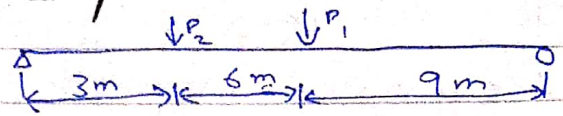
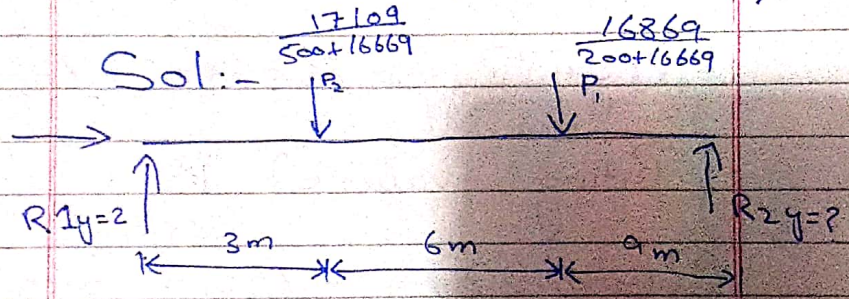
Name AFAQ AHMAD
ID 16669
Section - B
BE (civil)
Semsester 2nd
final term exam
Subject Mechanics
Date 27-6-2020

(Q No 1)



$(P_1 = 200 + 16669) + (P_2 = 500 + 16669)$

Sol:-



$R_1 y = 0$ ——— (1)

$\Sigma f_y = 0$

$R_{1y} + R_{2y} - 16869 - 17169$

$= 0$ — (ii)

$\Sigma F_y = 0$

$(R_{2y} \times 18) - (16869 \times 9) - (17169 \times 15)$ (iii) 20

$\Sigma M = 0$ at point (1)

$(R_{2y} \times 18) = (16869 \times 9) + (17169 \times 15)$

$151821 + 257535$

$R_{2y} \times 18 = 409356$

$R_{2y} = 22742\ N$

$R_{1y} + R_{2y} - 16869 - 17169$

Puting value of R_{2y}

$R_{1y} + 22742 - 16869 - 17169$

$R_{1y} + - 11296 = 0$

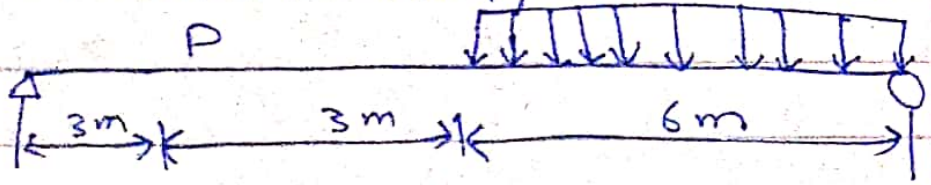
$R_{1y} = 11296N$

Now we have got $R_{1y} = 11296\ N$

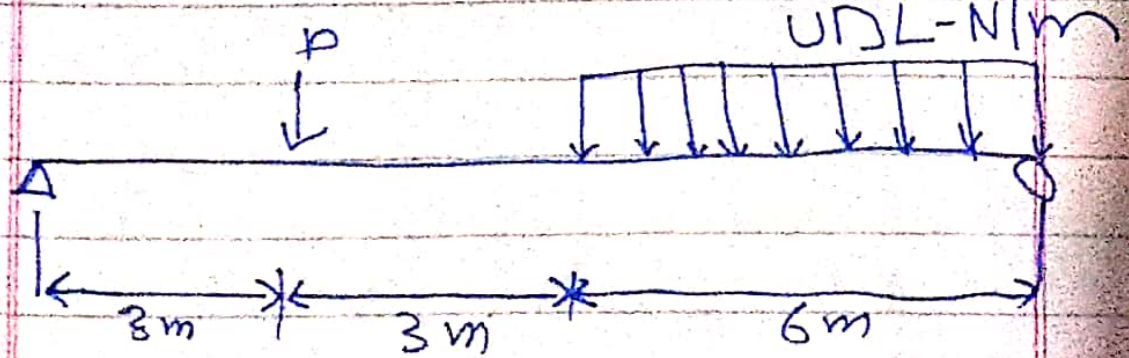
$R_{2y} = 22742\ N$

$R_{1x} = 0\ N.$

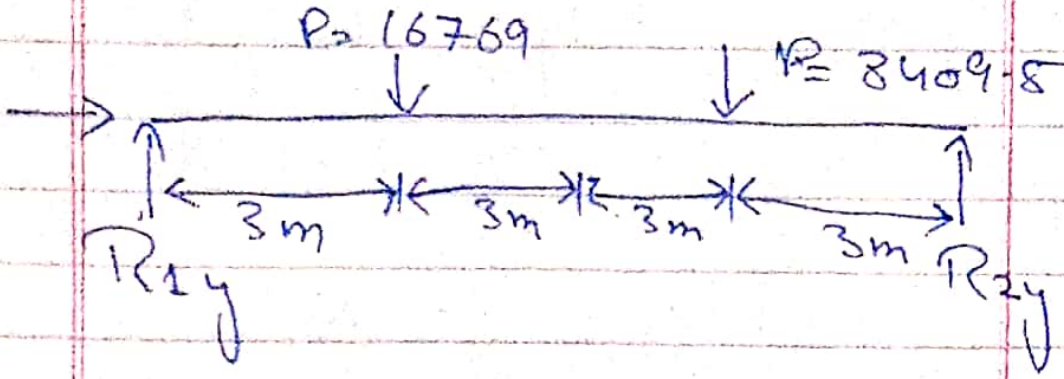
Q No 2:- Draw the neat shear force diagram, show all calculations (P = 100 + 16669) (UDL = 150 + 16669)

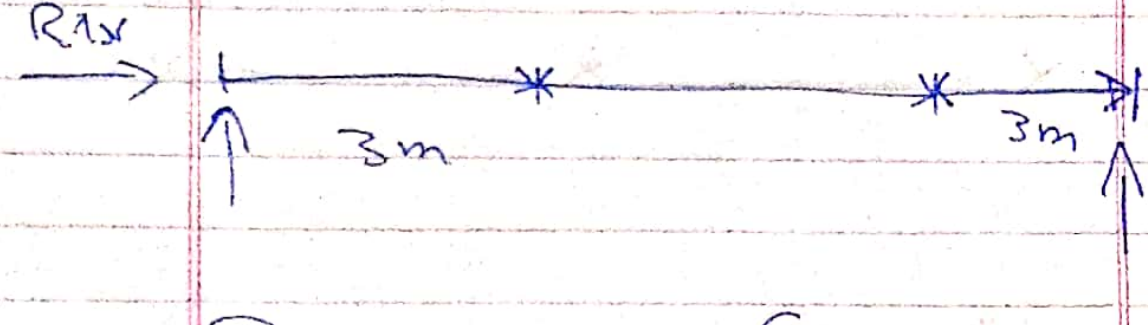


Sol:-



UDL = 150 + 16669 = 16819





$R_{1x} = 0$ —— (i) $\Sigma F_x = 0$

$R_{1y} + R_{2y} - 8409.5 - 16769 = 0$ —— (ii)

$(12 \times R_{2y}) - (8409.5 \times 3) - (16769 \times 9) = 0$ —— (iii)

$\Sigma M = 0$ at p (1)

$12\ R_{2y} = 25228.5 - 150921 = 0$

$R_{2y} = 14679.1\ N$

$R_{1y} = 8409.5 + 16769 - 14679.1$

$R_{1y} = 10499.4\ N$

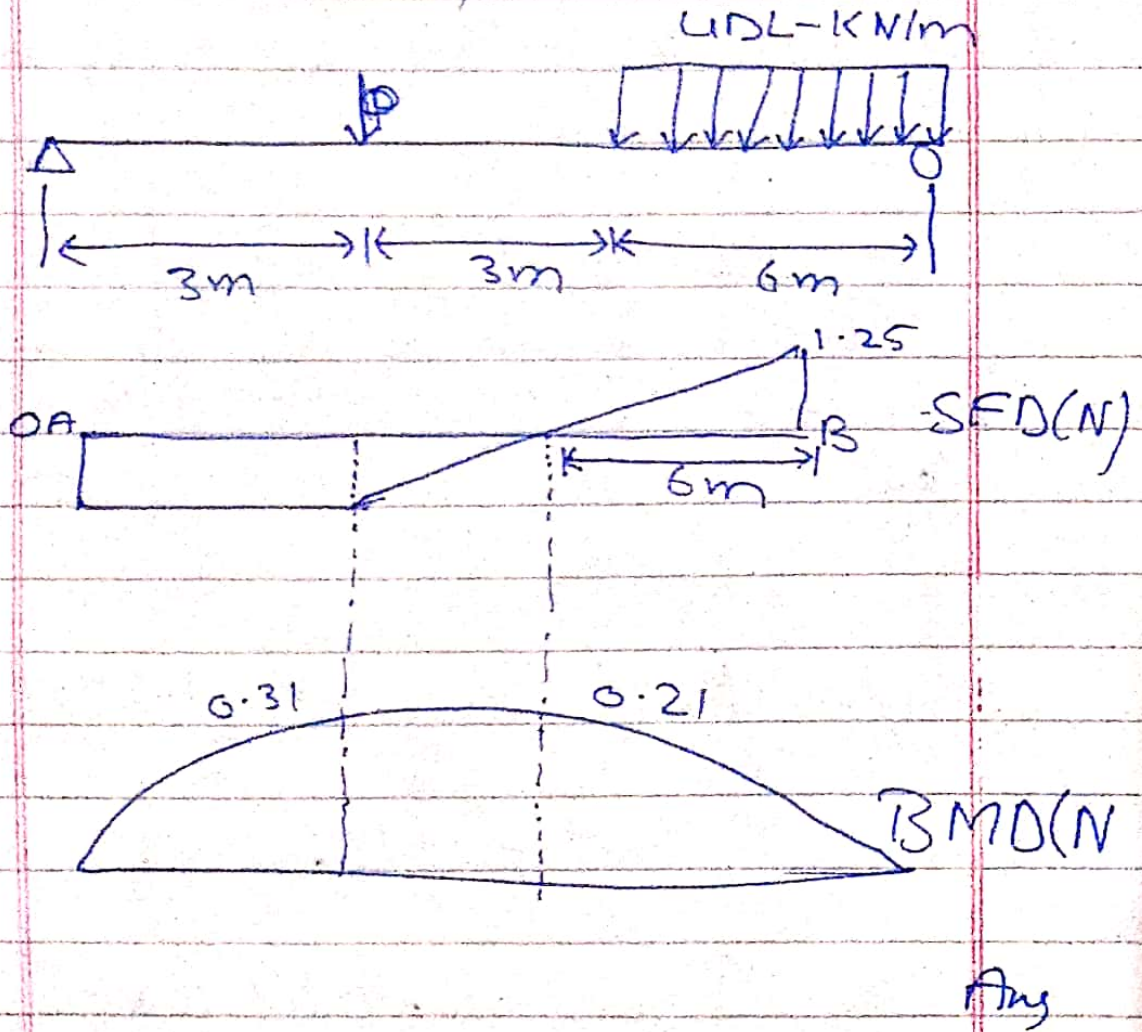
we got

$R_{1x} = 0N$

$R_{1y} = 10499.4N$

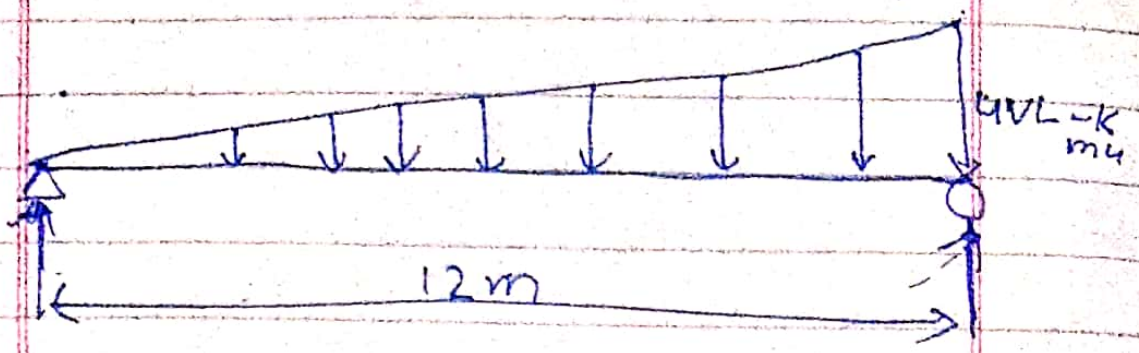
$R_{2y} = 14679.1N$

SFD & BMD



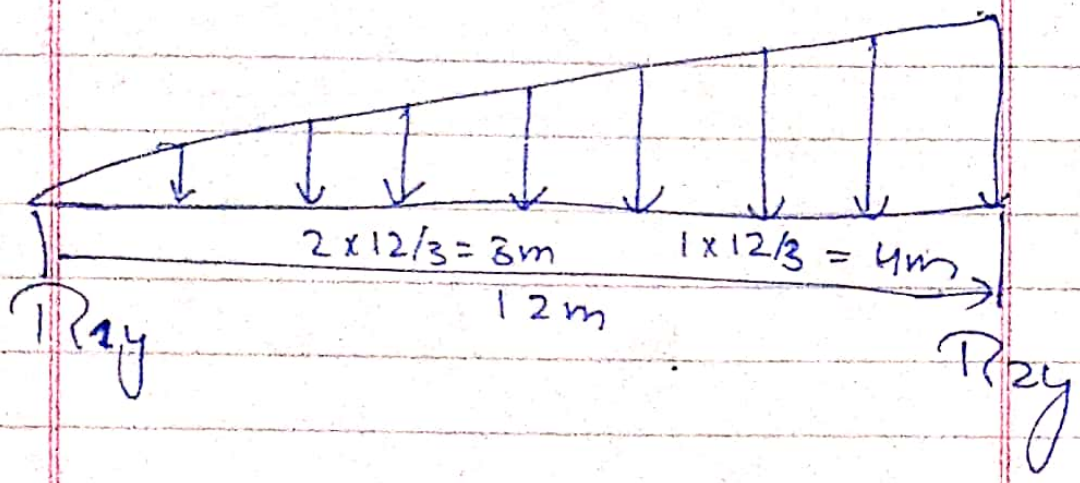
Ans

QNo 3:-3:-) (UVL= 16669/1000)



Sol:-

UVL = 16669/1000 = 16.669 KN/m



Resultant P= $\frac{\text{UVL} \times \text{Distance}}{2}$

$= \frac{16.669 \times 12}{2}$

P= 100.014 KN

as the load will act at 1/3 of legth from the maxim side.

$R_{1x} = 0$ — (i) $fx = 0$

$R_{1y} + R_{2y} - 100.014 = 0$ (ii) $fy = 0$

$(12 \times R_{2y}) - (100.014 \times 8) = 0$

$\Sigma M = 0$ at p1

$12 R_{2y} - 800.112 = 0$

$R_{2y} = 66.676$ KN.

$R_{1y} + R_{2y} - 100.014 = 0$

$R_{1y} + 66.676 - 100.014 = 0$

$R_{1y} = 33.338$ KN

Hence we have

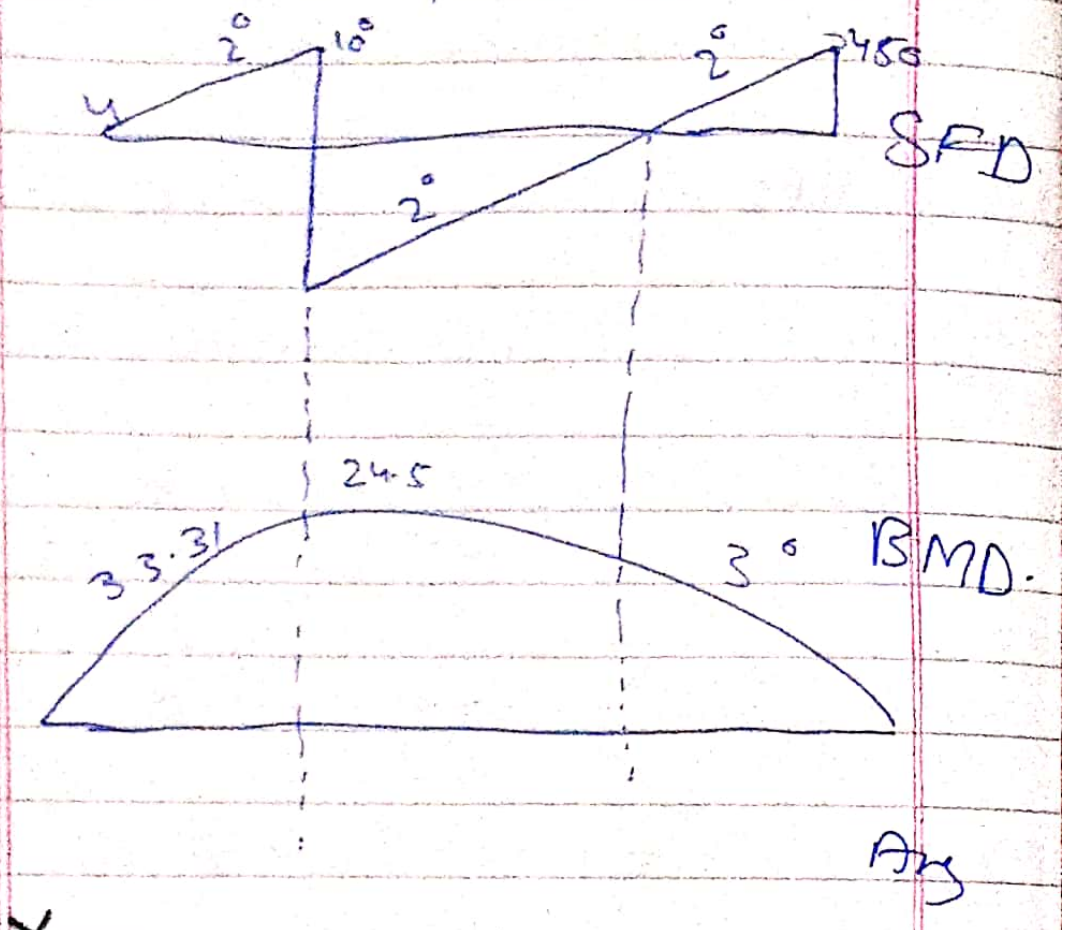
$R_{1x} = 0$ KN

$R_{1y} = 33.338$ KN

$R_{2y} = 66.676$ KN

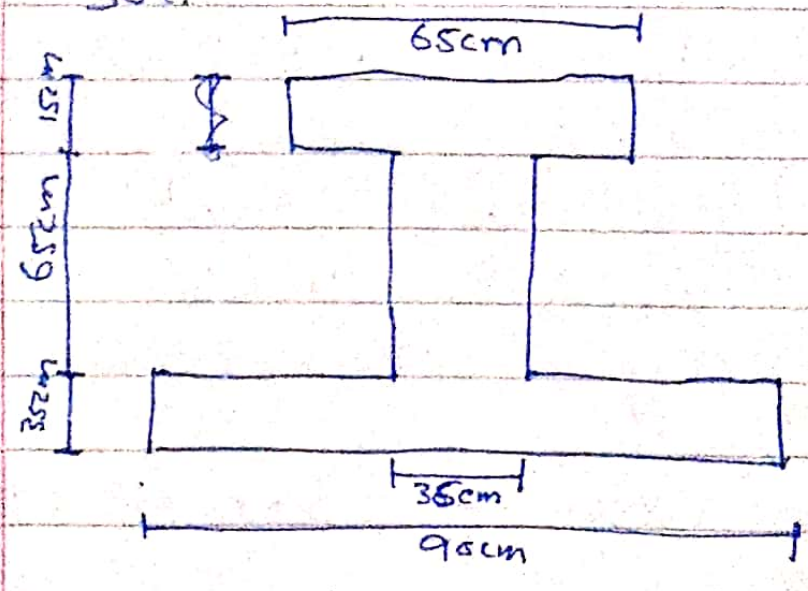
8

SFD & BMD 8-1



(Q No 4 (a))

Sol:-



Centroid for beam

$$\bar{y} = \frac{\Sigma A_j y_i}{\Sigma A_i}$$

A_i = The individual Segments area.

y_i = The invidual Segmt centroid distance.

Segment 1

$A_i = 65 \times 15 = 975\ cm$

$Y_i = 15 + 65 + 15 = 87.5$

Segment 2

$A_2 = 65 \times 35 = 2250\ cm^2$

$Y_2 = 35 + 65 + \frac{35}{2} = 117.1\ cm$

Segment 3

$A_2 = 90 \times 35 = 3150 cm^2$

$Y_3 = \frac{35}{2} = 17.5 cm^2$

Now put in formula

$$\bar{Y} = \frac{\Sigma A_i y_i}{\Sigma A_i}$$

$$\bar{Y} = \frac{(975 \times 87.5) + (2250 \times 11.75) + (3150 \times 17.5)}{975 + 2250 + 3150}$$

$\bar{Y} = 92.52$ cm.

(QNo 4 b)

Movement of ineig.

$$I = \frac{1}{2} b h^3$$

Alow find inertia at every semenf-s

Segment 1

$$I_1 = \frac{1}{2} 65 \times 115)^3$$

$$I_1 = 1096875 \text{ cm}^4$$

Segment 2

$$I_2 = \frac{1}{12} bh^3$$

$$I_2 = \frac{1}{12} \times 35 \times (65)^3$$

$$I_2 = 4805937.5 \text{ cm}^4$$

Segment=3

$$I_3 = \frac{1}{12} h b^3$$

$$I_3 = \frac{1}{2} \times 90 \times (35)^3$$

$$I_3 = 1929375 \text{ cm}^4$$

Total Interia

$\bar{I} = \bar{I}_1 + \bar{I}_2 + \bar{I}_3$

$\bar{I} = 109687.5 + 4505937.5$

$+ 1929375.2$

$\boxed{6845000}$ Ans.

Q No 5):

Ans Work:-

Work can be defined as transfer of energy. In physics we say that work is done on an object when you transfer energy to that object if one object transfers (gives) energy to second object, then the first object does work on the second object.

Work is the application of a force over a distance. Lifting a wight from the ground and putting it on a shelf is a good example of work. The force is equal to the wight of the object

and the distance is equal to the height of shelf (w=fxd).

Work-Energy Principle:-

The change in the Kinetic energy of an object is equal to net work done on the object.

Work example:-

1. To lift something from ground is the perfect example of work.

2. Driving a car Through Certain distance is also example of work.

Energy:-

Can be defind as the capactiy for doing work. The simplest case of mechanical works is when an object is standing still and we force it to kinetic energy. For an object of mass m, moving with velocity of magnitude v_1 this energy can

be calculated from the formula $E = 1/2 mv^2$.

Types of Energy

There two types of energy in many forms:

Kinetic Energy = Energy of Motion-

Potential Energy: stored Energy-

Energy Example:-

1. Sun is the ultimate source of chemical energy this energy is used in plants photosynthesis-
2. The all daily life Electric Apparatus uses the Hydro Energy which

is Converted then In the Dam of Electric energy.

3 All the fuel are Source of chemical energy which is used as Mechanical energy by Vehicles.

Power:-

Power is the work done in a unit of time. In other words, power is a measure of how quickly work can be done. The unit of powe is we watt = 1 joule/ Second.

One Common unit of energy is the Kilowatt-hour (KWh).

if we are using one KW of power, a KWh of energy will last one hour.-

Example power:-

Power shows the effeciency of Energy that how can it work.

1. The speed of car is the power chemical power

2. The movement of Fan by which it provides air is the perfect example.. of electrical and Mechanical power.

3. The Distrustion of Atomic bomb and other explossive material is Due to nuclear power.