (Numerical Problem)
I	1	Physical World	2	2		✓			
	2	Units and Measurements	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	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	10	✓✓		✓		✓
		Number of Questions	--	--	**10**	**8**	**8**	**6**	**5**
		TOTAL	**120**	**105**	**20**	**16**	**24**	**30**	**25**

MODEL QUESTION PAPER – 3

I P.U.C. PHYSICS (33)

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

General instructions:

a) All parts are compulsory.

b) Answers without relevant diagram/ figure/circuit wherever necessary will not carry any marks.

c) Direct answers to the Numerical problems without detailed solutions will not carry any marks.

PART – A

I Answer the following **10 x 1 = 10**

1. Write the dimensional formula for linear momentum.
2. What is unit vector?
3. Define workdone by the force.
4. Define radius of gyration.
5. What is the weight of a body at the centre of the earth?
6. Name the SI unit of stress.
7. What is streamline flow?
8. Mention the of degrees of freedom for a triatomic gas molecule.
9. Write Newton's formula for speed of sound in air.
10. Define amplitude of a wave.

PART – B

II. Answer any FIVE of the following questions **5×2 = 10**

11. Name any two fundamental forces in nature.
12. Mention any uses of dimensional analysis.
13. State triangle law of vector addition.
14. Mention any two methods of reducing friction.
15. Define average velocity and instantaneous velocity.
16. State and explain first law of thermodynamics.
17. Write the relation between g and G and explain the terms.
18. Mention an expression for the period of oscillation of a spring and explain the terms.

PART – C

III. Answer any FIVE of the following Questions **5×3 = 15**

19. Obtain an expression for time of flight of a projectile.
20. Using Newton's second law of motion , arrive at F = ma
21. Derive an expression for kinetic energy.
22. Mention the three types of moduli of elasticity.
23. State and explain Bernoulli's principle.
24. Define a)Specific heat of gas at constant volume b) Specific heat of gas at constant pressure c)Latent heat of fusion.
25. Write any three postulates of kinetic theory of gasses.
26. Give any three differences between progressive wave and a stationary wave.

PART – D

IV. Answer any TWO of the following Questions **2×5 = 10**

27. What is uniform circular motion? Derive an expression for centripetal acceleration.
28. State and explain a) Parallel axis theorem and b) perpendicular axes theorem.
29. Derive an expression for maximum speed of a car moving on banked circular road.

V. Answer any TWO of the following Questions **2×5 = 10**

30. Define Orbital speed of a satellite. Obtain an expression for the orbital speed of satellite.
31. State and explain the Newton's law of cooling.
32. What is SHM? Write its characteristics and give its graphical representation.

PART – E

VI. Answer any THREE of the following. **3×5 = 15**

33. A stone is dropped from top of a tower 100m height. At the same instant another stone is thrown vertically upward from the base of the tower with the velocity of 25m/s. When and where will the two stones meet? Given g = 10 m/s^2.
34. A bullet of mass 0.015kg strikes a metal plate of thickness 10cm with a velocity of 400m/s and emerge from it with a velocity of 260m/s. Find the average resistance offered by the plate to the motion of bullet.
35. A fly wheel of mass 12.5kg and diameter 0.36m rotating at 90rpm has its speed increased to 720rpm in 8s. Find the torque applied to flywheel.
36. A Carnot engine has an efficiency of 0.3, when the temperature of the sink is 350K. Find the change in temperature of the source when the efficiency becomes 0.5.
37. A train is moving at speed of 72kmph towards a station , is sounding a whistle of frequency 600Hz. What are the apparent frequencies of the whistle as heard by a man on the plot form when the train a) approaches him b)recedes from him?(speed of sound in air = 340m/s)

SCHEME OF EVALUATION - I PUC

Q. No	ANSWERS	Marks
I.	**PART – A**	
1.	$M^1L^1T^{-1}$	1
2.	It is the vector having unit magnitude	1
3.	It is	1
4.	It is the distance between the point at which the entire mass of the body is concentrated from the axis of rotation	1
5.	Zero	1
6.	Nm^{-2}	1
7.	It is the motion in which velocity of all the particles of fluid is same at a given point.	1
8.	6	1
9.	$V = \sqrt{\frac{P}{\rho}}$	1
10.	It is the maximum displacement of oscillating particle on either side of its mean position	1
II.	**PART–B**	
11.	Gravitational force, Electromagnetic force, Strong nuclear force, Weak nuclear force. } Any two	1 each
12.	1. To check the correctness of an equation. 2. To derive the relation between various physical quantities.	1each
13.	If two vectors are represented both in magnitude and direction by the two sides of a triangle taken in same order, then their resultant can be completely represented by the third side of the triangle taken in opposite order.	
14.	1) Friction can be reduced by polishing. 2) Friction can be reduced by using ball bearings. 3) Friction can be reduced by lubrication . 4) Friction can be reduced by streamlining. 5) Friction can be reduced by maintaining cushion of air between solid surfaces } Any two	
15.	<u>Average velocity</u> It is the ratio of total displacement to the total time taken <u>Instantaneous velocity</u> It is the limit of average velocity as the time interval tends to zero	2

16.	Statement. The heat energy absorbed by a system is equal to the sum of the increase in the internal energy and the external work done by the system on the surroundings. Let dQ be the amount of heat absorbed by the system, du be the increase in internal energy and dw be the external work done, then from Ist law of thermodynamics **dQ = du + dw**	1Each
17.	$g = \frac{GM}{R^2}$ Explanation of terms	1 1
18.	$T = 2\pi\sqrt{\frac{m}{k}}$ Explanation of the terms	1 1
III	**PART–C**	
19.	Diagram $v_y = u_y - g\,t$---> (1) Arriving at final formula , $T = \frac{2\,u\sin\theta}{g}$	1 1 1
20.	$F \propto \frac{dP}{dt}$ $F = m\frac{dv}{dt}$ Arriving at the relation F = ma	1 1 1
21.	W = Force×displacement $W = \frac{1}{2}mv^2$ $KE = \frac{1}{2}mv^2$	1 1 1

22.	Young's Modulus (Y). Bulk Modulus (B) Rigidity modulus (R)	1 each
23.	Statement Explanation	1 2
24.	Three definitions	1 each
25.	Any three postulates	1 each
26.	Any three differences	1 each
	PART–D	
IV.		
27.	Meaning of uniform circular motion Diagram $a_c = \frac{dv}{dt}$ $a_C = \frac{v}{r}\frac{dl}{dt}$ Arriving at expression $a_c = \frac{v^2}{r}$	1 1 1 1
28.	Two statements Two diagrams Two formula	1 each 1 1 each
29.	Figure $N\cos\theta = F_s\sin\theta + mg$ $N = \frac{mg}{\cos\theta - \mu_s\sin\theta}$ $v^2_{max} = \frac{rg(\sin\theta + \mu_s\cos\theta)}{\cos\theta - \mu_s\sin\theta}$ $v_{max} = \sqrt{\frac{rg(\tan\theta + \mu_s)}{(1 - \mu_s\tan\theta}}$	1 1 1 1
V.		
30.	Definition Diagram Centripetal force = gravitational force $\frac{mv_o^2}{r} = \frac{GMm}{r^2}$ *Arriving at* $v_o = \sqrt{\frac{GM}{(R+h)}}$	1 1 1 1

31.	Newtons law of cooling Statement $\frac{dQ}{dt} = -k(T_2 - T_1)$ Explanation of the terms Wien's disparagement law statement $\lambda_m T = b$	1 1 1 1 1
32.	Definition Three characteristics Graph	1 1each 1
VI.		
33	For Stone A, u = o,S=x and a= +g =10m/s^2 Formula s= ut +1/2at^2 Arriving at x = 5t^2 ……(1) For stone B s= 100-x , a = -g and u = 25 m/s Arriving at 100 –x =25t -5t^2 ….(2) Obtaining t = 4 second Obtaining x = 80 m	1 1 1 1 1
34	Formula work done = ½ mu^2-1/2 mv^2 Substitution and obtaining w = 693 J W = F S F = 6930 N	1 2 1 1
35	$\omega_1 = 2\pi f_1 = 3\pi$ rad /sec. $\omega_2 = 2\pi f_2 = 24\pi$ rad /sec. $\alpha = \omega_2 - \omega_1 / t = 8.243$rad /s^2 $\tau = I\alpha = (M r^2/2)\alpha$ τ= 1.669 Nm	1 1 1 1 1
36	$\eta_1 = 1 - T_2/T_1$ solving for T_1 = 500 K $\eta_2 = 1 - T_2/T^1_1$ solving for T^1_1 = 700 K change in temperature = 200K	1 1 1 1 1
37	Formula a) f' = (V/V-V$_s$)f obtaining f' = 637.5 Hz b) f' = (V/V+V$_s$)f obtaining f' = 566.7 Hz	1 1 1 1 1