SET 4 – MCQs (Motion in a Plane)

Q151. Which of the following pairs have the same dimension?
a) Work and Torque
b) Velocity and Acceleration
c) Momentum and Force
d) Displacement and Velocity
Ans: a

Q152. Which of the following is always positive?
a) Displacement
b) Distance
c) Work
d) Velocity
Ans: b

Q153. The magnitude of a vector is always –
a) Positive
b) Negative
c) Zero or positive
d) Zero or negative
Ans: c

Q154. A vector parallel to x-axis has –
a) Only y-component
b) Only x-component
c) Both x and y components
d) No component
Ans: b

Q155. A vector inclined at 90° to x-axis has –
a) Only x-component
b) Only y-component

c) No y-component
d) Both components zero
Ans: b

Q156. The resultant of two vectors of equal magnitude inclined at 90° is –
a) Zero
b) Equal to either vector
c) √2 times either vector
d) Double
Ans: c

Q157. If A and B are two vectors, $|A + B|^2 + |A – B|^2$ = ?
a) $2(A^2 + B^2)$
b) $A^2 + B^2$
c) AB
d) Zero
Ans: a

Q158. Which of the following is not true for vector addition?
a) A + B = B + A
b) (A + B) + C = A + (B + C)
c) A + (–A) = A
d) $|A + B| \leq |A| + |B|$
Ans: c

Q159. If two vectors are perpendicular, then their scalar product is –
a) Zero
b) Maximum
c) Negative
d) Undefined
Ans: a

Q160. Scalar (dot) product involves –
a) sin θ
b) cos θ
c) tan θ
d) cot θ
Ans: b

Q161. The process of splitting a vector into components is called –
a) Multiplication
b) Resolution
c) Addition
d) Projection
Ans: b

Q162. If Ax = 0, Ay = 5, then vector lies along –
a) x-axis
b) y-axis
c) z-axis
d) None
Ans: b

Q163. Which of these is true for components of a vector?
a) Each component is less than or equal to the magnitude of vector
b) Component can be greater than vector
c) Component is always zero
d) None
Ans: a

Q164. A = 12î + 5ĵ, direction angle with x-axis = ?
a) $\tan^{-1}(5/12)$
b) $\tan^{-1}(12/5)$
c) $\tan^{-1}(12 \times 5)$
d) None
Ans: a

Q165. If vector lies along negative y-axis, its representation = ?
a) –Ay ĵ
b) –Ax î
c) Ax î
d) None
Ans: a

Q166. If A = 3î, B = 4ĵ, resultant magnitude = ?
a) 5
b) 7
c) 12
d) 25
Ans: a

Q167. If A = 2î + 2ĵ, then magnitude = ?
a) 2
b) 4
c) √8
d) √2
Ans: c

Q168. Resultant of two vectors A and B is zero when –
a) A = B
b) A = –B
c) A ⊥ B
d) None
Ans: b

Q169. If two vectors A and B have magnitudes 6 and 8, angle 90°, then resultant = ?
a) 10
b) 12
c) 14

d) 8
Ans: a

Q170. The direction of resultant vector is given by –
a) tan θ = Ry/Rx
b) tan θ = Rx/Ry
c) sin θ = Ry/R
d) None
Ans: a

Q171. Which quantity can be zero for a moving body?
a) Speed
b) Distance
c) Displacement
d) Mass
Ans: c

Q172. The position vector defines –
a) Velocity
b) Location of a particle with respect to origin
c) Acceleration
d) Force
Ans: b

Q173. If a particle returns to its initial point, displacement = ?
a) Zero
b) Positive
c) Negative
d) None
Ans: a

Q174. Displacement is independent of –
a) Initial and final position
b) Path taken

c) Coordinates
d) Direction
Ans: b

Q175. Which of the following is not correct?
a) Velocity is vector
b) Speed is scalar
c) Displacement is scalar
d) Acceleration is vector
Ans: c

Q176. A car moves with velocity 20 m/s and comes to rest in 4 s. Its average acceleration = ?
a) –5 m/s²
b) 5 m/s²
c) –20 m/s²
d) 0
Ans: a

Q177. A particle moving in 2D has vx = constant, vy = increasing. Its path is –
a) Straight line
b) Parabola
c) Circle
d) None
Ans: b

Q178. A stone falls freely. Its motion is an example of –
a) UCM
b) Projectile
c) 1D uniformly accelerated motion
d) None
Ans: c

Q179. Acceleration is zero when –
a) Speed decreases
b) Speed increases
c) Velocity constant
d) Direction changes
Ans: c

Q180. In 2D motion, if ax = 0, ay = –g, then motion is –
a) Projectile
b) Circular
c) Uniform
d) None
Ans: a

Q181. If u = 50 m/s at 30°, horizontal component = ?
a) 25
b) 50
c) 43.3
d) 40
Ans: c

Q182. If u = 20 m/s at 60°, vertical component = ?
a) 10
b) 17.3
c) 20
d) 15
Ans: b

Q183. A projectile projected at θ and (90°–θ) has –
a) Same range
b) Different range
c) Zero range
d) Infinite range
Ans: a

Q184. Range is proportional to –
a) u^2
b) u
c) 1/u
d) √u
Ans: a

Q185. Maximum height is proportional to –
a) u
b) u^2
c) 1/u
d) √u
Ans: b

Q186. For same speed, range is maximum at –
a) 30°
b) 45°
c) 60°
d) 90°
Ans: b

Q187. In projectile, trajectory equation is quadratic because of –
a) Linear term
b) Square term
c) Constant term
d) None
Ans: b

Q188. The projectile equation is of form –
a) $y = mx + c$
b) $y = ax^2 + bx$
c) $y = ax$
d) None
Ans: b

Q189. If initial velocity doubles, range –
a) Doubles
b) Triples
c) Quadruples
d) Remains same
Ans: c

Q190. If angle = 0°, projectile reduces to –
a) Horizontal throw
b) Vertical throw
c) Free fall
d) Circular motion
Ans: a

Q191. In UCM, angular speed is –
a) Constant
b) Variable
c) Zero
d) Infinite
Ans: a

Q192. A body in UCM has linear velocity –
a) Constant magnitude, changing direction
b) Constant vector
c) Zero
d) None
Ans: a

Q193. Centripetal force always acts –
a) Away from centre
b) Towards centre
c) Along tangent
d) None
Ans: b

Q194. Direction of velocity vector in UCM is –
a) Tangent to circle
b) Along radius
c) Towards centre
d) None
Ans: a

Q195. If v = 10 m/s, R = 2 m, centripetal acceleration = ?
a) 20 m/s²
b) 25 m/s²
c) 50 m/s²
d) None
Ans: b

Q196. Angular velocity ω = 2πf. If f = 50 Hz, ω = ?
a) 100π rad/s
b) 50π rad/s
c) 200π rad/s
d) None
Ans: a

Q197. If a car moves in circle with constant speed, then –
a) Velocity constant
b) Acceleration zero
c) Both velocity and acceleration change in direction
d) None
Ans: c

Q198. Centripetal acceleration is provided by –
a) Gravitational force in satellites
b) Friction in turning vehicles
c) Tension in string
d) All of these
Ans: d

Q199. UCM is an example of –

a) Constant speed, accelerated motion

b) Constant velocity motion

c) Non-accelerated motion

d) None

Ans: a

Q200. A satellite moves around Earth due to –

a) Inertia

b) Centrifugal force

c) Gravitational centripetal force

d) None

Ans: c