

SATISH CHANDRA MEMORIAL SCHOOL

CLASS- XI

HOTS QUESTIOBN

1. What is null vector? Give an example. If a vector  $\vec{F}$  is given by,  $\vec{F} = 5\hat{i} - 6\hat{j}$  then what is the unit vector perpendicular to  $\vec{F}$ .  
**(2+1+2)**
2. What is meant by resolution of a vector? Prove:  $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$ , where  $\alpha, \beta$  and  $\gamma$  are the angles made by X, Y and Z axes with the given vector  $\vec{A}$ . **(2+3)**
3. State the Triangle law of vector addition. Find out the expression of the resultant vector of two given vectors. If the two given vectors are perpendicular to each other the what will be the expression of the resultant vector.  
**(2+2+1)**

**(3 MARKS)**

1. If vectors  $\vec{A}, \vec{B}$  &  $\vec{C}$  are mutually perpendicular to each other, then find  $\vec{A} \cdot (\vec{B} + \vec{C})$ . Find out the angle between vectors  $\vec{A} = \hat{i} + 2\hat{j} - \hat{k}$  and  $\vec{B} = \hat{i} + \hat{j} - 2\hat{k}$ . **(1+2)**
2. Is  $A^2$  scalar or vector? Justify. Find the value of  $\lambda$  in unit vector  $0.4\hat{i} + 0.8\hat{j} - \lambda\hat{k}$ . **(1+2)**
3. Find the unit vector parallel to the resultant of vectors  $\vec{A} = 2\hat{i} - 6\hat{j} - 3\hat{k}$  and  $\vec{B} = 4\hat{i} + 3\hat{j} - \hat{k}$ .  
**(3)**
4. If a force of  $\vec{F} = 5\hat{i} + 4\hat{j}$  newton displaces a body through  $\vec{S} = 3\hat{i} + 4\hat{k}$  metre in 5 sec, then find the power.  
**(3)**
5. Find out the vector whose magnitude is  $7\sqrt{2}$  and normal to the vectors  $\vec{A} = 2\hat{i} - 3\hat{j} + 6\hat{k}$  and  $\vec{B} = \hat{i} + \hat{j} - \hat{k}$ .  
**(3)**
6. A river is 500 m wide flows at a rate of 4 km/hr. A swimmer who can swim at 8 km/hr in still water, wishes to cross the river straight then
  - (i) Along what direction must he strike?
  - (ii) What should be his resultant velocity?
  - (iii) What is the time of crossing the river?**(3)**