MATHS

BOOKS - CENGAGE MATHS (ENGLISH)

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 $\overrightarrow{a}_1, \overrightarrow{a}_2$ and $\overrightarrow{a}_3$ are given in terms of base vectors $\overrightarrow{b}_1, \overrightarrow{b}_2$ and $\overrightarrow{b}_3$ as $\overrightarrow{a}_1 = 2\overrightarrow{b}_1 + 3\overrightarrow{b}_2 - \overrightarrow{b}_3$, $\overrightarrow{a}_2 = \overrightarrow{b}_1 - 2\overrightarrow{b}_2 + 2\overrightarrow{b}_3$ and $\overrightarrow{a}_3 = 2\overrightarrow{b}_1 + \overrightarrow{b}_2 - 2\overrightarrow{b}_3$, if $\overrightarrow{F} = 3\overrightarrow{b}_1 - \overrightarrow{b}_2 + 2\overrightarrow{b}_3$, then vector $\overrightarrow{F}$ in terms of $\overrightarrow{a}_1, \overrightarrow{a}_2$ and $\overrightarrow{a}_3$ is

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3. The number of distinct real values of λ for which the vectors $\overrightarrow{a} = \lambda^3\hat{i} + \hat{k}, \overrightarrow{b} = \hat{i} - \lambda^3\hat{j}$ and $\overrightarrow{c} = \hat{i} + (2\lambda - \sin\lambda)\hat{j} - \lambda\hat{k}$ 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 $a\hat{i}+b\hat{j}+\frac{1}{2}\hat{k}$ is linearly dependent with $\hat{i}+2\hat{j}$ and $\hat{j}-2\hat{k}$,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 $\Delta OAB, M$ is the mid-point 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, $\frac{OY}{YA}$ is equal to

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. Then, PZ is

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

$\overline{OP} = 45t\overline{(OA)}, \overline{OQ} = 60t\overline{(OB)}, \overline{OR} = (1-t)\overline{(OC)}$

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

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

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

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

Answer: B::D

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