

Default for MTH251 Exams

The default category for questions shared in context 'MTH251 Exams'.
top

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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 $a=(a_x,a_y,a_z)$ and $b=(b_x,b_y,b_z)$ are two vectors, then the expression $a \times b$,
 $a_y+b_y, a_z+b_z=$ ____

* $a \times b$ *

1.0000000

* $a + b$ *

1.0000000

FBQ4

The three unit vectors i, j, k pointing in the directions of the x, y, z axis form what is
known as _____

Orthonormal 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 $\hat{A} \cdot A = i\hat{A}_x A_x + j\hat{A}_y A_y + k\hat{A}_z A_z$ is defined _____.

div A

1.0000000

0.0000000

FBQ9

$\hat{A} \cdot \vec{A} = i\hat{A}_x A_x + j\hat{A}_y A_y + k\hat{A}_z A_z$ is the expression for _____

curl A

1.0000000

0.0000000

FBQ10

For two nonparallel vectors a and b drawn from O define a unique axis through O perpendicular to the plane containing a and b, the value $ab \sin \theta$ is the _____

Vector product

1.0000000

0.0000000

FBQ11

If θ is the angle between the vectors a and b, then the _____ of their sum is given by $\sqrt{a^2 + b^2 + 2ab \cos \theta}$

Length

1.0000000

0.0000000

FBQ12

Any vector $\mathbf{r}$ can be written as a sum of three vectors along the three axes as $\mathbf{r} =$

$x\mathbf{i} + y\mathbf{j} + z\mathbf{k}$

1.0000000

0.0000000

FBQ13

The basic equations of electromagnetic theory are _____ equations

Maxwell's

1.0000000

Maxwell

1.0000000

FBQ14

_____ force equation determines the force on a particle of charge q moving with velocity $\mathbf{v}$.

Lorentz

1.0000000

Lorentz's

1.0000000

FBQ15

$\mathbf{A}' = \gamma(\mathbf{A} - \mathbf{v} \times \mathbf{B})$ 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; Maxwell's equations separate into a pair of _____ equations

Electrostatic

1.0000000

0.0000000

FBQ18

The magnetic dipole field has precisely the same form as the _____ 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 $Ta = \lambda a$

Eigenvector

1.0000000

0.0000000

FBQ26

For a vector a if $Ta = \lambda a$, λ is called the _____

Eigenvalue

1.0000000

0.0000000

FBQ27

Equivalently, $Ta = \lambda a$ may be written as $T^{-1}\lambda a =$

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 $\mathbf{V} = d\mathbf{r}/dt = \dot{\mathbf{r}}$ is the velocity of $m\mathbf{v}$, the $\mathbf{p} = m\mathbf{v} = \dot{\mathbf{p}} = m\dot{\mathbf{v}} = m\ddot{\mathbf{r}}$ defines the ____ of the system

Total momentum

1.0000000

0.0000000

FBQ43

The velocity $\mathbf{v}$ of the ____ is given by $\mathbf{v} = d\mathbf{r}/dt$

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 $\hat{L} = \sum \mathbf{r} \times \mathbf{p}$ is called the total _____ momentum of the system of particles about origin O

angular

1.0000000

0.0000000

FBQ47

The sum $\hat{\tau} = \sum \mathbf{r} \times \mathbf{F}$ 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 T and V are respectively the total kinetic energy and total potential energy of a system of particles, then $T + V = \text{constant}$ 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 $\{T_{ij}\}$ and $\{T_{ijkl}\}$

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 _____

$a \cdot b \cos \theta$,

1.0000000

$(a+b) \cos \theta$,

0.0000000

$ab \cos \theta$,

0.0000000

$a \cdot b \sin \theta, \cos \theta$,

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

Maxwell's

0.0000000

Lorentz

1.0000000

MCQ5

The transformation $A' = \hat{A} \cdot \hat{I}$ 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 $a=(a_x,a_y,a_z)$ and $b=(b_x,b_y,b_z)$?

$a_x b_x + a_y b_y + a_z b_z$

1.0000000

$a_x b_z + a_y b_x$

0.0000000

$a_x b_y + a_y b_z$

0.0000000

$a_x b_x - a_y b_y - a_z b_z$

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 T has _____ components.

6

0.0000000

3

0.0000000

9

1.0000000

1

0.0000000

MCQ12

A vector a is called an/a _____ of T if $Ta = \lambda a$

eigenvector

1.0000000

eigenvalue

0.0000000
unit vector

0.0000000
null vector

0.0000000

MCQ13

Given that $Ta = \hat{I} \gg a$, where T is a tensor, the number $\hat{I} \gg$ is called _____

eigenvector

0.0000000
eigenvalue

1.0000000
unit vector

0.0000000
null vector

0.0000000

MCQ14

$Ta = \hat{I} \gg a$ can also be written as _____

$T - \hat{I} \gg 1 = 0$

0.0000000
 $T - \hat{I} \gg 1 a = 0$

1.0000000
 $T + \hat{I} \gg 1 = 0$

0.0000000
 $T + \hat{I} \gg a = 0$

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 $\mathbf{r}(t) = x(t)\mathbf{i} + y(t)\mathbf{j} + z(t)\mathbf{k}$ 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

$3N$ coordinates

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 field is 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 _____

$v = dr/dt$

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

$$\hat{L} = \hat{r} \times \hat{p} = \sum m \mathbf{r} \times \mathbf{v}$$

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 formula $T + V = \text{constant}$ 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 mass O , 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?

$\hat{a} \ll t_1 t_2 F t$

0.0000000

$\hat{a} \ll t_1 t_2 F dt$

1.0000000

$\hat{a} \ll F dt$

0.0000000

$\hat{a} \ll t_1 t_2 dF$

0.0000000

MCQ42

Let $\hat{I}_1$ is the angle between two vectors a and b , then the length of their sum $a+b$ is given by

$a^2 + b^2 + 2ab \sin \hat{I}_1$,

0.0000000

$a^2 + b^2 + 2ab \cos \hat{I}_1$,

1.0000000

$a^2 - b^2 + ab \cos \hat{I}_1$,

0.0000000

$a + b + 2ab \cos \hat{I}_1$,

0.0000000

MCQ43

The divergence of the vector $r = 3xyz^2i + 2xy^3j + x^2yzk$ 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 is $\mathbf{r} = \cos \omega t \mathbf{i} + \sin \omega t \mathbf{j} + t \mathbf{k}$?

$\sin \omega t \mathbf{j}$

0.0000000

$2\omega^2 \mathbf{j} + 2\mathbf{k}$

0.0000000

2

1.0000000

$2t\mathbf{i} + 2\omega^2 \mathbf{j}$

0.0000000

MCQ45

The displacement vector $\mathbf{r} = r\mathbf{a} + \mathbf{a}^3 t - r(t)$ 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 V of 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 is $\mathbf{r} = \cos \omega t \mathbf{i} + \sin \omega t \mathbf{j} + t \mathbf{k}$?

$\sin \omega t \mathbf{j}$

0.0000000

$-\cos \omega t \mathbf{i} + \sin \omega t \mathbf{j}$

0.0000000

$-\cos \omega t \mathbf{i} - \sin \omega t \mathbf{j}$

1.0000000

$\cos \omega t \mathbf{i} + \sin \omega t \mathbf{j}$

0.0000000