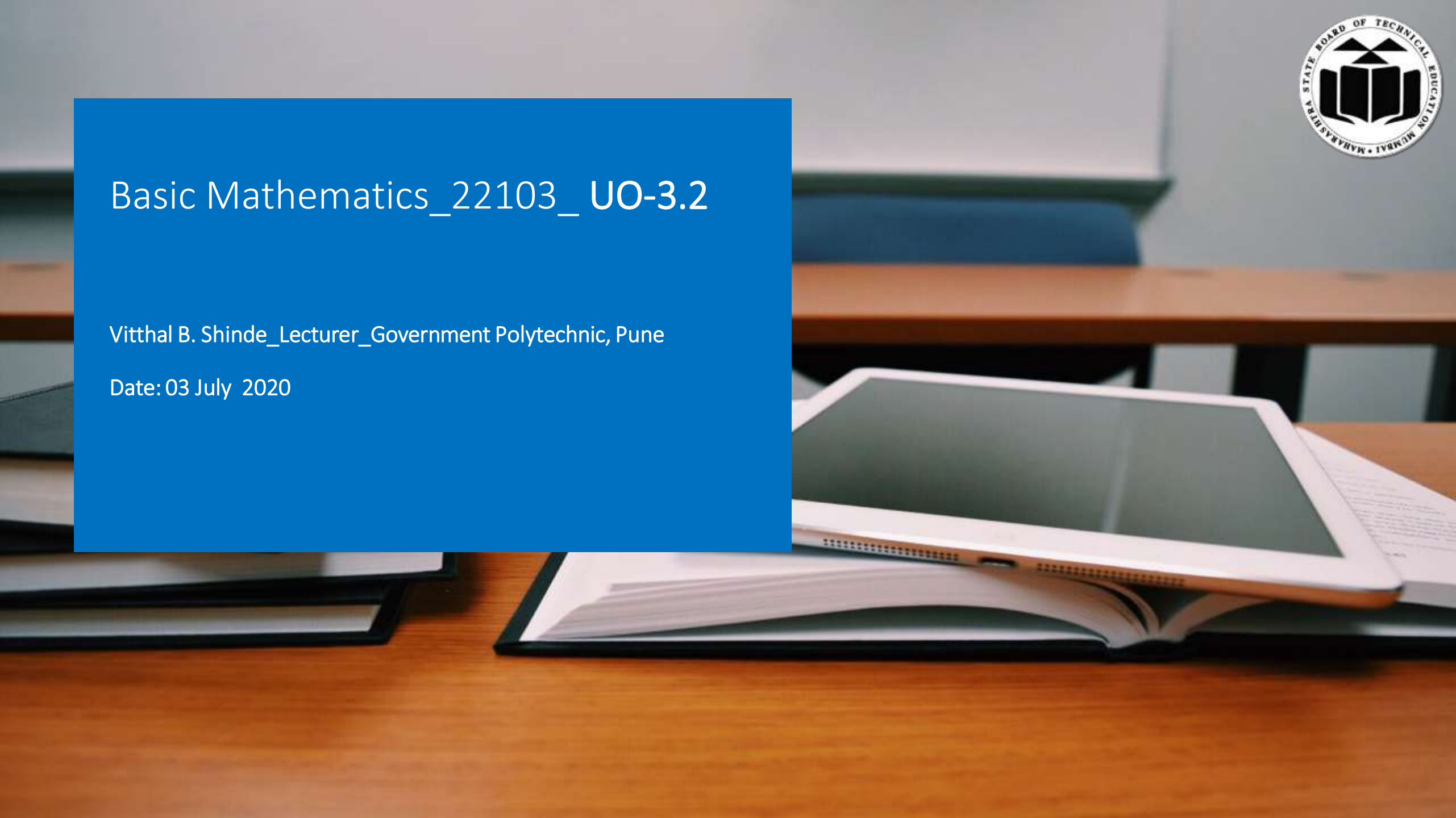

Basic Mathematics_22103_ UO-3.2

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Unit 3: Coordinate Geometry

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Topic : Straight Line

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Learning Objective/ Key learning

- Formulate equation of straight lines related to given engineering problems.

Contents

- Slope-point form
- Two intercept form (Double intercept form)
- Two point form

Slope-point form : Equation of line having slope 'm' and passing through a point A (x_1, y_1) is $\mathbf{y - y_1 = m(x - x_1)}$

Solved Examples

1) Find the equation of line passing through $(3, -4)$ and having slope $\frac{3}{2}$.

Solution : Given Slope = $(m) = \frac{3}{2}$

and $(x_1, y_1) = (3, -4)$

By using equation of line in slope-point form.

$$y - y_1 = m(x - x_1)$$

$$\therefore \quad y - (-4) = (x - 3)$$

$$\therefore \quad 2(y + 4) = 3(x - 3)$$

$$\therefore \quad 2y + 8 = 3x - 9$$

$$\therefore \quad 3x - 2y - 9 - 8 = 0$$

$$\therefore \quad 3x - 2y - 17 = 0$$

2) Find the equation of line passing through (1, 7) and having slope 2 units.

Solution :

Given slope = m = 2

and $(x_1, y_1) = (1, 7)$

By using equation of line in slope-point form.

$$y - y_1 = m(x - x_1)$$

$$y - 7 = 2(x - 1)$$

$$y - 7 = 2x - 2$$

$$\therefore \quad 2x - 2 - y + 7 = 0$$

$$\therefore \quad \mathbf{2x - y + 5 = 0}$$

Two point form: The equation of line passing through the point $A(x_1, y_1)$ and $B(x_2, y_2)$ is given by $\frac{y-y_1}{y_1-y_2} = \frac{x-x_1}{x_1-x_2}$

Solved Examples

1)Find the equation of straight line passes through the points (3, 5) and (4, 6).

Solution :

Equation of line is, $\frac{y-y_1}{y_1-y_2} = \frac{x-x_1}{x_1-x_2}$

$\therefore \quad \frac{y-5}{5-6} = \frac{x-3}{3-4}$

$\therefore \quad \frac{y-5}{-1} = \frac{x-3}{-1}$

$\therefore \quad x - y + 2 = 0$

2)Find the equation of straight line passes through the points $(-4, 6)$ and $(8, -3)$.

Solution : Let the given point $A(x_1, y_1) = (-4, 6)$ and $B(x_2, y_2) = (8, -3)$.

By using equation of line in two point form

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

$$\therefore \quad \frac{y - 6}{6 - (-3)} = \frac{x - (-4)}{(-4 - 8)}$$

$$\therefore \quad \frac{y - 6}{9} = \frac{x + 4}{-12}$$

$$\therefore \quad -12(y - 6) = 9(x + 4)$$

$$\therefore \quad -12y + 72 = 9x + 36$$

$$\therefore \quad 9x + 12y + 36 - 72 = 0$$

$$\therefore \quad 9x + 12y - 36 = 0$$

$$\therefore \quad 3x + 4y - 12 = 0$$

Two -intercept form (Double intercept form): The equation of a line making intercepts a and b on the x-axis and y-axis respectively is $\frac{x}{a} + \frac{y}{b} = 1$

Solved Examples:

1) Find the equation of the line whose x-intercept is 3 and y intercept is 4.

Solution : Given x-intercept = a = 3

y-intercept = b = 4

By using equation of line in two intercept form.

$$\frac{x}{a} + \frac{y}{b} = 1$$

$$\therefore \quad \frac{x}{3} + \frac{y}{4} = 1$$

$$\therefore \quad \frac{4x + 3y}{12} = 1$$

$$\therefore \quad 4x + 3y = 12$$

$$\therefore \quad 4x + 3y - 12 = 0$$

2) Find the equation of the line whose x-intercept is 10 and y intercept is 3.

Solution : Given x-intercept = a = 10

y-intercept = b = 3

By using equation of line in two intercept form.

$$\frac{x}{a} + \frac{y}{b} = 1$$

$$\therefore \quad \frac{x}{10} + \frac{y}{3} = 1$$

$$\therefore \quad \frac{3x + 10y}{30} = 1$$

$$\therefore \quad 3x + 10y = 30$$

$$\therefore \quad 3x + 10y - 30 = 0$$

Summary

So today we learn-

- Slope-point form
- Two intercept form (Double intercept form)
- Two point form

.Quiz

1)Find the equation of straight line passes through the points (2, 3) and (1, - 1).

a) 4x +y – 5=0 b) 4x + y + 5=0 c) x –4y – 5=0 d) 4x – y – 5=0

2) Find y-intercept of the line 5x – 4y + 7 = 0

a) $\frac{7}{4}$ b) $\frac{5}{4}$ c) $\frac{3}{4}$ d) 8

Ans: 1. d) 2.a)

Thank You