CG-11-2020
WINTER EXAM 2020
Subject Name : RB-23_MATHEMATICS - Mechanics – I – XIV (CBCS) OR_V_18-03-2021

Date : 18/03/2021 Duration : 60 min.

Instruction / सुचना / :-

* Follow the detail instructions given on OMR Sheet
* ओ एम आर वरील सर्व सूचनांचे पालन करावे.

Q.1
Two forces acting at a point of rigid body are in equilibrium if
A]They are equal in magnitude and in the same direction
B]They are equal in magnitude and opposite in direction
C]They are not equal in magnitude and opposite in direction
D]None of the above

Q.2
It is a cause which changes, or tends to change, the state of rest of of uniform motion of the body. Which is the definition of
A]Equilibrium
B]Rigid body
C]Force
D]Particle

Q.3
If Two forces acting at a point are represented both in magnitude and direction by the adjacent sides of a parallelogram drawn through their point of application ,their resultant is represented by the diagonal of the parallelogram passing through that point." it is the statement of.
A]Law of the parallelogram
B]Principle of the transmissibility
C]Resultant of the forces
D]Resultant of like parallel forces

Q.4
If a force acts on a body, its effect remains the same, whatever point may be chosen on the line of action of the force as the point of application, provided this point is rigidly connected with the body. it is the statement of
A]Law of the parallelogram of forces
B]Resultant of the forces
C]Principle of the transmissibility of force.
D]None of the above

Q.5
The magnitude of the resultant $\vec{R}$ of two forces $\vec{P}$ and $\vec{Q}$ acting at an angle Q is ------
A) $R = \sqrt{P^2 - Q^2 + 2PQcos\theta}$
B) $R = \sqrt{P^2 + Q^2 + 2PQcos\theta}$
C) $R = \sqrt{P^2 + Q^2 + 2PQsin\theta}$
D) $R = \sqrt{P^2 + Q^2 - 2PQcos\theta}$

.

Q.6
If Two forces whose magnitudes are 8kg and 7kg respectively at an angle of 60°. then the Resultant is ----
A) R = 10 kg
B) R = 12 kg
C) R = 13 kg
D) R = 15 kg

.

Q.7
If The components $\vec{P}$ and $\vec{Q}$ of the resultant $\vec{R}$ are at right angles, then they are said to be---
A) Resolved part of $\vec{P}$
B) Resolved part of $\vec{Q}$
C) Resolved part of $\vec{R}$
D) All the above

.

Q.8

Two forces are said to be like parallel forces when they act in the

A] Same direction and their lines of action do not meet at a point
B] different direction and their lines of action do not meet at a point
C] Opposite direction and their lines of action meet at a point
D] None of the above

Q.9

If Q=0 i.e. when the two forces $\vec{P}$ and $\vec{Q}$ act along the same straight line and in the same direction, then Resultant----

A) $R = 2p\cos\theta/_2$
B) $R = P + Q$
C) $R = \sqrt{P^2 + Q^2}$
D) $R = P - Q$

Q.10

Two forces are said to be unlike parallel forces when they act in the

A] Opposite direction and their lines of action do not meet a point
B] Same direction and their lines of action meet at a point
C] different direction and their lines of action do not meet a point
D] All the above

Q.11

If the three forces acting on a particle be represented in Magnitude and direction by the three sides of a triangle, taken in order,then the forces are in equilibrium. It is the statement of.

A] Parallelogram law
B] Polygon of forces
C] An axiom for equilibrium of two forces
D] Triangle law of forces

Q.12

If any number of forces, acting on a particle, be represented in magnitude and direction, by the sides of a polygon, taken in order, then the forces are in equilibrium. It is statement of

A] Parralelogram law of forces
B] Triangle law of forces
C] Polygon of forces
D] An axiom for equilibrium of two forces

Q.13

If three forces of magnitudes P , Q and R respectively acting on a particle are in equilibrium, each is proportional to the sine of the angle between the other two. i.e. $\frac{P}{\sin\alpha} = \frac{Q}{\sin\beta} = \frac{R}{\sin\gamma}$ where $\measuredangle(\vec{Q},\vec{R}) = \alpha$, $\measuredangle(\vec{R},\vec{P}) = \beta$ and $\measuredangle(\vec{P},\vec{Q}) = \gamma$, which is the statement of -----

A) Lami's theorem
B) Parallelogram law of forces
C) Triangle law of forces
D) Polygon of forces

Q.14

Motion which has the same Magnitude and direction for each particle of the rigid body is called as -----

A] Motion of Rotation
B] Motion of translation
C] Moment of force
D] Motion of Rigid body

Q.15

Vector moment of the force $\vec{F}$ about O is denoted by

A) $\vec{M} = \vec{r} \times \vec{F}$
B) $\vec{M} = \vec{r} + \vec{F}$
C) $\vec{F} = \vec{M} \times \vec{r}$
D) $\vec{M} = \vec{F} - \vec{r}$

Q.16

If P be the perpendicular distance between the parallel forces $\vec{F}$ and - $\vec{F}$ is called as

A) Moment of the force
B) Equilibrium of two forces
C) Arms of the couple
D) Vector moment of the given forces

.

Q.17

Two couples, in two different and parallel planes, are said to be equivalent couples if

A] They possess the opposite moment
B] They possess the different moment
C] They possess the vector moment
D] They possess the same moment

Q.18

The necessary and sufficient condition that a given system of forces acting upon a rigid body is in equilibrium is that----

A] the force -sum and moment -sum must separately vanish
B] The force- sum and moment- sum are not separately vanish
C] Only force-sum vanish
D] Only moment sum vanish

Q.19

If $\vec{R} = \overrightarrow{F_1} + \overrightarrow{F_2} + \overrightarrow{F_3} \ldots\ldots + \overrightarrow{F_n}$ then $\vec{R}$ is called

A) Force-sum
B) Moment-sum
C) Vector moment
D) All the above

.

Q.20

If G be the vector moment of their resultant then $\vec{G} = \overrightarrow{G_1} + \overrightarrow{G_2} + \overrightarrow{G_3} \ldots\ldots + \overrightarrow{G_n}$ then $\vec{G}$ is called------

A) Vector –sum
B) Moment-sum
C) Force-sum
D) All the above

.

Q.21

A force $\vec{F} = \vec{I} + 2\vec{J} + 3\vec{K}$ acting at the point $(-1,2,3)$ about the origin then vector moment of the force $\vec{F}$ is

A) $-6\vec{I} - 4\vec{K}$
B) $-6J - 4\vec{K}$
C) $-2\vec{I} - 6\vec{J} + 4\vec{K}$
D) $6\vec{J} - 4\vec{K}$

.

Q.22

If $\bar{e}$ be the unit vector along the force $\vec{F}$ then following is true

A) $\vec{e} = \vec{a} \,.\, |\vec{a}|$
B) $\vec{e} = \frac{\vec{a}}{|\vec{a}|}$
C) $\vec{e} = -\vec{a}$
D) $\vec{e} = \vec{a} - |\vec{a}|$

.

Q.23

If force $\vec{F} = \frac{8}{5\sqrt{2}}(3\vec{I} + 4\vec{J} + 5\vec{K})$ then the moment of the force $\vec{F}$ about x-axis is

A) $\frac{12\sqrt{2}}{5}$ units

B) $\frac{-12\sqrt{2}}{5}$ Units

C) $\frac{8}{5\sqrt{2}}$ Units

D) $\frac{-8}{5\sqrt{2}}$ Units

.

Q.24

Two equal, unlike, parallel forces acting at the different points of the rigid body are said to form-------

A]Force sum

B]Vector moment

C]Arms of the couple

D]Couple

Q.25

If $P_1, P_2, P_3, P_4, P_5, P_6$ be the forces acting on a particle and when $\vec{P_1} + \vec{P_2} + \vec{P_3} + \vec{P_4} + \vec{P_5} + \vec{P_6} = \vec{0}$ then we say that

A) the forces are in equilibrium

B) The forces are in same direction

C) The forces are in different direction

D) All the above

.

Q.26

If the three forces acting on a particle are in equilibrium,they can be represented both in magnitude and direction by the sides of any triangle, taken in order,and drwan parallel to the given forces. It is the statement of

A]Triangle law of forces

B]Parallelogram law of forces

C]Converse of the triangle law of forces

D]Polygon of forces

Q.27

If P = Q i.e. when the magnitudes of two forces $\vec{P}$ and $\vec{Q}$ are equal then

A) $R = 2P\cos\frac{\pi}{2}$

B) $R = 2P\cos\frac{\theta}{2}$

C) $R = \cos\frac{\theta}{2}$

D) $R = 2P\cos\pi$

.

Q.28

If Q= $\frac{\pi}{2}$ i.e. when the two forces $\vec{P}$ and $\vec{Q}$ act at right angle then

A) $\alpha = \tan^{-1}\frac{Q}{P}$

B) $\alpha = \tan\frac{Q}{P}$

C) $\alpha = \sin^{-1}\frac{Q}{P}$

D) $\alpha = \cos^{-1}\frac{Q}{P}$

.

Q.29

A body which is indefinitely small in size and shape is called

A]Force

B]Rigid body

C]Particle

D]Vector

Q.30

It is a system of particles, the distances between which remain unchanged is called

A]Force

B]Vector

C]Particle

D]Rigid body

Q.31
A system of forces acting on a body initially at rest, is said to be

A]Equilibrium
B]Force
C]Rigid body
D]Particle

Q.32
It is a part of the mechanics which deals with the equilibrium of systems at rest which is definition of

A]Force
B]Particle
C]Rigid body
D]Statics

Q.33
If Two forces $\vec{P}$ and $\vec{Q}$ acting at an angle Q and $\vec{R}$ be the resultant then direction will be

A) $\alpha = \tan^{-1}\left(\frac{Q\sin\theta}{P+Q\cos\theta}\right)$
B) $\alpha = \tan\left(\frac{Q\sin\theta}{P+Q\cos\theta}\right)$
C) $\alpha = \tan^{-1}\left(\frac{Q\sin\theta}{P-Q\cos\theta}\right)$
D) $\alpha = \tan\left(\frac{Q\cos\theta}{P+Q\sin\theta}\right)$

Q.34
If any number of coplanar forces acting at a point then magnitude of $\vec{R}$ is

A) $R = \sqrt{X^2 + Y^2}$
B) $R = \sqrt{X^2 - Y^2}$
C) $R = \sqrt{(x-y)^2}$
D) $R = \sqrt{(x+y)^2}$

Q.35
If any number of coplanar forces acting at a point then direction of $\vec{R}$ is

A) $\alpha = \sin^{-1}\left(\frac{y}{x}\right)$
B) $\alpha = \cos^{-1}\left(\frac{y}{x}\right)$
C) $\alpha = \tan^{-1}\left(\frac{y}{x}\right)$
D) $\alpha = \tan\left(\frac{y}{x}\right)$

Q.36
When the system of forces is in equilibrium then the following is true

A) $x^2 - y^2 = 0$
B) $x^2 + y^2 = 0$
C) $\sqrt{x^2 - y^2} = 0$
D) $(x^2 + y^2) < 0$

Q.37
A couple is equal to another coplanar couple provided its moment remains --------

A]different
B]Zero
C]the same
D]None of the above

Q.38
The moment of the couple, denoted by $\vec{G}$, is a

A) Unit vector
B) Free vector
C) Absolute vector
D) Scalar

Q.39

If Q= π, i.e. when the two forces $\vec{P}$ and $\vec{Q}$ act along the same straight line but in opposite direction then magnitude

A) $R = P + Q$
B) $R = P - Q$
C) $R = P^2 + Q^2$
D) $R = P^2 - Q^2$

.

Q.40
The direction of the resultant of like or unlike parallel forces is the same as that of

A] bigger component
B] Smaller component
C] Resolved part
D] None of the above