Note:-
   1. All Questions are compulsory.
   2. Numbers on the right indicate full marks.

Section A

Q.1 Select and Write the correct answer. (4)

1. A single vector that produces the same effect of two or more vectors is called

   A) Equal vector
   B) Resultant vector
   C) Resolution of vector
   D) Component of vector

2. If the resultant of two vectors each of magnitude F is also F, the angle between them will be

   A) 0°
   B) 45°
   C) 90°
   D) 120°

3. $$\int x^5 \, dx =$$

   A) $\dfrac{x^6}{6} + C$
   B) $\dfrac{x^5}{6} + C$
   C) $\dfrac{x^6}{5} + C$
   D) $\dfrac{x^5}{6} + C$

4. The angle between vectors $\sqrt{2} \, (\hat{i} + \hat{j})$ and $2\hat{i} + \hat{j}$ is

   A) 30°
   B) 45°
   C) 60°
   D) 90°

Q.2 Answer the following. (3)

1. Can a rectangular component of a vector be greater than the vector itself?

2. If $\overrightarrow{v_1} = 3\hat{i} + 4\hat{j} + \hat{k}$ and $\overrightarrow{v_2} = \hat{i} - \hat{j} - \hat{k}$, determine the magnitude and direction of $\overrightarrow{v_1} + \overrightarrow{v_2}$

3. What is the essential condition for addition of two vectors?

Section B
Attempt any Four

Q.3   Distinguish between dot product and cross product. **(2)**

Q.4   Explain scalar and vector quantity giving examples. **(2)**

Q.5   Give important points for vector addition. **(2)**

Q.6   Using the rule for differentiation for quotient of two functions, prove $\dfrac{d}{dx} \left(\dfrac{sin \, x}{cos \, x} \right) \, sec^2 \, x$ **(2)**

Q.7   Find a vector which is parallel to $\overrightarrow{v} = \hat{i} - 2\hat{j}$ and has a magnitude 10. **(2)**

Q.8 Find the area of a triangle formed by $\vec{A} = 3\hat{i} - 4\hat{j} + 2\hat{k}$ and $\vec{B} = \hat{i} + \hat{j} - 2\hat{k}$ as **(2)** adjacent sides measured in metre.

Section C
Attempt any Two

Q.9 What is law of polygon of vectors? **(3)**

Q.10 Explain representation of vectors using diagram. **(3)**

Q.11 In a Cartesian co-ordinate system, the co-ordinates of two points P and Q are (2,4,4) and (–2,– **(3)** 3,7) respectively. Find $\overrightarrow{PQ}$ and its magnitude.

Section D
Attempt any One

Q.12 Explain addition and subtraction of two vectors. **(4)**

At what angle must the two forces A + B and A – B act so that the resultant is $\sqrt{A^2 + B^2}$

Q.13 Define Scalar product of two vectors. State the characteristics of scalar product. **(4)**