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Fill in the Blank (FBQs)
FBQ1
A vector is a quantity specified by ------------- and ----------------

*Magnitude and direction*
1.0000000
*Magnitude direction*
1.0000000
*Magnitude, direction*
1.0000000
*Magnitude/direction*
1.0000000
FBQ2
The __________vector coincides with the origin

*Zero vector*
1.0000000
*Zero*
1.0000000
FBQ3
Suppose a=(ax,ay,az) and b=(bx,by,bz) are two vectors, then the expression ax+bx, ay+by,az+bz= ___

*a+b*
1.0000000
*a + b*
1.0000000
FBQ4
The three unit vectors i,j,kpointing in the directions of the x, y, z axis form what is known as __________

*Orthonomal triad*
1.0000000

0.0000000
FBQ5
A vector whose sense is merely conventional, and would be reversed by changing from a right-hand to a left-hand convention is called _______

*Axial vector*

1.0000000

0.0000000
FBQ6
The vector product of a vector with itself is the _____ vector

*Zero*
1.0000000
*0*
1.0000000
FBQ7
A scalar quantity is specified by _________

*Direction*
1.0000000

0.0000000
FBQ8
For a vector field A the expression âˆ‡.A=iâˆ‚Axâˆ‚x+jâˆ‚Ayâˆ‚y+kâˆ‚Azâˆ‚z is defined _________.

*div A*
1.0000000

0.0000000
FBQ9
âˆ‡Ã—A=iâˆ‚Axâˆ‚y-âˆ‚Ayâˆ‚z+jâˆ‚Axâˆ‚z-âˆ‚Azâˆ‚x+k(âˆ‚Ayâˆ‚x-âˆ‚Axâˆ‚y) is the expression for _________

*curl A*
1.0000000

0.0000000
FBQ10
For two nonparallel vectors a and b drawn from 0 define a unique axis through 0 perpendicular to the plane containing a and b, the value absinÎ¸ is the ___

*Vector product*
1.0000000

0.0000000
FBQ11
If Î¸ is the angle between the vectors a and b, then the ___ of their sum is given by a2+b22abcosÎ¸

*Length*
1.0000000

0.0000000
FBQ12
Any vector r can be written as a sum of three vectors along the three axes as R=
___________

*xi +yj + xk*
1.0000000

0.0000000
FBQ13
The basic equations of electromagnetic theory are _______ equations

*Maxwellâ€™s*
1.0000000
*Maxwell*
1.0000000
FBQ14
_______force equation determines the force on a particle of charge q moving with velocity v.

*Lorentz*
1.0000000
*Lorentzâ€™s*
1.0000000
FBQ15
A'=A-âˆ‡Î› is a ___ equation

*Transformation*
1.0000000

0.0000000
FBQ16
When there is no electric charge or current density, there are _____dimensional wave equations, which describe a wave propagating with velocity c

*Three*
1.0000000
*3*
1.0000000
FBQ17
For a static case, in which all the fields are time-independent; Maxwellâ€™s equations separate into a pair of ______equations

*Electrostatic*
1.0000000

0.0000000
FBQ18
The magnetic dipole field has precisely the same form asthe _____dipole field

*Electric*
1.0000000

0.0000000
FBQ19
The first two members of a family of quantities known as tensors are _____ and ______

*Scalars and vectors*
1.0000000
*Scalars, vectors*
1.0000000
FBQ20
Scalars are called tensors of rank ______

*Zero*
1.0000000
*0*
1.0000000
FBQ21
The family of tensors of rank 2 are often called ______

*Dyadic*
1.0000000

0.0000000
FBQ22
Most frequently when one vector b is defined as a linear function of another vector a _______ occurs

*Tensor*
1.0000000

0.0000000
FBQ23
Tensors are commonly denoted by ______ capitals

*Sans-serif capital*
1.0000000

0.0000000
FBQ24
A tensor T has ________ components

*Nine*
1.0000000
*9*
1.0000000
FBQ25
A vector a is called an/a ________of T if Ta=Î»a

*Eigenvector*
1.0000000

0.0000000
FBQ26
For a vector a if Ta=Î»a, Î» is called the__________________

*Eigenvalue*
1.0000000

0.0000000
FBQ27
Equivalently, Ta=Î»a may be written as T-Î»1a=

*0*
1.0000000

0.0000000
FBQ28
When the density is a constant, the systems is said to be of _______

*Uniform*
1.0000000

0.0000000
FBQ29
A mass defined per unit volume is called _______ density

*Volume*
1.0000000

0.0000000
FBQ30
We can define a mass per unit length or linear density when the particles occupy a ________

*Line*
1.0000000

0.0000000
FBQ31
When ______ system of particles occupies a surface, we can define a surface density

or mass per unit area

*Continuous*
1.0000000

0.0000000
FBQ32
Forces that change the distances between individual particles when applied to systems of particles are called _______systems

*Deformable*
1.0000000

0.0000000
FBQ33
A system in which the distance between any two specified particles remains the same regardless of applied forces is called ________

*Rigid body*
1.0000000

0.0000000
FBQ34
The number of coordinates required to specify the position of a system of one or more particles is called the number of __________of the system

*Degrees of freedom*
1.0000000

0.0000000
FBQ35
The number of degrees of freedom for five particles moving freely in a plane is ___

*Ten*
1.0000000
*10*
1.0000000
FBQ36
A system consisting of N particles moving freely in space requires 3N_____ to specify its position.

*Coordinates*
1.0000000

0.0000000
FBQ37
A constraint is ________ if the particle is constrained to move along a surface which is

in a plane

Holonomic
1.0000000

0.0000000
FBQ38
The total linear impulse is equal to the change in linear _______

*Motion*
1.0000000

0.0000000
FBQ39
A rigid body which can move freely in space has ______ degrees of freedom

*6*
1.0000000
*Six*
1.0000000
FBQ40
In practice it is fairly simple to go from discrete to continuous systems by merely replacing summations by__________

*Integration*
1.0000000

0.0000000
FBQ41
If a system of particles is in a uniform gravitational field, the center of mass is sometimes called the ___________

*Centre of gravity*
1.0000000

0.0000000
FBQ42
If Vv=drvdt=rË™v is the velocity of mv, the p= âˆ‘u=1Nmvvw=âˆ‘u=1NmvrvË™ defines the ___of the system

*Total momentum*
1.0000000

0.0000000
FBQ43
The velocity v -of the ___is given by v-=dr-dt

*Centre of mass*
1.0000000

0.0000000
FBQ44
The total momentum of a system of particles can be found by multiplying the ___ M of the system by the velocity v -

*Total mass*
1.0000000

0.0000000
FBQ45
If the resultant external force acting on a system of particles is zero, then the total _________ remains constant

*Momentum*
1.0000000

0.0000000
FBQ46
The quantity Î©=âˆ‘v=1Nmv(rvXVv)is called the total _________ momentum of the system of particles about origin O

angular
1.0000000

0.0000000
FBQ47
The sum âˆ§=âˆ‘v=1Nrv(rvXFv) is called the total external _______ about the origin

*Torque*
1.0000000

0.0000000
FBQ48
The total external torque on a system of particles is equal to the time rate of change of angular momentum of the system, provided that the internal forces between particles are _________ forces

*Central*
1.0000000

0.0000000
FBQ49
When all forces, external and internal, are conservative, we can define a total _______ energy V of the system.

potential
1.0000000

0.0000000
FBQ50
If Tand Vare respectively the total kinetic energy and total potential energy of a system of particles, then T + V= constant is called the principle of ________for systems of particles.

*Conservation of energy*
1.0000000

0.0000000
FBQ17
The first two members of a family of quantities known as tensors are {#1} and {#2}

4689 4690,4691
FBQ17 {100:SHORTANSWER:%100%Scalars}
Scalars
1.0000000
FBQ17 {100:SHORTANSWER:%100%vectors}
vectors
1.0000000
Multiple Choice Questions (MCQs)
MCQ1
Geometrically, a vector is represented by ______

a line

0.0000000
a dot

0.0000000
a curve

0.0000000
an arrow

1.0000000
MCQ2
The scalar product of two vectors a and b is given by ____

a.bcosÎ¸

1.0000000
(a+b) cosÎ¸

0.0000000
ab cosÎ¸

0.0000000
a . b sinÎ¸cosÎ¸

0.0000000
MCQ3
The vector product of a vector with itself is the_____ vector

polar

0.0000000
zero

1.0000000
axial

0.0000000
negative

0.0000000
MCQ4
_______force equation determines the force on a particle of charge q moving with velocity v.

Gauss

0.0000000
Lorenzo

0.0000000
Maxwellâ€™s

0.0000000
Lorentz

1.0000000
MCQ5
The transformation A'= âˆ‡Î› is called a _______ transformation.

guage

1.0000000
guag

0.0000000
Gauss

0.0000000
grad

0.0000000
MCQ6

How many coordinates are required to specify the position of a rigid body which moves freely in space?

3

0.0000000
4

0.0000000
6

1.0000000
2

0.0000000
MCQ7
What is the scalar vector of the two vectors a=(ax,ay,az)andb=(bx,by,bz)?

axbx+ayby+azbz

1.0000000
axbz+aybx

0.0000000
axby+aybz

0.0000000
axbx-ayby-azbz

0.0000000
MCQ8
The magnetic dipole field has precisely the same form as the _____dipole field.

electromagnetic

0.0000000
electric

1.0000000
density

0.0000000
electrostatic

0.0000000
MCQ9
The first two members of a family of quantities known as tensors are _____ and ____.

scalars and tensor

0.0000000
vectors and magnitude

0.0000000
scalars and vectors

1.0000000
vectors and tensor

0.0000000
MCQ10
Tensors are commonly denoted by _______ capitals

small

0.0000000
sans

0.0000000
serif

0.0000000
sans-serif

1.0000000
MCQ11
A tensor Thas _________ components.

6

0.0000000
3

0.0000000
9

1.0000000
1

0.0000000
MCQ12
A vector ais called an/a _________of T if Ta=Î»a

eigenvector

1.0000000
eigenvalue

0.0000000
unit vector

0.0000000
null vector

0.0000000
MCQ13
Given that Ta=Î»a, where T is a tensor, the number Î» is called ______

eigenvector

0.0000000
eigenvalue

1.0000000
unit vector

0.0000000
null vector

0.0000000
MCQ14
Ta=Î»acan also be written as _________

T-Î»1=0

0.0000000
T-Î»1a=0

1.0000000
T+Î»1=0

0.0000000
T+Î»a=0

0.0000000
MCQ15
The total momentum of a system of particles can be found by multiplying the total mass
M of the system by the velocity v-of the __________

center of mass

1.0000000
center of gravity

0.0000000
gravitational field

0.0000000
force of attraction

0.0000000
MCQ16
A systems is said to be of uniform density when the density is ______

uniform

0.0000000
dense

0.0000000
constant

1.0000000
normal

0.0000000
MCQ17
Forces applied to systems of particles will change the distances between individual particles. Such systems are often called ___ bodies

deformable

1.0000000
non-deformable

0.0000000
uniform

0.0000000
collapsible

0.0000000
MCQ18
Mass per unit volume is known as _______

continuous system

0.0000000
pressure

0.0000000
surface area

0.0000000
density

1.0000000
MCQ19
Vectors are tensors of rank ______

0

0.0000000
3

0.0000000
4

0.0000000
1

1.0000000
MCQ20
Dyadic are members of the tensor family of rank ______

0

0.0000000
3

0.0000000
2

1.0000000
1

0.0000000
MCQ21
Forces that can change the distances between individual particles of agiven systems are called _______

deformable forces

1.0000000
contact forces

0.0000000
continuous forces

0.0000000
discrete force

0.0000000
MCQ22
A system in which the distance between any two particles remains constant regardless

of the applied forces is called ________

rigid body

1.0000000
free body

0.0000000
static body

0.0000000
polar body

0.0000000
MCQ23
The number of degree of freedom of a system is the number of ______ required to specify the position of a system of one or more particles.

forces

0.0000000
system

0.0000000
particles

0.0000000
coordinates

1.0000000
MCQ24
The vector function r(t) = x(t)i+ y(t)j+ z(t)k from the origin to the particle is called the __________ vector

null

0.0000000
position

1.0000000
commutative

0.0000000
identity

0.0000000
MCQ25
What is the number of degrees of freedom for five particles moving freely in space?

15

1.0000000
10

0.0000000
2

0.0000000
1

0.0000000
MCQ26
A system of N particles moving freely in space requires _____ to specify its position.

2N coordinates

0.0000000
6N coordinates

0.0000000
3Ncoordinates

1.0000000
N coordinates

0.0000000
MCQ27
Surface density is defined as ________

mass per unit area

1.0000000
mass per unit volume

0.0000000
volume per unit area

0.0000000
pressure per unit area

0.0000000
MCQ28
A rigid body which can move freely in space has ______ degrees of freedom.

6

1.0000000
10

0.0000000
2

0.0000000
1

0.0000000
MCQ29
To go from discrete systems to continuous systems, we simply replace summations by ___________

multiplications

0.0000000
coordinates

0.0000000
differentiations

0.0000000
integrations

1.0000000
MCQ30
The principle of conservation of momentum states that _________

the resultant of the external forces acting on a system of particles is zero

1.0000000
the sum of some of the external forces acting on a system of particles is zero

0.0000000
system of particles is under the state of motion under the action of an applied force

0.0000000
the resultant of the external forces acting on a system of particles is negligible

0.0000000
MCQ31
The center of mass for a body with uniform gravitational fieldis called _________

mass center

0.0000000
center of gravity

1.0000000
gravitational attraction

0.0000000
center of attraction

0.0000000
MCQ32
The number of degree of freedom of a particle moving freely in space is ________

5

0.0000000
3

1.0000000
2

0.0000000
1

0.0000000
MCQ33
The velocity v-of the center of mass of an object is given by __________

v-=drdt

0.0000000
v-=ds-dt

1.0000000
v-=dr-dt

0.0000000
v-=dr-dv

0.0000000
MCQ34
Which of the following is not correct?

Total momentum remains constant if the resultant external forces acting on a system of particles is zero

0.0000000
Total momentum is conserved if the resultant external forces acting on a system of particles is zero

0.0000000
If the resultant external forces acting on a system of particles is zero, the center of mass is either at rest or in motion with constant velocity

0.0000000
Total momentum is zero if the resultant external forces acting on a system of particles is conserved

1.0000000
MCQ35
The quantity

Î©=âˆ‘v=1Nmvrv*Vv

Is called ________ of the system of particles about origin O.

the total momentum

0.0000000
the total circular momentum

0.0000000
the total angular momentum

1.0000000
the total angular moment

0.0000000
MCQ36
The total external torque on a system of particles is equal to the time rate of change of angular momentum of the system, provided that the internal forces between particles are ________ forces.

Triangular

0.0000000
circular

0.0000000
angular

0.0000000
central

1.0000000
MCQ37
The total linear impulse of force is equal to the change in linear _______

momentum

1.0000000
torque

0.0000000
energy

0.0000000
force

0.0000000
MCQ38
If T and V are respectively the total kinetic energy and total potential energy of a system of particles, then the formulaT + V= constant is called the ________for systems of particles.

the principle of conservation of momentum

0.0000000
the principle of conservation of potential energy

0.0000000
the principle of conservation of energy

1.0000000
uniform energy

0.0000000
MCQ39
Assuming that the total mass of a system of particles is located at the center of massO, then the total kinetic energy equals the kinetic energy of translation plus______ about the center of mass.

the kinetic energy motion

1.0000000
the kinetic energy force

0.0000000
the kinetic energy momentum

0.0000000
the kinetic energy moment

0.0000000
MCQ40
Which of the following is true for rigid bodies and for motion on curves and surfaces without friction?

the virtual work of the constraint forces is zero

1.0000000
the virtual work of the constraint forces is negligible

0.0000000
the virtual work of the constraint forces is infinity

0.0000000
the virtual work of the constraint nonzero

0.0000000
MCQ41
If F is the total external force acting on a system of particles, then which of the following best describes the total linear impulse of the force?

âˆ«t1t2Ft

0.0000000
âˆ«t1t2Fdt

1.0000000
âˆ«Fdt

0.0000000
âˆ«t1t2dF

0.0000000
MCQ42
Let Î¸ is the angle between two vectors a and b, then the length of their suma+b2 is given by

a2+b2+2ab sinÎ¸

0.0000000
a2+b2+2ab cosÎ¸

1.0000000
a2-b2+ab cosÎ¸

0.0000000
a+b+2ab cosÎ¸

0.0000000
MCQ43
The divergence of the vectorrt=3xyz2i+2xy3j+x2yzk at the point (1,-1,1) is ________

4

1.0000000
-4

0.0000000

3

0.0000000
5

0.0000000
MCQ44
What is the speed of a body whose position vector isrt=cosâ□¡t i+sinâ□¡t j+t k?

sinâ□¡tj

0.0000000
2â□¡j+2k(

0.0000000
2

1.0000000
2 ti+2â□¡tj

0.0000000
MCQ45
The displacement vector â–³r=rt+â–³t-r(t) is used to represent

change in speed

0.0000000
change in temperature

0.0000000
change in position

1.0000000
change in speed

0.0000000
MCQ46
A system of particles will be in stable equilibrium if the potential Vof the system is __________

a maximum

0.0000000
a minimum.

1.0000000
negative

0.0000000

a torque

0.0000000
MCQ47
The three basic notions for analyzing motion are position, velocity, and ________

acceleration

1.0000000
momentum

0.0000000
viscosity

0.0000000
motion

0.0000000
MCQ48
The rate of change of velocity with respect to time is called the ____________

acceleration

1.0000000
momentum

0.0000000
viscosity

0.0000000
motion

0.0000000
MCQ49
The speed v of a particle is defined to be the rate of change of distance along the path with respect to ______.

speed

0.0000000
rate

0.0000000
motion

0.0000000
time

1.0000000

MCQ50
Which is the acceleration of a body whose position vector isrt=cosâ□¡t i+sinâ□¡t j+t k?

sinâ□¡tj

0.0000000
-cos ti+sinâ□¡tj(

0.0000000
-cos ti-sinâ□¡tj

1.0000000
cos ti+sinâ□¡tj

0.0000000