



## 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 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

A. 
$$\overrightarrow{F}=3\overrightarrow{a}_{1}+2\overrightarrow{a}_{2}+5\overrightarrow{a}_{3}$$

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

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

D. none of these

#### Answer: C

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**3.** The number of distinct real values of  $\lambda$  for which the

vectors 
$$\overrightarrow{a} = \lambda^3 \hat{i} + \hat{k}, \overrightarrow{b} = \hat{i} - \lambda^3 \hat{j}$$
 and

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

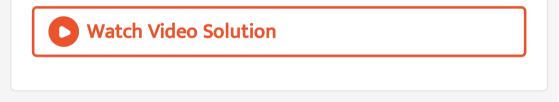
A. 0

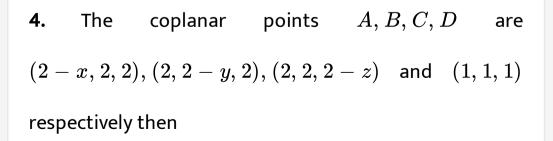
B. 1

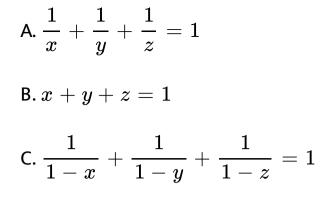
C. 2

D. 3

#### **Answer: A**







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  $\overrightarrow{ai} + \overrightarrow{bj} + \frac{1}{2}\overrightarrow{k}$  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



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



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



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



**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  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are non-zero and non-coplanar vectors. Then which of the following are coplanar.

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

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

