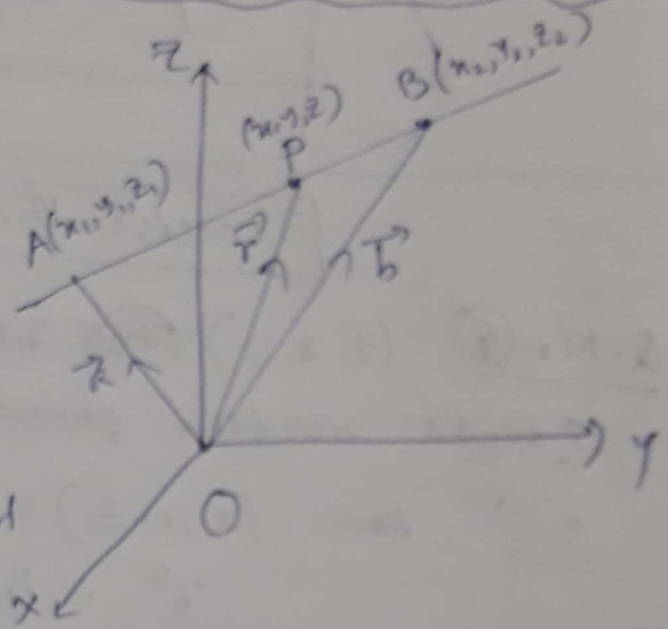


दूटो बिंदुओ बिंदुओ आकार (अथ वरुन (अथो नरु) अथः
 (Equation of a p. line passing through two given points):

दुओ वरुन (अथो अथो अथो
 बिंदु $A(x_1, y_1, z_1)$ अथ
 $B(x_2, y_2, z_2)$ अथ अथो
 बिंदुओ (अथो अथो अथो अथो \vec{a} अथो \vec{b} .
 [Let the p.v. of $A(x_1, y_1, z_1)$
 & $B(x_2, y_2, z_2)$ are \vec{a} and
 \vec{b} respectively].



अथो अथो $P(x, y, z)$ अथ बिंदुओ अथो अथो अथो अथो अथो अथो अथो \vec{r}
 [Let $P(x, y, z)$ be any point and its p.v. be \vec{r}]

Now, ~~P~~ the point P will lie on the line
 if & only if $\vec{AP} = \vec{r} - \vec{a}$ & $\vec{PB} = \vec{b} - \vec{r}$ are collinear. (अथो अथो अथो)

$$\therefore \vec{r} - \vec{a} = \lambda(\vec{b} - \vec{r})$$

$$\Rightarrow \vec{r} = \vec{a} + \lambda(\vec{b} - \vec{a}), \lambda \in \mathbb{R} \quad \text{--- (1)}$$

which is the required eqn of the line.



(3220-01000100) ଅନୁପ୍ରାପ୍ତ ରୂପ
(Cartesian form from vector form)

We have

$$\vec{r} = x_i + y_j + z_k$$

$$\vec{a} = x_1i + y_1j + z_1k$$

$$\vec{b} = x_2i + y_2j + z_2k$$

ଏଠି ଅନୁପ୍ରାପ୍ତ (1) ଠି ଅନୁପ୍ରାପ୍ତ ଅଟେ ,

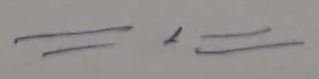
$$x_i + y_j + z_k = (x_1i + y_1j + z_1k) + \lambda(x_2i + y_2j + z_2k - x_1i - y_1j - z_1k)$$

$$= \{x_1 + \lambda(x_2 - x_1)\}i + \{y_1 + \lambda(y_2 - y_1)\}j + \{z_1 + \lambda(z_2 - z_1)\}k$$

$$\Rightarrow \begin{cases} x = x_1 + \lambda(x_2 - x_1) & \Rightarrow \lambda = \frac{x - x_1}{x_2 - x_1} \\ y = y_1 + \lambda(y_2 - y_1) & \Rightarrow \lambda = \frac{y - y_1}{y_2 - y_1} \\ z = z_1 + \lambda(z_2 - z_1) & \Rightarrow \lambda = \frac{z - z_1}{z_2 - z_1} \end{cases}$$

$$\Rightarrow \boxed{\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1} = \frac{z - z_1}{z_2 - z_1}}$$

which is the required eqn.



Exercise 11.2

(61)

Ex. 8 ଦୁଇ ବିନ୍ଦୁ A ଓ B $(5, -2, 3)$ ବିନ୍ଦୁ-ଆକାରରେ ଦେଖାଯାଉଥିବା ସମସ୍ତ ସମ୍ପର୍କ-
ସୂତ୍ରରେ A ଓ B କାର୍ଡିନେଟ୍ସର ସମ୍ପର୍କରେ ଦିଆଯାଉ ।

Sol: Here, $A(x_1, y_1, z_1) = A(0, 0, 0)$

$$B(x_2, y_2, z_2) = B(5, -2, 3).$$

$$\therefore \vec{a} = 0i + 0j + 0k = \vec{0}.$$

$$\& \vec{b} = 5i - 2j + 3k.$$

\therefore ସମସ୍ତ ସମ୍ପର୍କ-ସୂତ୍ରରେ A ଓ B କାର୍ଡିନେଟ୍ସର (vector eqn):

$$\vec{r} = \vec{a} + \lambda(\vec{b} - \vec{a}), \quad \lambda \in \mathbb{R}.$$

$$= \vec{0} + \lambda(5i - 2j + 3k - \vec{0})$$

$$\Rightarrow \vec{r} = \lambda(5i - 2j + 3k), \quad \lambda \in \mathbb{R}.$$

ଏହାକୁ, ସମସ୍ତ ସମ୍ପର୍କ-ସୂତ୍ରରେ A ଓ B କାର୍ଡିନେଟ୍ସର ସମ୍ପର୍କରେ (Cartesian eqn. of the line):

$$\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1} = \frac{z - z_1}{z_2 - z_1}$$

$$\text{or, } \frac{x - 0}{5 - 0} = \frac{y - 0}{-2 - 0} = \frac{z - 0}{3 - 0}$$

$$\text{or, } \frac{x}{5} = \frac{y}{-2} = \frac{z}{3} \quad \leftarrow \text{Ans.}$$

===== x =====

Exercise 11.2

(62)

Q.9 $(3, -2, -5)$ ଓ $(3, -2, 6)$ ବିନ୍ଦୁ ମଧ୍ୟ ଗୋଟିଏ ରେଖାରେ ଥିବାରୁ ଏହାକୁ ନିମ୍ନଲିଖିତ ସମୀକରଣ ଦ୍ଵାରା ସମୀକରଣ କରାଯାଇପାରେ ।

Solⁿ Here, $A(x_1, y_1, z_1) = A(3, -2, -5)$

$$B(x_2, y_2, z_2) = B(3, -2, 6)$$

$$\therefore \vec{a} = 3i - 2j - 5k$$

$$\vec{b} = 3i - 2j + 6k$$

\therefore ରେଖା ସମୀକରଣ (ସଦୃଶ ସମୀକରଣ): (vector eqn. of the line):

$$\vec{r} = \vec{a} + \lambda(\vec{b} - \vec{a}), \quad \lambda \in \mathbb{R}$$

$$= (3i - 2j - 5k) + \lambda(3i - 2j + 6k - 3i + 2j + 5k)$$

$$= 3i - 2j + 5k + \lambda(11k) \quad \leftarrow \underline{\underline{\text{Ans}}}$$

Again, Cartesian eqn. of the line is:

$$\frac{x - x_1}{x_2 - x_1} = \frac{y - y_1}{y_2 - y_1} = \frac{z - z_1}{z_2 - z_1}$$

$$\text{or, } \frac{x - 3}{3 - 3} = \frac{y + 2}{-2 + 2} = \frac{z + 5}{6 + 5}$$

$$\text{or, } \frac{x - 3}{0} = \frac{y + 2}{0} = \frac{z + 5}{11} \quad \leftarrow \underline{\underline{\text{Ans}}}$$

