Model Questions for Vector Analysis

1) Choose the correct answer if $[\vec{a}\ \vec{b}\ \vec{c}] = 0$ then, (a) all vectors are equal
(b) all vectors are coplanar
(c) all vectors are mutually perpendicular
(d) the vectors are parallel to each other.

2) The value of $[\vec{i}\ \vec{j}\ \vec{k}]$ is
(a) 1 (b) 0 (c) −1 (d) none of these.

3) The value of $[\vec{a}\ \vec{a}\ \vec{b}]$ is :-
(a) 1 (b) 0 (c) −1 (d) none of these.

4) If $\vec{a}, \vec{b}, \vec{c}$ are coplanar, the value of $[\vec{a}\ \vec{b}\ \vec{c}]$ is
(a) 1 (b) −1 (c) 0 (iv) none of these.

5) Choose the correct answer if $|\vec{u}|$ is constant then (a) $\frac{d\vec{u}}{dt} = 0$ (b) $\frac{d\vec{u}}{dt}$ is perpendicular to $\vec{u}$
(c) $\frac{d\vec{u}}{dt}$ is parallel to $\vec{u}$ (d) none of these.

6) If the vector function $\vec{u}(t)$ has constant direction $\vec{u} \times \frac{d\vec{u}}{dt}$ is equal to
(a) $\vec{0}$ (b) −1 (c) 1 (d) none of these.

7) If $\vec{u}(t)$ be a constant vector, then $\frac{d\vec{u}}{dt}$ is equal to
(a) 0 (b) 1 (c) −1 (iv) $\vec{0}$

Short Answer type Questions.

1) Define the following :
(a) Unit Vector
(b) Null Vector
(c) Negative of a vector
(d) Collinear Vectors
(e) Co-planar Vectors.

2) Define vector product and state any four properties of vector product

3) Define limit of vector function and state any four fundamental theorems on limits of vector function.

4) Prove that if a vector function is differentiable finitely at a point, then it must be continuous at that point.

Long Answer type Questions

1) If $\vec{u}(t)$ and $\vec{v}(t)$ be two differential function of the scalar t. Then prove that

(a) $\frac{d}{dt}(\vec{u}\cdot\vec{v}) = \vec{u}\cdot\frac{d\vec{v}}{dt} + \frac{d\vec{u}}{dt}\cdot\vec{v}$

(b) $\frac{d}{dt}(\vec{u}\times\vec{v}) = \vec{u}\times\frac{d\vec{v}}{dt} + \frac{d\vec{u}}{dt}\times\vec{v}$

3) To prove that a necessary and sufficient condition for the vector function $\vec{u}$ of a scalar variable t to have constant magnitude is

$$\vec{u}\cdot\frac{d\vec{u}}{dt} = 0.$$