VECTOR ALGEBRA

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A.FILL IN THE BLANKS

1) Let **A**, **B**, **C** be vectors of length 3,4,5 respectively .Let **A** be perpendicular to **B**+**C**,**B** to **C**+**A** and **C** to **A**+**B**. The the length of vector **A**+**B**+**C** is (1981-2marks)
2) The unit vector perpendicular to the plane determined by **P**\$$(1,-1,2)$,**Q**$(2,0,-1)$ and **R**$(0,2,1)$ is (1983-1mark)
3) The area of the triangle whose vertices are **A**$(1,-1,2)$, **B**$(2,0,-1)$, **C**$(3,-1,2)$ is (1983-1 mark)
4) **A**,**B**,**C** and **D**, are four points in a plane with position vectors **a**,**b**,**c** and **d** respectively such that $(\mathbf{a}-\mathbf{d})\cdot(\mathbf{b}-\mathbf{c}) = (\mathbf{b}-\mathbf{d})\cdot(\mathbf{c}-\mathbf{a}) = 0$ The point **D**, then, is the ...of the triangle ABC. (1984-2 marks)
5) If $\begin{vmatrix} a & a^2 & 1+a^3 \\ b & b^2 & 1+b^3 \\ c & c^2 & 1+c^3 \end{vmatrix} = 0$ and the vectors **A**=(1,a,a^2),**B**=(1,b,b^2),**C**=(1,c,c^2), are co-planar, then the product abc=... (1985-2 marks)
6) If **ABC** are the three non-coplanar vectors, then- $\frac{\mathbf{A}\cdot\mathbf{B}\times\mathbf{C}}{\mathbf{C}\times\mathbf{A}\cdot\mathbf{B}} + \frac{\mathbf{B}\cdot\mathbf{A}\times\mathbf{C}}{\mathbf{C}\cdot\mathbf{A}\times\mathbf{B}} =$ (1985-2 marks)
7) $\mathbf{A} = (1,1,1)$, $\mathbf{C} = (0,1,-1)$ are given vectors, then a vector **B** satisfying the given equations $\mathbf{A}\times\mathbf{B} = \mathbf{C}$ and $\mathbf{A}\cdot\mathbf{B} = 3$ ... 1985-2 marks
8) If the vectors $a\hat{i}+\hat{j}+\hat{k}$,$\hat{i}+b\hat{j}+\hat{k}$ and $\hat{i}+\hat{j}+c\hat{k}$ $(a \neq b \neq c \neq 1)$ are co-planar, then the value of the $\frac{1}{(1-a)}+\frac{1}{(1-b)}+\frac{1}{(1-c)}$=... (1987-2 marks)
9) Let $b = 4\hat{i}+3\hat{j}$ and **c** be two vectors perpendicular to each other in the xy-plane.All vectors in the same plane having projections 1 and 2 along **b** and **c**, respectively, are given by ... (1987-2 marks)
10) The components of a vectors **a** along and perpendicular to a non-zero vector **b** are ...and ...respectively. (1988-2 marks)
11) Given that $\mathbf{a} = (1,1,1)$, $\mathbf{c} = (0,1,-1)$,$\mathbf{a}\cdot\mathbf{b} = 3$ and $\mathbf{a}\times\mathbf{b} = \mathbf{c}$, then $\mathbf{b} = \ldots$ (1991-2 marks)
12) A unit vector coplanar with $\hat{i}+\hat{j}+2\hat{k}$ and $\hat{i}+2\hat{j}+\hat{k}$ and perpendicular to $\hat{i}+\hat{j}+\hat{k}$ is ... (1992-2 marks)
13) A unit vector perpendicular to the plane determined by the points **P**$(1,-1,2)$,**Q**$2,0,-1)$ and **R**(0,2,1) is ... (1994-2 marks)
14) A non-zero vector **a** is parallel to the line of intersection of the plane determined by the vectors $\hat{i}$,$\hat{i}+\hat{j}$ and the plane determined by the vectors $\hat{i}-\hat{j}$,$\hat{i}+\hat{k}$.The angle between **a** and the vector $\hat{I}-2\hat{j}+2\hat{k}$ is ... (1996-2marks)
15) If **b** and **c** are any two non-collinear unit vectors and **a** is any vector, then $(\mathbf{a}\cdot\mathbf{b})\mathbf{b} + (\mathbf{a}\cdot\mathbf{c})\mathbf{c} + \frac{\mathbf{a}\cdot(\mathbf{b}\times\mathbf{c})}{|\mathbf{b}\times\mathbf{c}|}(\mathbf{b}\times\mathbf{c})$=...