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I.D:- 16212

Section:- B

Subject:- Engineering Mechanics

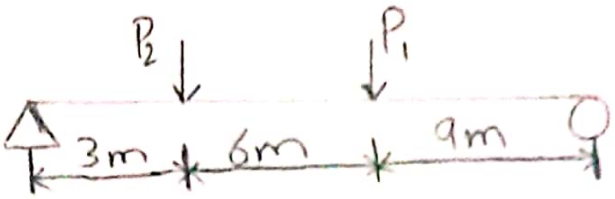
Department of Civil Engineering

2nd Semester

Final Term Paper

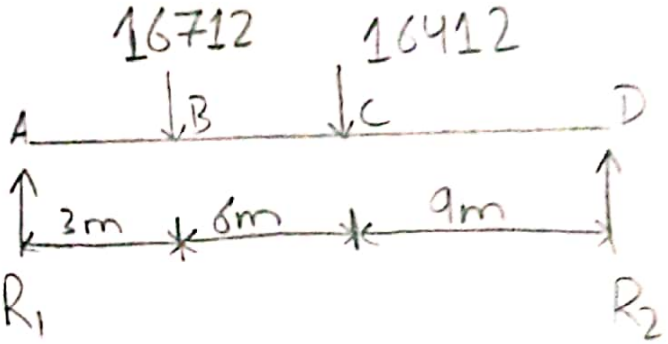
Submitted To:- Sir Majid Naeem

QUESTION#1



Sol:- $P_1 = 200 + 16212 = 16412$

$P_2 = 500 + 16212 = 16712$



$\sum M_A = 0$ (+ ↷ , − ↶)

$-R_2 \times 18 + 16412 \times 9 + 16712 \times 3 = 0$

$18R_2 = 197844$

$R_2 = 10991.33$ Newton

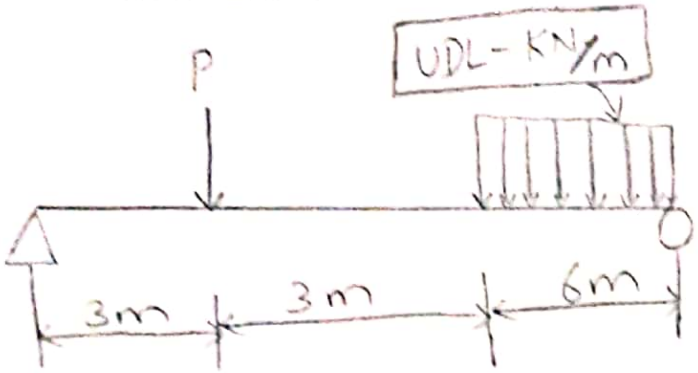
$\sum M_B = 0$ (+ ↷ , − ↶)

$R_1 \times 18 - 16712 \times 15 - 16412 \times 9 = 0$

$18R_1 = -398388$

$R_1 = 22132.66$ Newton

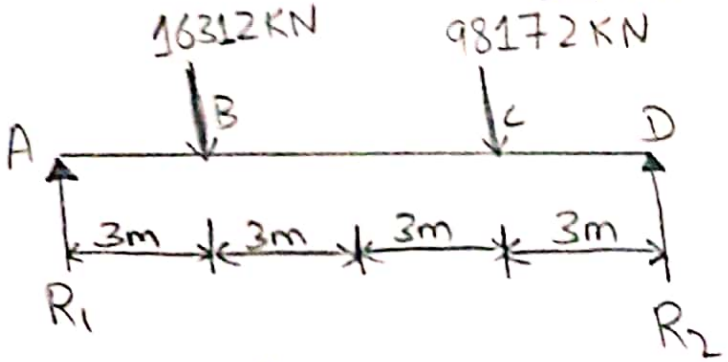
QUESTION#2



$P = 100 + 16212 = 16312\ KN$

$UDL = 150 + 16212 = 16362\ KN/m$

$16362 \times 6 = 98172\ KN$



$\sum M_A = 0$ (+ ↻ , − ↺)

$-R_2 \times 12 + 98172 \times 9 + 16312 \times 3 = 0$

$12R_2 = 932484$

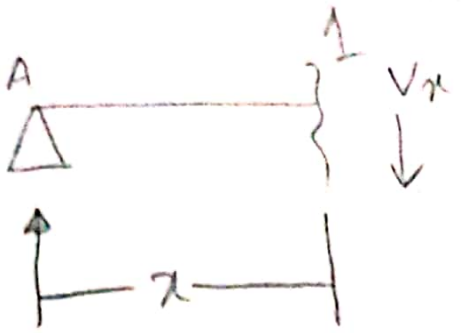
$R_2 = 77707\ KN$

$\sum M_B = 0$ (+ ↻ , − ↺)

$-R_1 \times 12 - 16312 \times 9 - 98172 \times 3 = 0$

$12R_1 = 441324$

$R_1 = 36777\ KN$



$R_1 = 36777$

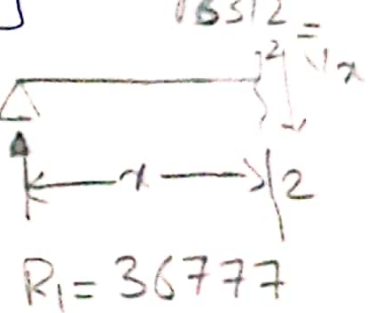
Origin A limit $[0 \leq x \leq 6]$

$\Sigma F_y = 0$ ↑+ , ↓-

$R_1 - Vx = 0$

$Vx = 36777\ KN$

Origin A limit $[3 \leq x \leq 6]$



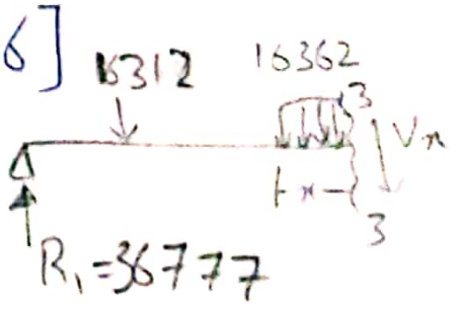
$\Sigma F_y =$ ↑+ , ↓-

$36777 - 16312 - Vx = 0$

$Vx = 20465KN$

$R_1 = 36777$

Origin A limit $[6 \leq x \leq 6]$



$\Sigma F_y = 0$ ↑+ , ↓-

$36777 - 16312 - 16362x$

$-Vx = 0$

$Vx = 20465 - 16362x$

$R_1 = 36777$

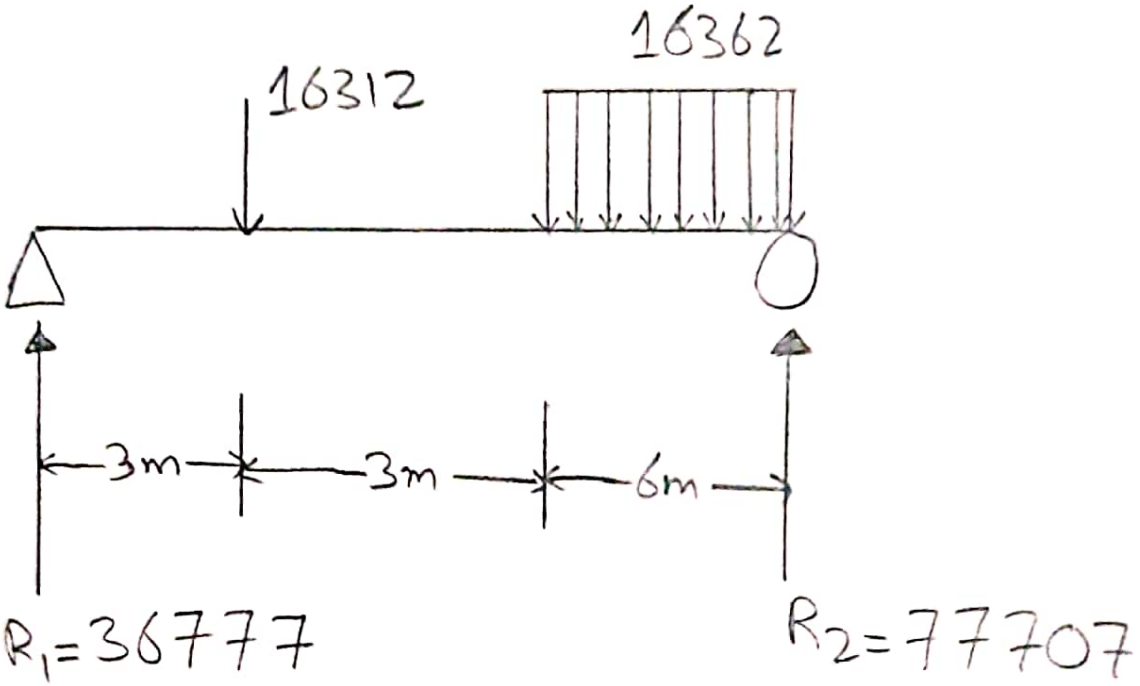
Put values of x

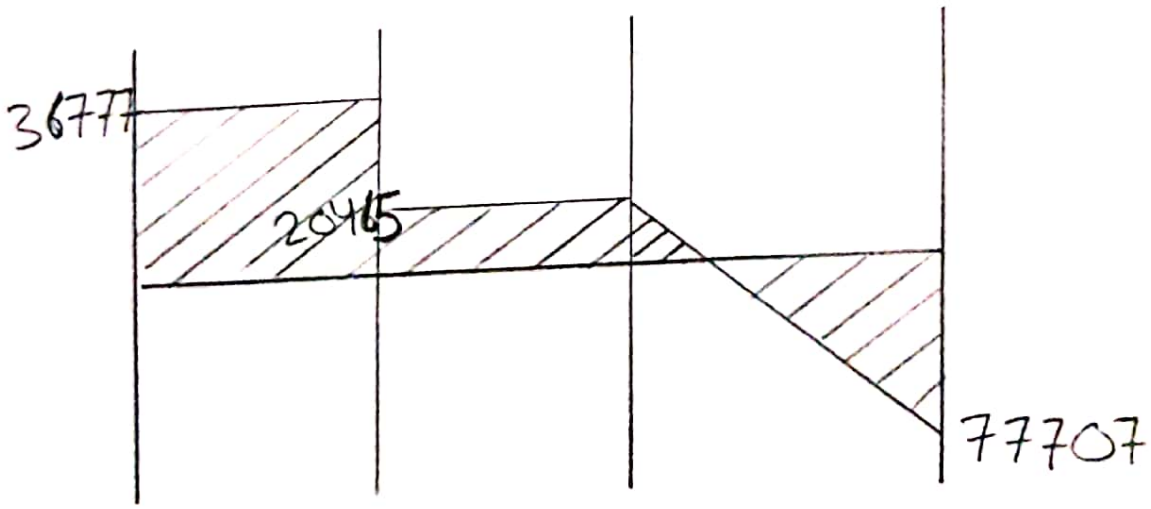
~~For x = 0~~

for 0 = 20465

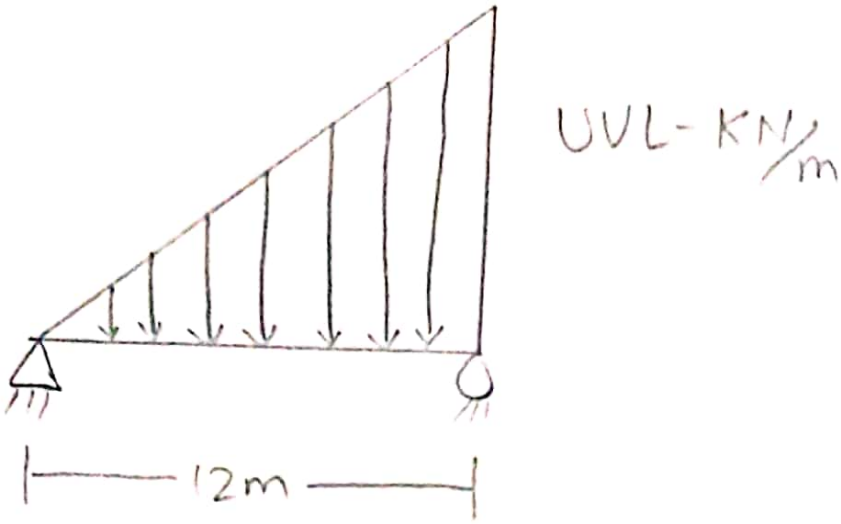
for 3 = -28621

for 6 = -77707





QUESTION #3



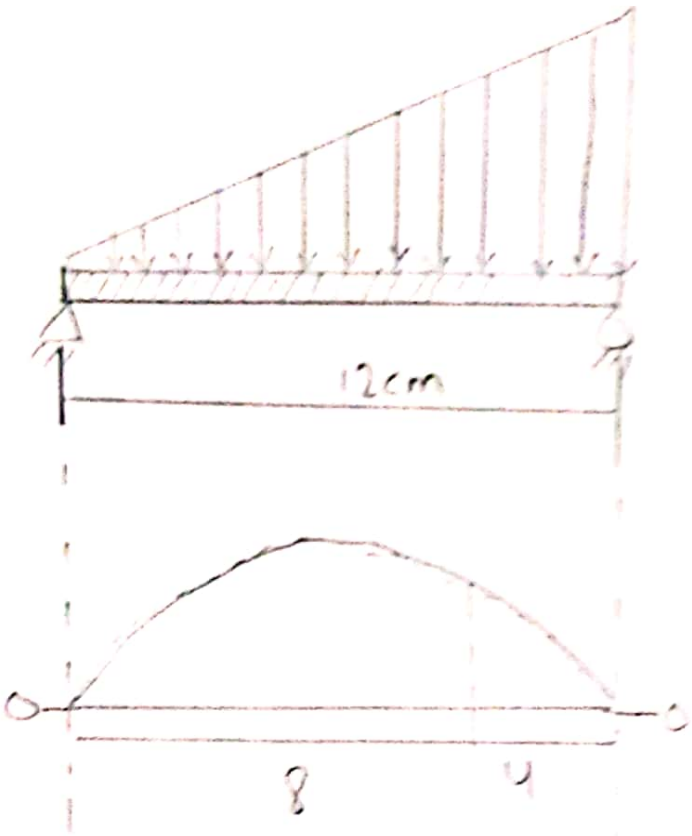
Sol:- $UVL = \frac{16212}{1000} = 16.212$

$\text{Area load} = \frac{16.212 \times 12}{2} = 97.272$

$\text{Distance} = \frac{2(12)}{3} = 8m$

$\Sigma M_A = 0$

$= 97.272 \times 8 = 778.176$



QUESTION#5

Work:-

Work is defined as the force causing movement or displacement of an object. In the case of constant force work is the product of the force acting on an object and the displacement caused by that force. Though both force and displacement are vector quantities. Work has no direction due to nature of a scalar product in vector.

Examples of Work:-

Work has many examples in our every day life. Some of them are: A person pulling a door, a student lifting a bag, an athlete kicking a ball, a boy pushing a cart etc.

In general for work to occur, a force has to be exerted

causing something to move. So a frustrated person pushing against a wall does not do any work because the wall does not move.

Mathematical Form:-

$$W = F.d$$

Unit:-

The unit of work is joule.

Energy:-

The ability to do work is called energy. There are various forms of energy. Moreover heat and work i.e energy is the process of transfer from one form to another form and from one body to another body. Energy is always designed according to its nature. Hence heat transfer

may become thermal energy. while work done may manifest itself in the form of mechanical energy.

Examples of Energy:-

All forms of energy are associated with motion. for example any given body has kinetic energy if it is in motion. A tensioned device such as bow or spring though at rest, has a potential for creating motion. It contain potential energy because of its configuration. Similarly, nuclear energy is potential energy because it results from the configuration of subatomic particles in the nucleus of an atom.

Power:- Power can be defined as the rate of doing work. It is the work done in unit time. The SI unit for power is watt. (w) which is joule per second (J/sec). Sometimes the power of motor vehicles and other machines are given in terms of horsepower (hp) which is approximately equal to 745.7 watts. Power is always dependent on work done. So if a person does ~~not~~ work at different rates, his power also differs at different times.

Mathematical Form:-

$$P = \frac{w}{t}$$

$$\text{Power} = \frac{\text{work}}{\text{time}}$$

Unit:- The ~~unit~~ SI unit of Power is watt (w).

Example:- If person A takes 10 min to climb a tree and person B takes 5 min to climb the same tree. We say that person B is more powerful.