Public Exam
Higher Secondary - First Year
Physics - March - 2025
Answer Key

PART-I

1)	d)	angular Momentum	1.)	கோண உந்தம்
2)	b)	Centre Point of Circle	2.)	வட்டத்தின் மையப்புள்ளி
3)	d)	decrease	3.)	குறையும்
4)	a)	785 m, Zero	4.)	785 m, சுழி
5)	d)	75 J	5.)	75 J
6)	c)	7s	6.)	7s
7)	a)	a Straight line	7.)	நேர் கோட்டுப்பாதை
8)	d)	$I = \frac{1}{3}Ml^2$	8.)	$I = \frac{1}{3}Ml^2$
9)	a)	average velocity	9.)	சராசரி திசை வேகம்
10)	a)	Velocity	10.)	திசைவேகம்
11)	c)	$\sin(x+vt)$	11.)	$\sin(x+vt)$
12)	d)	$g = 25\ ms^{-2}$	12.)	$g = 25\ ms^{-2}$
13)	b)	Net force on the object is Zero	13.)	பொருளின் மீதான தொகுபயன் விசை சிறு
14)	a)	$-9ms^{-1}$ and $5ms^{-1}$	14.)	$-9ms^{-1}$ and $5ms^{-1}$
15)	b)	torque and energy	15.)	திருப்புதிறன் மற்றும் ஆற்றல்

PART-II

16) **Newton's Second law:**

Force acting on the object is equal to rate of change of momentum.

$$F = \frac{dp}{dt}$$

17) **P.V. Diagram:**

P.V diagram is a graph b/w Pressure and Volume. To calculate the amount of work done by the gas during expansion (or) during Compression.

18) Area of triangle $= \frac{1}{2}|\vec{A} \times \vec{A}|$

$$\vec{A} \times \vec{B} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 5 & -3 & 0 \\ 4 & 6 & 0 \end{vmatrix} = \hat{i}(0) + \hat{j}(0) + \hat{k}(30+12) = 42\hat{k}$$

$$|\vec{A} \times \vec{B}| = \sqrt{42^2} = 42$$

$$\frac{1}{2}|\vec{A} \times \vec{B}| = \frac{1}{2} \times 42 = 21\,m^2$$

19) **Factors affecting λ:**

i) $\lambda \uparrow$; $T \uparrow$; Average Speed of each molecule $\uparrow$

ii) $\lambda \uparrow$; P.V of gas & diameter of gas molecule.

20) $V = u + at$

$$[L\,T^{-1}] = [L\,T^{-1}] + [L\,T^{-2}][T]$$

$$[L\,T^{-1}] = [L\,T^{-1}] + [L\,T^{-1}]$$

21) **Torque day-to-day life:**

i) Opening & closing of door

ii) Tuning of a nut using a wrench.

22) **Resonance:** Special case of forced Vibration where the freq of external Periodic force nearly the natural freq. of Vibrating body.

23) **Gravitational field:**

Force experienced by unit mass

$$E_1 = \frac{F}{m}$$

24) $V = n\lambda \Rightarrow \lambda = \frac{V}{n}$

$$\lambda = \frac{900}{25} = 36m$$

$$\lambda = 36m$$

$$n = \frac{3000}{2 \times 60} = 25$$

PART-III

25) **Properties of Vector Product:**

i) Not Commutative

$$\vec{A} \times \vec{B} \neq \vec{B} \times \vec{A}$$

ii) $(\vec{A} \times \vec{B})_{max} = AB\hat{n}$

iii) $(\vec{A} \times \vec{B})_{min} = 0$

iv) $\vec{A} \times \vec{A} = AA \sin 0^\circ \hat{n} = \vec{0}$

v) $\hat{i} \times \hat{i} = \hat{j} \times \hat{j} = \hat{k} \times \hat{k} = \vec{0}$

26) **Postulates of Kinetic Theory of Gases:**

i) All the molecules of gas are identical elastic Spheres

ii) Molecules of different gas are different

iii) Obey Newton's law of motion.

iv) Continous Random motion

v) Collisions are instantaneous.

27) $W = F \cdot dr \cos\theta$

$W = 25 \times 15 \cos 30^\circ$

$W = 25 \times 15 \sqrt{3}/2$

$W = 324.76 J$

28) Geo-Stationary Satellites:

i) They appear to be stationary when seen from Earth.

ii) It turns out to be 36,000km.

iii) Purpose of tele-communication

Polar Satellites:

Distance of 500 to 800km from the surface of Earth from North Pole to South pole.

T.P = 100 minutes.

29) Various modes of Heat transfer:- Explanation of i) Conduction (ii) Convection and (iii) Radiation.

30)

Static friction	Kinetic friction
i) Opposes the starting of motion	Opposes the relative motion of object
ii) Independent of Surface of Contact	independent of Surface of Contact
iii) $f_s^{max} > f_k$	less than maximal value
iv) $\mu_s > \mu_k$	$\mu_k < \mu_s$

31) End Correction:

Antinodes are not exactly formed at open end, to include a correction called end correction.

$\frac{1}{4} d = L_1 + e$

32) Torque & Angular Momentum

$\tau = I\frac{d\omega}{dt}$; $\tau = \frac{d(I\omega)}{dt}$

$\tau = \frac{dL}{dt}$

33) $Y = \frac{F/A}{\Delta L/L}$; $\Delta L = \frac{F}{A} \cdot \frac{L}{Y}$

$Y = \frac{5 \times 10}{1.25 \times 10^{-4}} \times \frac{10}{4 \times 10^{10}}$

$Y = 10^{4} m$

34) a) Types of Errors:

i) Systematic Errors
ii) Random Errors
iii) Gross Errors.

i) Systematic Errors
1) Instrumental
2) Imperfection in Expt. Tech.
3) Personal Error
4) Errors due to external Cause.
5) least Count.

34) b) Newtons-Laplace Correction.

$PV = \text{const.}$

$P\,dV + V\,dp = 0$

$P = -V\frac{dp}{dV} = k_1$

$V_T = 279.80 ms^{-1}$

$PV^2 = \text{const.}$

$V^2\,dp + P(2V^{2-1}\,dV) = 0$

$P = -V\frac{dp}{dV} = k_2$

$V_A = 331.30\ ms^{-1}$

35) a) Need for Banking of tracks:

i) In level Circular Road, Skidding mainly depends on Co-efficient of static friction.

ii) Outer edge of road is slightly raised Compared to inner edge.

$N\cos\theta = mg$

$N\sin\theta = mv^2/r$

$\tan\theta = v^2/rg$

$\boxed{v = \sqrt{rg\tan\theta}}$

35) b) Pascal's law:

Pressure in a liquid is changed at a Particular Point, the Change is transmitted to entire liquid without being diminished in magnitude.

i) Hydraulic lift diagram.

$F_2 = P \times A_2 = \frac{F_1}{A_1} \times A_2$

$\therefore F_2 = \frac{A_2}{A_1} \times F_1$

36) Expression for Centripetal Acceleration.

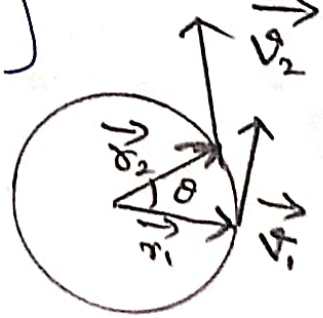
$\frac{\Delta r}{r} = -\frac{\Delta v}{v} = \theta$

$\Delta v = -v\left(\frac{\Delta r}{r}\right)$ =

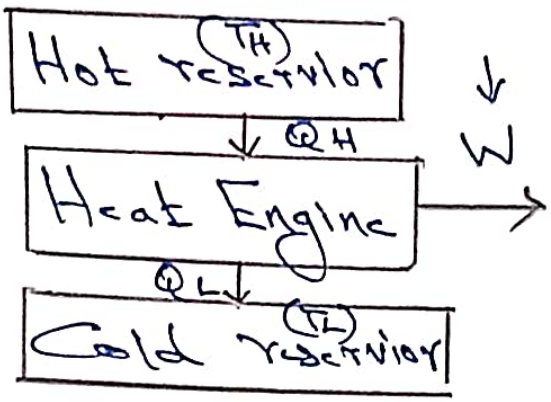
$a = \frac{\Delta v}{\Delta t} = \frac{v}{r}\left(\frac{\Delta r}{\Delta t}\right)$

$\boxed{a = -v^2/r}$

$\boxed{a = -\omega^2 r}$



36 (b) Heat Engine:



Efficiency: $\eta = \frac{W}{Q_H} = \frac{Q_H - Q_L}{Q_H}$

$$\eta = 1 - Q_L/Q_H$$

37) a) Horizontal Oscillation of a Spring: i) Diagram

$F \propto x$

$F = -kx$; $m\frac{d^2x}{dt^2} = -kx$

$\frac{d^2x}{dt^2} = -k/m\,x$

$\omega^2 = k/m$; $\omega = \sqrt{\frac{k}{m}}$

$f = \frac{\omega}{2\pi} = \frac{1}{2\pi}\sqrt{k/m}$

$$T = 1/f = 2\pi\sqrt{m/k}$$

37) (b) Rolling on inclined Plane:

Diagram.

$mg\sin\theta - f = ma$

$Rf = I\alpha$

$Rf = mk^2\frac{a}{R}$

$f = ma(k^2/R^2)$

$mg\sin\theta - ma\left(\frac{k^2}{R^2}\right) = ma$

$a\left(1 + \frac{k^2}{R^2}\right) = g\sin\theta$

$$a = \frac{g\sin\theta}{1 + k^2/R^2}$$

38) a) Power:-

$P = \frac{\text{Work done}}{\text{time taken}} = \frac{W}{t}$

Unit: i) Watt

ii) $J\,s^{-1}$

$E = P \times t = 75W \times 2hr$

$= 18000\ Whr = 18kwh.$

$= 18 unit$

38) b) Energy of Satellite:

$U = -\frac{GM_sM_E}{(R_E+h)}$; $K.E = \frac{1}{2}m_sv^2$

$E = U + K.E$

$E = \frac{1}{2}\frac{GM_EM_s}{(R_E+h)} - \frac{GM_EM_s}{(R_E+h)}$

$$E = -\frac{GM_sM_E}{2(R_E+h)}$$

ii) $E_m = -\frac{GM_EM_m}{2R_m}$

$E_m = -38.42\times10^{-19}\times10^{4}$

$E_m = -38.42\times10^{-27}$ Joul

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