MATHS

BOOKS - CENGAGE

LINEAR COMBINATION OF VECTORS, DEPENDENT AND INDEPENDENT VECTORS

Dpp 1 2

1. The number of integral values of p for which $(p+1)\hat{i}-3\hat{j}+p\hat{k}, p\hat{i}+(p+1)\hat{j}-3\hat{k}$ and $-3\hat{i}+p\hat{j}+(p+1)\hat{k}$ are linearly dependent vectors is

q

A. 0

B. 1

C. 2

D. 3

Answer: B

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2. The base vectors $\vec{a}_1, \vec{a}_2$ and $\vec{a}_3$ are given in terms of base vectors $\vec{b}_1, \vec{b}_2$ and $\vec{b}_3$ as $\vec{a}_1 = 2\vec{b}_1 + 3\vec{b}_2 - \vec{b}_3$, $\vec{a}_2 = \vec{b}_1 - 2\vec{b}_2 + 2\vec{b}_3$ and $\vec{a}_3 = -2\vec{b}_1 + \vec{b}_2 - 2\vec{b}_3$, if

$\vec{F} = 3\vec{b}_1 - \vec{b}_2 + 2\vec{b}_3$, then vector $\vec{F}$ in terms of $\vec{a}_1$, $\vec{a}_2$ and $\vec{a}_3$ is

A. $\vec{F} = 3\vec{a}_1 + 2\vec{a}_2 + 5\vec{a}_3$

B. $\vec{F} = 3\vec{a}_1 - 5\vec{a}_2 - 2\vec{a}_3$

C. $\vec{F} = 3\vec{a}_1 + 5\vec{a}_2 + 3\vec{a}_3$

D. none of these

Answer: C

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3. The number of distinct real values of λ for which the vectors $\vec{a} = \lambda^3\hat{i} + \hat{k}$, $\vec{b} = \hat{i} - \lambda^3\hat{j}$ and

$\overrightarrow{c} = \hat{i} + (2\lambda - \sin\lambda)\hat{i} - \lambda\hat{k}$ are coplanar is

A. 0

B. 1

C. 2

D. 3

Answer: A

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4. The coplanar points A, B, C, D are $(2-x, 2, 2), (2, 2-y, 2), (2, 2, 2-z)$ and $(1, 1, 1)$ respectively then

A. $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$

B. $x + y + z = 1$

C. $\frac{1}{1-x} + \frac{1}{1-y} + \frac{1}{1-z} = 1$

D. none of these

Answer: A

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5. If a_1 and a_2 are two values of a for which the unit vector $a\overrightarrow{i} + b\overrightarrow{j} + \frac{1}{2}\overrightarrow{k}$ is linearly dependent with $\overrightarrow{i} + 2\overrightarrow{j}$ and $\overrightarrow{j} - 2\overrightarrow{k}$, then $\frac{1}{a_1} + \frac{1}{a_2}$ is equal to

A. 1

B. $\frac{1}{8}$

C. $-\frac{16}{11}$

D. $-\frac{11}{16}$

Answer: C

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6. Let a,b and c be distinct non-negative numbers and the vectors $a\hat{i}+a\hat{j}+c\hat{k}$, $\hat{i}+\hat{k}$, $c\hat{i}+c\hat{j}+b\hat{k}$ lie in a plane, then the quadratic equation $ax^2+2cx+b=0$ has

A. real and equal roots

B. real unequal roots

C. unreal roots

D. both roots real and positive

Answer: A

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7. In the $\triangle OAB$, M is the midpoint of AB, C is a point on OM, such that $2OC = CM$. X is a point on the side OB such that OX = 2XB. The line XC is produced to meet OA in Y. Then $\frac{OY}{YA} =$

A. $\frac{1}{3}$

B. $\frac{2}{7}$

C. $\frac{3}{2}$

D. $\frac{2}{5}$

Answer: B

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8. Points X and Y are taken on the sides QR and RS, respectively of a parallelogram PQRS, so that $QX = 4XR$ and $RY = 4YS$ The line XY cuts the line PR at Z Find the ratio PZ: ZR

A. $\frac{21}{25}\overrightarrow{PR}$

B. $\frac{16}{25}\overrightarrow{PR}$

C. $\frac{17}{25}\overrightarrow{PR}$

D. None of these

Answer: A

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9. On the xy plane where O is the origin, given points, A(1,0), B(0,1) and C(1,1). Let P,Q, and R be moving points on the line OA, OB, OC respectively such that $\overrightarrow{OP} = 45t\left(\overrightarrow{OA}\right), \overrightarrow{OQ} = 60t\left(\overrightarrow{OB}\right), \overrightarrow{OR} = (1-t)\left(\overrightarrow{OC}\right)$ with $t > 0$. If the three points P,Q and R are collinear then the value of t is equal to

A. $\frac{1}{106}$

B. $\frac{7}{187}$

C. $\frac{1}{100}$

D. none of these

Answer: B

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10. Given three vectors $\vec{a}$, $\vec{b}$ and $\vec{c}$ are non-zero and non-coplanar vectors. Then which of the following are coplanar.

A. $\vec{a}+\vec{b}, \vec{b}+\vec{c}, \vec{c}+\vec{a}$

B. $\overrightarrow{a} - \overrightarrow{b}, \overrightarrow{b} + \overrightarrow{c}, \overrightarrow{c} + \overrightarrow{a}$

C. $\overrightarrow{a} + \overrightarrow{b}, \overrightarrow{b} - \overrightarrow{c}, \overrightarrow{c} - \overrightarrow{a}$

D. $\overrightarrow{a} + \overrightarrow{b}, \overrightarrow{b} + \overrightarrow{c}, \overrightarrow{c} - \overrightarrow{a}$

Answer: B::D

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