1. In a 2-D frame, the components of a vector A of magnitude A making angle **θ** with the +x axis are:
   A. Ax=A sinθ, Ay=A cosθ
   B. Ax=A cosθ, Ay=A sinθ
   C. Ax=A tanθ, Ay=A cotθ
   D. Ax=A secθ, Ay=A cscθ (B)

*Explanation :* For 2-D resolution, Ax=A cosθ, Ay=A sinθ.

2. In 2-D, the magnitude A from rectangular components is:
   A. HA=√(AxAy)  B. A=Ax+Ay
   C. $A=\sqrt{(Ax^2+Ay^2)}$
   D. A=|Ax−Ay| (C)

*Explanation :* Squaring and adding the component relations gives $A^2=Ax^2+Ay^2$.

3. The direction **θ** of A in the xy-plane satisfies:
   A. tanθ=Ax/Ay  B. tanθ=Ay/Ax
   C. tanθ=A/Ax
   D. tanθ=A/Ay (D)

*Explanation :* From the right-triangle relation, tan**θ**=Ay/Ax.

4. In 3-D, the vector in unit-vector form is:
   A. A=Ax î+Ay ĵ+Az k̂  B. A=A î+A ĵ+A k̂
   C. A=î+ĵ+k̂
   D. A=A(îĵk̂) (A)

*Explanation :* The decomposition is A=Ax î+Ay ĵ+Az k̂.

5. The 3-D magnitude–component relation is:
   A. $A^2=AxAyAz$
   B. $A^2=Ax^2+Ay^2+Az^2$
   C. $A^2=(Ax+Ay+Az)^2$
   D. $A^2=Ax^2+Ay^2$ (D)

*Explanation :* For 3-D resolution, $A^2=Ax^2+Ay^2+Az^2$.

6. If **α, β, γ** are the angles of A with the x, y, z axes, then:
   A. $\cos^2\alpha+\cos^2\beta+\cos^2\gamma=0$
   B. $\cos^2\alpha+\cos^2\beta+\cos^2\gamma=1$
   C. $\cos\alpha+\cos\beta+\cos\gamma=1$
   D. $\cos\alpha \cos\beta \cos\gamma=1$ (B)

*Explanation :* With Ax=Acosα, etc., one obtains $\cos^2\alpha+\cos^2\beta+\cos^2\gamma=1$.

7. Displacement from $(x_1,y_1)$ to $(x_2,y_2)$ is:
   A. $\Delta r=(x_2+y_2)\hat{i}+(x_1+y_1)\hat{j}$
   B. $\Delta r=(x_1-x_2)\hat{i}+(y_1-y_2)\hat{j}$
   C. $\Delta r=(x_2-x_1)\hat{i}+(y_2-y_1)\hat{j}$
   D. $\Delta r=(x_2x_1)\hat{i}+(y_2y_1)\hat{j}$ (C)

*Explanation :* $\Delta r=r_2-r_1=(x_2-x_1)\hat{i}+(y_2-y_1)\hat{j}$.

8. The average velocity vector in a plane is defined as:
   A. Vavg=Δr/Δt  B. Vavg=Δr·Δt
   C. Vavg=Δt/Δr
   D. Vavg=Δr+Δt (A)

*Explanation :* Average velocity is displacement per unit time.

9. The magnitude of average velocity from its components is:
   A. Vavg=|Vx−Vy|
   B. $Vavg=\sqrt{(Vx^2+Vy^2)}$
   C. Vavg=Vx+Vy
   D. Vavg=√(VxVy) (B)

*Explanation :* The relation is $Vavg^2=Vx^2+Vy^2$ ⇒ $Vavg=\sqrt{(Vx^2+Vy^2)}$.

10. The average acceleration in a plane is given by:
   A. aavg=Δv/Δt  B. aavg=Δv·Δt
   C. aavg=Δt/Δv
   D. aavg=Δv+Δt (A)

*Explanation :* Average acceleration is change in velocity per unit time.