KARAPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE-21

DEPARTMENT OF PHYSICS

LECTURE PLAN (2017-2018 ODD SEMESTER)

I B.SC PHYSICS (2017-2020 BATCH)

MECHANICS

Lecture Plan

UNIT – I

S.No	Hour required	Title of the topic to be covered	Page No.
1	1 hr	Vectors: Vector algebra	T2 (2-3)
2	1 hr	Scalar and vector products	T2(12-13)
3	1 hr	Derivatives of a vector with respect to a parameter.	T2(35-37_
4	1 hr	Continuation	
5	1 hr	Ordinary Differential Equations	R2 (397-395)
6	1 hr	1st order homogeneous differential equations	R2(395-396)
7	1 hr	Continuation	
8	1 hr	Continuation	
9	1 hr	2nd order homogeneous differential equations with constant coefficients.	R2(396-398)
10	1 hr	Continuation	
11	1 hr	Revision	

Text Books: **T1-**Upadhyaya J.C. (1969), General Properties of Matter, Vol- I., Agra, RamPrasad & Sons.

T2- Mathur D.S. (2014), Mechanics, New Delhi, S. Chand & Co.

UNIT – II

S.No	Hour required	Title of the topic to be covered	Page No.
1	1 hr	Laws of Motion: Frames of reference	T2-(63-64)
2	1 hr	Newton's Laws of motion	T2-(66)
3	1 hr	Dynamics of a system of particles	
4	1 hr	Continuation	
5	1 hr	Centre of Mass	T2-(253-55)
6	1 hr	Continuation	
7	1 hr	Momentum and Energy: Conservation of momentum	T2-(250-53)
8	1 hr	Continuation	
9	1 hr	Work and energy. Conservation of energy	T2-(216)
10	1 hr	Continuation	
11	1 hr	Motion of rockets	T2-(265-69)
12	1 hr	Continuation	
13	1 hr	Rotational Motion	
14	1 hr	Angular velocity and angular momentum	
15	1 hr	Continuation	
16	1 hr	Torque.	T2-(270-73)
17	1 hr	Conservation of angular momentum.	T2-(273-74)
18	1 hr	Revision	

Text Books: **T1-**Upadhyaya J.C. (1969), General Properties of Matter, Vol- I., Agra, Ram Prasad & Sons.

T2- Mathur D.S. (2014), Mechanics, New Delhi, S. Chand & Co.

UNIT-III

S.No	Hour required	Title of the topic to be covered	Page No.
1	1 hr	Gravitation: Newton's Law of Gravitation.	T2-(583-84)
2	1 hr	Motion of a particle in a central force field	
3	1 hr	Continuation	
4	1 hr	Kepler's Laws	T2-(648-52)
5	1 hr	Satellite in circular orbit and applications	
6	1 hr	Special Theory of Relativity	T2-(106-07)
7	1 hr	Constancy of speed of light	
8	1 hr	Postulates of special theory of Relativity	
9	1 hr	Length contraction, Time dilation	T2-(111-116)
10	1 hr	Relativistic addition of velocities.	
11	1 hr	Continuation	
12	1 hr	Revision	

Text Books: T1-Upadhyaya J.C. (1969), General Properties of Matter, Vol- I., Agra, Ram Prasad & Sons.

T2- Mathur D.S. (2014), Mechanics, New Delhi, S. Chand & Co.

Reference Books: R1- Brijlal N.Subramaniam, Properties of Matter, New Delhi, S.Chand & Co.

R2- Murugeshan.S, Properties of Matter, New Delhi, S.Chand & Co.

UNIT - IV

S.No	Hour required	Title of the topic to be covered	Page No.
1	1 hr	Oscillations: Simple harmonic motion	T2-(312-16)
2	1 hr	Differential equation of SHM and its solutions.	R1-(102-03)
3	1 hr	Continuation	R1-(102-03)
4	1 hr	Kinetic and Potential Energy	T2-(316-18)
5	1 hr	Continuation	
6	1 hr	Total Energy and their time averages	T2-(318-19)
7	1 hr	Continuation	T2-(318-19)
8	1 hr	Damped oscillations	R1-(107-08)
9	1 hr	Continuation	R1-(107-08)
10	1 hr	Revision	

Text Books: **T1-**Upadhyaya J.C. (1969), General Properties of Matter, Vol- I., Agra, Ram Prasad & Sons.

T2- Mathur D.S. (2014), Mechanics, New Delhi, S. Chand & Co.

Reference Books: R1- Brijlal N.Subramaniam, Properties of Matter, New Delhi, S.Chand & Co.

R2- Murugeshan.S, Properties of Matter, New Delhi, S.Chand & Co.

UNIT - V

S.No	Hour required	Title of the topic to be covered	Page No.
1	1 hr	Elasticity: Hooke's law	T2-(672)
2	1 hr	Stress-strain diagram	T2-(673-74)
3	1 hr	Continuation	
4	1 hr	Elastic moduli-Relation between elastic constants	T2-(675-78)
5	1 hr	Continuation	
6	1 hr	Poisson's Ratio	T2-(682)
7	1 hr	Expression for Poisson's ratio in terms of elastic constants	T2-(682-85)
8	1 hr	Continuation	
9	1 hr	Work done in stretching & work done in twisting a wire	T2-(685-87)
10	1 hr	Continuation	T2-(685-87)
11	1 hr	Twisting couple on a cylinder	T2-(690-92)
12	1 hr	Continuation	
13	1 hr	Determination of Rigidity modulus by static torsion	R2-(17-18)
14	1 hr	Continuation	
15	1 hr	Torsional pendulum	R2-(19-20)
16	1 hr	Continuation	
17	1 hr	Determination of Rigidity modulus and moment of inertia	R2-(19-22)
18	1 hr	Continuation	
19	1 hr	q, η & by Searles method.	R2-(19-22)
20	1 hr	Continuation	
21	1 hr	Revision	
22	1 hr	Old Question Paper Revision	

23	1 hr	Old Question Paper Revision	
24	1 hr	Old Question Paper Revision	

Text books : T1-Upadhyaya J.C. (1969), General Properties of Matter, Vol- I., Agra, Ram Prasad & Sons.

T2- Mathur D.S. (2014), Mechanics, New Delhi, S. Chand & Co.

Reference Books: R1- Brijlal N.Subramaniam, Properties of Matter, New Delhi, S.Chand & Co.

R2- Murugeshan.S, Properties of Matter, New Delhi, S.Chand & Co.

KARAPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE-21

SEMESTER – I

MECHANICS **L T P C**

17PHU101 **5 - - 5**

Objective:: The main objective of the course is to know how to use Newton's laws of motion to solve advanced problems involving the dynamic motion of mechanical systems and the use of differential equations and other advanced mathematics in the solution of the problems. Also to find the use of conservation of energy and linear and angular momentum to solve dynamics problems.

UNIT - I

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients.

UNIT - II

Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum.

UNIT - III

Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Special Theory of Relativity: Constancy of speed of light. Postulates of special theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities.

UNIT - IV

Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations.

UNIT - V

Elasticity: Hooke's law- Stress-strain diagram - Elastic moduli-Relation between elastic constants- Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants- Work done in stretching & work done in twisting a wire- Twisting couple on a cylinder- Determination of Rigidity modulus by static torsion- Torsional pendulum-Determination of Rigidity modulus and moment of inertia - q, η & by Searles method.

TEXT BOOKS

1. Mathur D.S. (2014), *Mechanics*, New Delhi, S. Chand & Co.
2. Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley
3. Engineering mechanics by D.P. Sharma, 2010, Pearson edition, Delhi, ISBN 978-81-317-3222-9.

REFERENCE BOOKS

1. D. S. Mathur "Elements of Properties of Matter" S. Chand & Co.

2. Mechanics, Second edition, H. S. Hans, S. P. Puri, 2006, Tata McGraw Hill Publishing Company Limited, ISBN 0-07-047360-9.
3. Mechanics Berkeley Physics course, v.1:Charles Kittel, et.al. 2007, Tata McGraw Hill
4. Engineering Mechanics, Basudeb Bhattacharya, 2nd edn., 2015, Oxford University Press
5. Engineering mechanics and Statistics by N. H. Dubey, 2013, Tata McGraw Hill Education Private Limited, ISBN: 978-0-07-107259-5.

UNIT - I

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients.

SCALAR PRODUCTS

The scalar product of two vectors A and B is denoted by A.B .It is also known as the dot product of the two vectors.

It is definied as the product of the magnitudes of the two vectors. A and B and the cosine of their included angle θ irrespective of the co-ordinate system used.

$$A.B=AB\cos\theta$$

The scalar product is clearly commutative and

$$A.B=B.A$$

The order of the factors may be reversed without in anyway affecting the value of the product.

SOME IMPORTANT POINTS ABOUT SCALAR PRODUCT:

I. If the two vectors have the same direction,θ=0

$$A.B=AB\ \cos 0°$$

$$A.B=AB$$

so that the scalar product is equal is to the product of the magnitude of two vectors.

II. If the two vectors have the opposite direction ,θ=π

$$A.B=AB\ \cos\pi$$

$$A.B=AB(-1)$$

$$A.B=-AB$$

so that the scalar product is equal to the negative of their magnitudes

III. If A.B=0,it means that either A or B=0 or A and B are perpendicular to each other

IV. The scalar product obeys the distributive law

$$A(B+C)=AB+AC$$

VECTOR PRODUCT

The vector product of two vectors is denotd by A*B. It is also called the cross product of the two vectors.

It is definied as the vector R whose magnitude is equal to the product of the magnitudes of the two vectors A and B and the sine of their included angle θ.

R=A*B=AB Sin θ

The direction R is perpendicular to the plain containing the vectors A and B.It is to be noted that if the order of vectors is reveresd the sign of the vector product changes

A*B=-B*A

SOME IMPORTANT POINTS ABOUT VECTOR PRODUCT:

I. if the two vector are perpendicular to each other ,then θ=90°

A*B=AB Sin 90°

A*B=AB

II. If the two vectors be parellel then θ=0

A*B=AB Sin θ

A*B=0

Therefore, the vector product of two parellel (or) equal vectors is zero.

III. The distributive law holds good for the cross product of vectors.

DEREVATIVES OF A VECTOR WITH RESPECT TO A PARAMETER:

VECTOR DERIVATIVES-VELOCITY *ACCELERATION

Let r be a single –valued function of a scalar variable t such that for every value of t there exists only one value of r. then as t varies continuously r also changes.

In this case , t reprecents the time variable and r represents the position vector of a moving particle with respect to a fixed origin o.then as t varies continuously ,the point moves along a continuous curve in space so that ,if r and r+δ be the position vectors of the point in positions P and Ṕ relative to origin 0 for the values t and t+δt of the scalar variable, we have

change in the value of r=δr

as δt→0, point Ṕ approaches P and the chord PṔ tends to coincide with the tangent to the curve at P

The time derivative of r with respect to t can be written as

$$\frac{dr}{dt}=\lim_{\delta t\to 0} \delta r\,\frac{\delta r}{\delta t}$$

the second and third derivatives of r are respectively d^2 r/ dt^2 and d^3 r/ dt^3 clearly ,δr represents the displacement of the particle in time inrerval δt and δr/δt gives its average velocity cluring interval δt. the limiting value of this average velocity ,as δt→ 0,is the instantaneous velocity v of the particle .thus we have ,

$$v^2\text{=dr/dt}$$

along the tangent to the path of the particle in the same manner ,if δv be the increase in the velocity v of the particle during the time-interval δt,the rate of change of velocity (or) the average acceleration during the interval =δv/δt and therefore ,instantaneous accleration a of the particle is the limiting value dv/dt of δv/δt as δt→ 0 thus ,

$$a=dv/dt=d^2r/dt^2$$

now since,r=xi+yi+zk and since x,y and z are functions of time ,we also have

$$v=dr/dt=dx/dt\ \ i+dy/dt\ \ j+dz/dt\ \ k \quad \text{and}$$

$$a=d^2r/dt^2=d^2x/dt^2\ \ i+d^2y/dt^2\ \ j+d^2z/dt^2\ \ k$$

ORDINARY DIFFERENTAL EQUATIONS:

1^{ST} ORDER HOMOGENEOUS DIFFERENTIAL EQUATIONS

The general linear differential equation of first order is

$$dy/dx+p(x)y=f(x) \quad \rightarrow (1)$$

to solve this equation let us substitute

$$y=u(x)v(x) \qquad \rightarrow(2)$$

where u and v are function of x to be determined substituting y from (2) in (1).we get,

$$u\ dv/dx+v\ \ du/dx+puv=f(x)$$

this may be expressed in the form

$$v[du/dx+pu]+u\ dv/dx=f(X) \quad \rightarrow(3)$$

Since u and v are orbitary functions of x ,we may choose u such that

$$du/dx+pu=0 \quad \rightarrow(4)$$

then equation (3) would reduce to

$$u\ dv/dx=f(x) \quad \rightarrow(5)$$

equation (4) may be put in the form

$$du/u=-p(x)dx$$

integrating we get,

$$\log_e u=-\int p(x)dx+\log k \quad \rightarrow(6)$$

where log k is constant of integration

from equations (6) we have

$$\log_e \frac{u}{k} = -\int p(x)\text{dx or}$$

$$u = ke^{-\int p(x)dx} \quad \rightarrow (7)$$

now from equation (5) we have

$$dv = f(x)dx/u = 1/k \quad e^{\int p(x)dx)} \quad f(x)\,dx$$

integrating both sides with respect to x, we get

$$v = 1/k\int \quad e^{+}\int p(x)dx \quad f(x)\,dx + c$$

C being a constant of integration

substituting these values of u and v in equation (2)

we get,

$$y = k\ e^{-\int p(x)dx}[1/k\int e \int p(x)dx f(x)\,dx + c]$$

$$= A\ e^{-\int p(x)dx} + e^{\int p(x)dx}\ e^{\int p(x)} f(x)dx \quad \rightarrow (8)$$

where A=KC is an orbitary constant equation (8) represents the required solution of differentrial equation (1)

SECOND ORDER DIFFERENTIAL EQUATIONS WITH CONSTANT CO-EFFICIENTS

Consider the differential equation

$$d^2y/dx^2 + a1dy/dx + a2\ y = f(x) \quad \rightarrow (1)$$

where a1 and a2 are constants and f (x) is a known function of x

let us introduce the symbol of operation

$$D^r = d^r/dx^r \quad \text{i.e } d/dx = D \text{ and } d^{2/dx^2} = D^2 \quad \rightarrow (2)$$

then equation (1) may be expressed in the form

$$(D^2 + a1\ D + a2)y = f(x) \quad \rightarrow (3)$$

Equation (3) can be written as ,

$$L(D)y = f(x) \rightarrow (4)$$

If f(x)=0,then equation (4) reduces to

$$L(D)y = 0 \rightarrow (5)$$

this is called the veduced equation and its solution is called the complementary function denoted by yc then we may specity

$$L(D)yc=o \rightarrow (6)$$

the general solution of equation (a) consists of the sum of two parts :

the complementary function yc and the particular integral yp which may be seen as follows

the particular integral Yp satisfies the equation (4)

$$L(D)yp=f(x) \rightarrow (7)$$

Adding (6) and (7) we get ,

$$L(D)yc+L(D)yp=f(x)$$

$$L(D)[yc+yp]=f(x) \rightarrow (8)$$

If we substitute ,

$$y=yc+yp \rightarrow (9)$$

we obtain

$$L(D)y=f(x) \rightarrow (10)$$

this proves the proposition that the general solution of a linear differntial equation with constant co-efficient is the sum of a particular integral yp and the complementary function yc.

If α and β are the roots of auxiliary equation

$$(D^2+a1\ D+a2)y=0$$

then we may write equation (3) in the form

$$(D-\alpha)\ (D-\beta)y=f(x) \rightarrow (11)$$

substituting $(D-\beta)y=u \rightarrow (12)$

equation (11) becomes ,

$$(D-\alpha)u=f(x)\ (or)\ du/dx\ \ -\alpha u=f(x) \rightarrow (13)$$

this is a first order linear equation with p(x)=-αL y(x)=u(x)

$$u=A1e^{\alpha x}+e^{\alpha x}+\int \quad e^{-\alpha x}f(x)\,dx$$

$$=e^{\alpha x}[A1+\varphi\ (x)] \rightarrow (14)$$

where

$$d(x) = \int_0^x e^{\alpha x} f(x) dx \rightarrow (15)$$

if we substitute this value of u in equation (12) we get,

$$(D-\beta)y \ = \ e^{\alpha x}[A_1 \ + \ \varphi(x)] \rightarrow (16)$$

$$(D-\beta)y \ = \ F(x) \rightarrow (17)$$

$$F(x) = e^{\alpha x}[A_1 + \varphi(x)] \rightarrow (18)$$

Equation (17) is again first order liner differential equation, hence its solution is,

$$Y = A_2\, e^{\beta x} + e^{\beta x} \int e^{-\beta x}\ F(x)dx \rightarrow (19)$$

Substitiuting value of F(x) from (18) in (19)

we get,

$$Y = A_2\, e^{\beta x} + e^{\beta x} \int e^{-\beta x}\quad e^{\alpha x}[A_1 + \varphi(x)]\ dx$$

$$Y = A_2\, e^{\beta x} + e^{\beta x} \int e^{(\alpha-\beta)x}\ [A_1 + \varphi(x)]\ dx$$

$$Y = A_2\, e^{\beta x} + e^{\beta x} A_1 \int e^{(\alpha-\beta)x} dx + e^{\beta x} \int e^{(\alpha-\beta)x}\ \varphi(x)\, dx$$

$$Y = A_2\, e^{\beta x} + \frac{e^{\beta x} A_1}{\alpha-\beta}\, e^{(\alpha-\beta)x} + e^{\beta x} \int e^{(\alpha-\beta)x}\ \varphi(x)\, dx \rightarrow (20)$$

On changing the meaning of constant A_1, the solution of equation (1) may be written as

$$Y = A_1\, e^{\alpha x} + A_2\, e^{\beta x} + e^{\beta x} \int e^{(\alpha-\beta)x}\ \varphi(x)\, dx \rightarrow (21)$$

where $\varphi(x)$ is given by equation (15)

In this solution the first two terms represent the complementary function while the remaining last term represents the particular integral.

KARAPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE-21

POSSIBLE QUESTIONS

UNIT I

1. Explain the scalar products with suitable examples.
2. Obtain the derivatives of a vector with respect to a parameter.
3. Explain the vector product with suitable examples
4. Define vector algebra and give some applications of the vector algebra.
5. Explain in detail about the differential equations.
6. Derive the expression for first order homogenous differential equations.
7. Obtain the solution for second order homogeneous differential equations.

KARPAGAM ACADEMY OF HIGHER EDUCATION, COIMBATORE-21

DEPARTMENT OF PHYSICS

I B.SC PHYSICS **BATCH: 2017-2020**

MECHANICS (17PHU101)

MULTIPLE CHOICE QUESTIONS

Questions	option 1	option 2	option 3	option 4	option 5	option 6	Answer
UNIT I							
A physical quantity which posses only magnitude are called --------------	scalar	tensor	vector	none			scalar
A physical quantity which posses magnitude and direction are called --------------	scalar	tensor	vector	none			vector
Force is a ------------ quantity	tensor	vector	scalar	both a and b			vector
Mass is a -------------- quantity	vector	tensor	scalar	none			scalar
Physical quantities can be divided into ----------- types.	2	3	4	5			2
The commutation law of addition can be written as ------------	A+B=B+A	A+B+C=(A+B)C	A+(B+C)=(A+C)+B	none			A+B=B+A
The association law of addition can be written as ------------	A+B=B+A	A+B+C=(A+B)C	A+(B+C)=(A+B)+C	none			A+(B+C)=(A+B)+C
The distributive law can be written as ------------	AX(B+C)=(AXB)+(AXC)	A+(B+C)=(A+B)+C	A+B+C=(A+B)C	none			AX(B+C)=(AXB)+(AXC)
The commutation law of multiplication can be written as ------------	AXB=BXA	AX(BXC)=(AXB)XC	A+B+C=(A+B)C	AX(B+C)=(AXB)+(AXC)			AXB=BXA
The association law of multiplication can be written as ------------	AXB=BXA	AX(BXC)=(AXB)XC	A+B+C=(A+B)C	AX(B+C)=(AXB)+(AXC)			AX(BXC)=(AXB)XC
A vector of unit magnitude is called a --------------	zero vector	null vector	unit vector	proper vectors			unit vector
Vectors other than null vectors are referred as -----------	zero vector	unit vector	proper vectors	none			proper vectors
Mechanics can be divided into ------------- types	2	3	4	5			2
The scalar product of two vectors A and B is denoted as -------------	A.B	A+B	AXB	A-B			A.B
If the two vectors A and B are equal and have same direction then the product can be w	A.A=0	A.A=A	A.A=1	$A.A=A^2$			$A.A=A^2$
The rate of doing work is known as -----------	energy	acceleration	momentum	power			power
The rate of change of velocity is --------------	momentum	impulse	acceleration	power			acceleration
velocity is a ------------ quantity	scalar	vector	tensor	none			scalar
If the lines of action of all forces lying in one plane, then the force system is said to be -	concurrent forces	coplanar forces	equal forces	none			coplanar forces
The couple can be written as ------------	aXf	aXp	axr	none			aXf
The product of mass and volume can be written as ------------	acceleration	density	momentum	energy			density
The vector product of two vectors A and B can be written as -------------	A.B	A+B	AXB	A-B			AXB
The velocity of a particle of zero rest mass is always	c	1	0	>1			c
The energy equivalent of the mass loss E=mC2 is called	gravity	center of mass	momentum	binding energy			binding energy
The relativistic law of conservation of momentum is	p=rm0v	p=mv	p=m0	none			p=rm0v
The first experimental confirmation of the relativity of mass came from	bohr	thomson	bucherer	none			bucherer
The vectors associated with a linear or directional effect are called	unit vectros	polar vectors	scalar	position vectors			polar vectors
A null vector is denoted by	1	-1	0	none			0
The process by which we obtain a product is called multiplication and each of the two v	factor of product	factor of addition	factor of subtraction	none			factor of product
The interacting forces after the cllision became effectively	1	-1	0	none			0
The external torque applied determines the rotation of the system about	gravity	center of mass	momentum	none			center of mass
In physics, ------------ is the motion of study of particles.	dynamics	mechanics	statics	kinetics			mechanics
In physics, ------------ is the study of rest state of particles.	dynamics	mechanics	statics	kinetics			statics
Inertia is a property of a body by virtue of which the body is	unable to change by itself th	unable to change by motion	unable to change by its	none			unable to change by itself the state of rest
When an object undergoes acceleration	its speed always increases	its velocity always increase	it always falls towards t	a force always acts on it			a force always acts on it
The spin angular momentum of an electron is also referred to as its	angular momentum	linear momentum	momentum	intrinsic angular momentum			intrinsic angular momentum
The magnitude of the angular velocity and hence also that of the angular momentum of	changed	increases	decreases	unaltered			unaltered
The property momentum was introduced by --------------	galileo	newton	einstein	bohr			newton
Newton's law's remain unchanged or invariant	Under Galilean transformati	Under Lorentz transformat	both a and b	none			Under Galilean transformation
The SI unit of momentum is --------------	kg ms^{-1}	kg ms^{-2}	kg ms^{-3}	kg s^{-2}			kg ms^{-1}

The couple can be written as ------------	aXF	a+F	0	r+F	aXF
The region of space concerned is known as	scalar field	vector field	both a and b	none	both a and b
Density can be defined as	mxv	m/v	ma	none	m/v
Of the following units, the one that is a unit of energy is	Joule	Meter	Newton	none	Joule
The term inertia means which of the following? The tendency of an object to	maintain its mass	remain in motion	remain in rest or motior	stop the motion of other objects	remain in rest or motion
Which pair of variables defines motion?	speed and distance	time and momentum	change of position and	speed and passage of time	change of position and passage of time
Which two fundamental properties are used to describe motion?	mass and distance	length and time	speed and time	distance and speed	length and time
What is a difference between an object's speed and velocity?	Speed includes direction as	Velocity includes time dur	Velocity includes the d	none	Velocity includes the direction of travel whereas speed does not.
What feature of motion is described by acceleration?	The rate at which speed cha	How quickly final velocity	The rate at which veloc	Whether motion is speeding up or slowing down	The rate at which velocity changes.
If the forces on an object are balanced, the object will	remain at rest if initially at r	continue moving in a strai	both A and B	none	both A and B
According to Newton's second law of motion, acceleration is proportional to force. That	produces a smaller accelerat	doesn't affect acceleration	produces a smaller mas	produces a larger acceleration	produces a larger acceleration
Which of the following statements are true of both weight and mass?	Weight is a force, mass is a	Mass depends on gravity,	Heavier objects weigh	Gravity is necessary to measure both weight and mass	Weight is a force, mass is a measure of inertia
What is the unit of weight in the metric system?	kilogram	newton	pound	meters per second squared	newton
According to Newton's second law of motion, what causes a change in the motion of an	decrease in inertia	change in velocity	net force	acceleration	net force
Which of the following indicate that an object has been subjected to an unbalanced forc	The object speeds up	The object slows down	The object changes dire	Any of the above	Any of the above
Which of the following correctly states Newton's third law of motion? Forces occur in n	equal in magnitude and equ	opposite in magnitude and	equal in magnitude and	opposite in magnitude and opposite in direction	equal in magnitude and opposite in direction
A person walking on a level surface moves forward because the forces of	his feet pushing forward on	his feet pushing backward	the ground pushing for	the ground pushing backward on his feet	the ground pushing forward on his feet
What are the metric units for momentum?	kg • m/s^2	newton	kg • m/s	newton • m	kg • m/s
In Newton's second law of motion, what is the relationship between acceleration and m	is directly proportional to m	is inversely proportional to	does not depend on ma	none	is inversely proportional to mass
The conservation of momentum is correctly expressed by which of the following statements? The total momentum of interacting objects					

PREPARED BY : Mrs. A. Sahana Fathima, Assistant Professor, Department Of Physics, KAHE-CBE-21