FBQ1: A vector a is a _____ specified by a magnitude and direction in space.
Answer: Quantity

FBQ2: The vector a may be represented geometrically by an arrow of length α drawn from any point in the appropriate _____.
Answer: Direction

FBQ3: Any vector can be specified, with respect to a given set of Cartesian axes, _____.
Answer: three component

FBQ4: If X.YZ are the Cartesian co-ordinates of P, then we write _____, and say the X, Y, Z are the components of r.
Answer: r= (X, Y, Z)

FBQ5: _____of two vectors a and b may be defined geometrically by drawing one vector from the head of the other.
Answer: Addition

FBQ6: Any vector r can be written as a sum of three _____along the three axes.
Answer: Vectors

FBQ7: If _____is the angle between the vectors a and b, then by elementary trigonometry the length of their sum is given [a + b] = a + b + 2abcosθ.
Answer: Theta

FBQ8: The scalar products of the _____ i, j, k are i2=j2=k2=1, i.j=j.k=k.i=0.
Answer: 1

FBQ9: If we take the _____ of two vectors a and b, we find a.b = axbx+ayby+azbz, and in particular r2=X2+Y2+Z2.
Answer: scalar product

FBQ10: A vector whose sense is merely conventional, and would be reversed by changing from a right – hand to a left – hand convention is called an _____, as opposed to an ordinary or polar vector.
Answer: axial vector

FBQ11: The vector product of two _____ is thus an axial vector.
Answer: Polar vector

FBQ12: From any three vectors a,b,c we can form the _____ (a^b).c.
Answer: scalar triple vectors

FBQ13: The vector distance travelled by the particle in a _____ Δt is Δr=rt+Δt-rt.
Answer: short time interval

FBQ14: The velocity, or derivative with respect to t, is defined just as for scalars, as the _____, r = drdt = limΔt→0ΔrΔt.
Answer: Limit

FBQ15: The rate of change of the distance r from the origin is equal to the _____of the velocity vector.
Answer: Radial component

FBQ16: A scalar field is a _____ ø(X,Y,Z) of position in space.
Answer: Scalar function

FBQ17: If the distance |dr| is fixed, then this scalar product takes on its

_____ when dr is in the direction of Vø.
Answer: Maximum value

FBQ18: The symbol ∇ may be regarded as a vector which is also a _____ given by ∇ =i∂∂x+j∂∂y+k∂∂z.
Answer: Differential operator

FBQ19: The _____ is defined to be DivA = ∇.A=∂Ax∂xi+∂Ay∂yj+∂AZ∂zk.
Answer: Divergence of A

FBQ20: ∇ ^A= ijk∂∂x∂∂y∂∂zAxAyAz is called _____.
Answer: Curl of A

FBQ21: An important identity, analogous to the expansion of the _____ is ∇ ^ (∇ ^A)= ∇∇.A-∇2A.
Answer: Vector triple product

FBQ22: There are three important theorems for vectors which are generalizations of the _____ of the calculus, ∫x0x1dfdxdx=fx1-f(x0).
Answer: Fundamental theorem

FBQ23: _____ states that if A is any vector field, then
Answer: Stoke's theorem

FBQ24: _____ states that if V is a volume in space bounded by the closed surface S, then for any vector field B, ∭dv∇·B=∬sds·B .
Answer: Gausss's theorem

FBQ25: The speed V of a particle is defined to be the _____ of distance (along the path) with respect to time.
Answer: Rate of change

FBQ26: One of the uses of the _____ is to provide expressions for the gradient, divergence and curl in terms of curvilinear co – ordinates.
Answer: Integral theorem

FBQ27: To find an expression for the divergence, we use _____, applied to a small volume bounded by the coordinate surface.
Answer: Gauss's theorem

FBQ28: Any two _____ vectors a and b drawn from O define a unique axis through O perpendicular to the plane containing a and b.
Answer: Non-parallel

FBQ29: The basic equations of _____ are Maxwell's equations.
Answer: Electromagnetic theory

FBQ30: The basic set of equations is completed by the _____, which determines the force on a particle of charge q moving with velocity V, F = q(E + 1c V ^ B).
Answer: Lorentz fore equation

FBQ31: For the static case, in which all the fields are time independent; _____, separate into a pair of electro static equations, ∇ ^ E=0, ∇.E= 4πρ, ε0-1ρ.
Answer: Maxwell's equation

FBQ32: Scalars and vectors are the first two members of a family of quantities known as _____.
Answer: Tensors

FBQ33: Tensors are commonly denoted by sans – serif capitals like _____
Answer: T

FBQ34: For any tensor T, we define the _____ if Tji=-Tij.
Answer: Transposed tensor

FBQ35: The tensor T is called _____ if Tji=Tij.
Answer: Symmetric

FBQ36: T is called _____ (or skew – symmetric) if Tji=-Tij.
Answer: Antisymmetric

FBQ37: The tensor R = αS+BT is the tensor with _____ Rij=αSij+ βTij
Answer: Components

FBQ38: A _____ a is called an eigen – vector of T if Ta = where is a number called eigenvalue.
Answer: Vector

FBQ39: If ∇M is the total mass of a volume ΔT of particles, then the _____ can be defined as δ= limΔT→0ΔMΔT
Answer: Density

FBQ40: The density is a _____ and can vary from point to point.
Answer: Function of position

FBQ41: When the density is a _____, the systems is said to be of uniform density or simply uniform.
Answer: Constant

FBQ42: When the continuous system of particles occupy a surface, we can similarly define a _____ or mass per unit area.
Answer: Surface density

FBQ43: In practice, force applied to systems of particles will change the _____ between individual particles, such system are often called deformable or _____.
Answer: Distance, elastic body

FBQ44: The distance between any two specified particles of a system remains the same regardless of _____ such a system is called a _____.
Answer: Applied forces, rigid body

FBQ45: The number of coordinates required to specify the position of a system of one or more particles is called the _____ of the system.
Answer: Degree of freedom

FBQ46: The centre of mass or _____ of the system of particles is defined as that point c having position vector.
Answer: Centroid

FBQ47: In practice, it is fairly simple to go from discrete to continuous system by merely replacing _____ by integrations.
Answer: Summations

FBQ48: If a system of particles is in a uniform _____ the center of mass is sometimes called the center of gravity.
Answer: Gravitational field

FBQ49: If VV= drvdt= v is the velocity of mv, the total _____ of the system is defined as p = ∑V=1NMVVV = ∑V=1NMVV
Answer: Momentum

FBQ50: If the resultant external force acting on a system of particles is _____ then the total momentum remains constant, i.e is conserved.
Answer: Zero

MCQ1: For continuous systems of particles occupying a region of space it is often convenient to define a mass per unit volume which is called the
Answer: Volume density

MCQ2: Mathematically, if ΔM is the total mass of a volume ΔT of particles, then the density can be defined as
Answer: = limΔT →0ΔM ΔT

MCQ3: Density is a function of position and can vary from point to point, when the density is a constant, the system is said to be of
Answer: Uniform density

MCQ4: In practice, forces applied to systems of particles will change the distance between individual particles, such systems are often called
Answer: Deformable bodies

MCQ5: A mathematical model in which the distance between any two specified particles of a system remains the same regardless of applied forces, such a system is called a
Answer: Rigid body

MCQ6: The number of coordinates required to specify the position of a system of one or more particles called the
Answer: Number of degrees of freedom of the system

MCQ7: A particle moving freely in space requires 3 coordinates to specify its position. Thus the number of degrees of freedom is
Answer: 3

MCQ8: A system consisting of N particles moving freely in space requires 3N coordinates to specify its position, thus the number of degrees of freedom is
Answer: 3N

MCQ9: A rigid body which can move freely in space has 6 degrees of freedom. How many coordinates are required to specify the position.
Answer: 6

MCQ10: In practice, it is fairly simple to go from discrete to continuous systems by merely replacing summations by
Answer: Integrations

MCQ11: If a system of particles is in a uniform gravitational field, the center of mass is sometimes called the
Answer: Center of gravity

MCQ12: If vr= drvdt= rv is the velocity of mv, the total momentum of the system is
Answer: P = ∑v=1Nmvvv= ∑v=1Nmvrv

MCQ13: Suppose that the internal forces between any two particles of the system obey Newton’s third law, then if F is the resultant external forces acting on the system, we have
Answer: F = dpdt= Md2dt2 = Mddt

MCQ14: Let F = dpdt= Md2dt2 = Mddt, then putting F = 0, we find that
Answer: P = ∑v=1Nmvvv= constant

MCQ15: If the resultant external force acting on a system of particles is zero, then the momentum remains
Answer: Constant

MCQ16: If the resultant external force acting on a system of particles is zero, then the total momentum remains constant i.e is conserved. This theorem is often called

Answer: Principles of conservation of momentum

MCQ17: The quantity Ω = ∑V=1N(rv×vv) is called the
Answer: Total angular momentum of the system of particle about origin O

MCQ18: If Fv is the external force acting on particles V, then vv× Fv is called the
Answer: Moment of the force Fv

MCQ19: The total external torque on a system of particles is equal to the time rate of change of the angular momentum of the system, provided
Answer: The internal forces between particles are central forces

MCQ20: If both the external and internal forces for a system of particles are conservative, the
Answer: Principle of conservation of energy is valid

MCQ21: If the external forces are conservation, then we have
Answer: Fv = -ΔVv

MCQ22: The total kinetic energy of a system of particles is defined as
Answer: T = 12∑v=1NMvvv2 = 12∑v=1NMvrv2

MCQ23: If Fv is the force (external or internal) acting on particle V, then the total work done in moving the system of particles is
Answer: W12= ∑V=1N∫12Fvdrv

MCQ24: The total work done in moving a system of particles from one state where the kinetic energy T1to another where the kinetic energy is T2, is
Answer: W12 = T2- T1

MCQ25: If T and V are respectively the Total kinetic energy and total potential energy of a system of particles, then
Answer: T + V = Constant

MCQ26: The total linear momentum of a system of particles about the center of mass is zero. In symbols,
Answer: ∑v=1NMvvv1 = ∑v=1NMvrv.=0

MCQ27: If F is the total external force acting on a system of particles, then ∫t1t2Fdt is called the
Answer: Total linear impulse

MCQ28: The total linear impulse is equal to the change in linear momentum, similarly if ∧ is the total external torque applied to a system of particles about o, then ∫t1t2∧dt is called the
Answer: Total angular impulse

MCQ29: The total angular impulse is equal to the change in angular
Answer: Momentum

MCQ30: The limitations on the motion are often called
Answer: Constraints

MCQ31: If the constraints conditions can be expressed as an equation ø(r1,r2, …, rN)=0 connecting the position vectors of the particles and the time, then the constants is called
Answer: Holonomic

MCQ32: If the constraints condition cannot be so expressed it is called
Answer: Non – holonomic

MCQ33: In order for a system of particles to be in equilibrium, the resultant force acting on each particle must

Answer: Zero

MCQ34: A system of particle is in equilibrium if and only if the total virtual work of the actual forces is zero i.e if ∑v=1NFv(a).δrv = 0. This is often called
Answer: The principle of virtual work

MCQ35: The resultants for equilibrium of a particle in a conservative force field can be generalized to
Answer: Minimum

MCQ36: The resultants for equilibrium of a particle in a conservative force field can be generalized to
Answer: System of particles

MCQ37: The other cases of equilibrium where the potential is not a minimum are called
Answer: Unstable

MCQ38: A system of particles moves in such a way that the total virtual work ∑v=1N(Fva- v).δrv = 0, is often called
Answer: D’ Alembert’s principle

MCQ39: If V is the total potential of a system of particles depending on coordinates q1, q2, …, then the system will be in equilibrium if
Answer: δVδq1=0, dVδq2=0, …

MCQ40: The simple pendulum is one of the most common examples of
Answer: Simple harmonic motion

MCQ41: A harmonic motion is one for which the restoring force obeys
Answer: Hooke’s law

MCQ42: Vibrating and periodic motion is a prototype of the motions of most
Answer: Physical system

MCQ43: The angular equation of motion of a pendulum is simply
Answer:

MCQ44: Which of the following is not part of the three basic notions for analyzing motion?
Answer: Position

MCQ45: The displacement vector Δr=rt+ Δt-r(t) represents the
Answer: Change in position

MCQ46: The scalar Δr/Δt represents the average change in position from time t to
Answer: t + Δt

MCQ47: The average change in position is called
Answer: The average velocity over the time period Δt

MCQ48: Velocity is the rate of change of position with respect to
Answer: Time

MCQ49: The rate of change of velocity with respect to time is called the
Answer: Acceleration

MCQ50: The speed V of a particle is defined to be rate of change of distance with respect to
Answer: Time