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REVIEW ARTICLE

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A NOVICE APPROACH TO SOLVE THE ENGINEERING / TECHNOLOGY PROBLEMS WITH THE MOST UPDATED TOOLS

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ABSTRACT

This research paper tries to put forth a new concept the study of the Engineering Mechanics by applying the latest online tools available on the web for solving the numerical concerning the problems of the same . The tools that had been applied here show how to reduce the processes of solving the concepts and the problems, thus reducing the duration and the efforts required concerning the same .

Keywords : Online Calculators

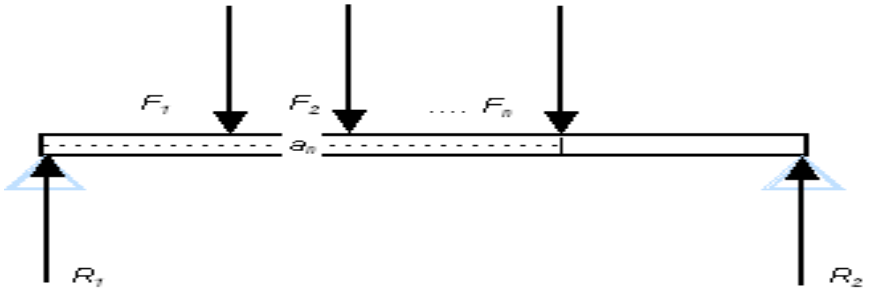
INTRODUCTION

A methodology has been presented here by which the even a worker at the floor level would also be able to solve the numerical concerning the basic engineering principles in the most effective , easiest and efficient manner within the least time possible .

A numerical problem had been considered which had been solved in both the ways ,one through the manual procedure of putting all the formula and the steps sequentially and the other approach by using the online calculator wherein only the data are entered into the online calculator and the results are generated automatically .

LITERATURE

Let us solve a question manually , while solving the question manually , the solution has the below mentioned procedure / steps .



engineeringtoolbox.com

For a beam in balance loaded with weights (or other load forces) the reactions forces - *R* - at the supports equals the load forces - *F*. The force balancecan be expressed as

$F_1 + F_2 + ... + F_n = R_1 + R_2$ *(1) where F = force from load (N, lb$_f$) R = force from support (N, lb$_f$)*

In addition for a beam in balance the algebraic sum of moments equals zero. The moment balance can be expressed as $F_1 a_{f1} + F_2 a_{f2} + ... + F_n a_{fn} = R a_{r1} + R a_{r2}$ *(2)*

Where a = the distance from the force to a common reference - usually the distance to one of the supports (m, ft)

1) *Example - A beam with two symmetrical loads*

A 10 m long beam with two supports is loaded with two equal and symmetrical loads F_1 and F_2 , each *500 kg*. The support forces F_3 and F_4 can be calculated

$(500\ kg)(9.81\ m/s^2) + (500\ kg)(9.81\ m/s^2) = R_1 + R_2 \Rightarrow R_1 + R_2 = \underline{9810}\ (N)$

Note! Load due to the weight of a mass - *m* - is *mg* Newton's - where $g = 9.81\ m/s^2$.

With symmetrical and equal loads the support forces also will be symmetrical and equal. Using $R_1 = R_2$ the equation above can be simplified to $R_1 = R_2 = (9810\ N) / 2 = \underline{4905}\ N$

2) *Example - A beam with two not symmetrical loads*

A 10 m long beam with two supports is loaded with two loads, *500 kg* is located *1 m* from the end (R_1), and the other load of *1000 kg* is located *6 m* from the same end. The balance of forces can be expressed as

$(500\ kg)(9.81\ m/s^2) + (1000\ kg)(9.81\ m/s^2) = R_1 + R_2$

⇨ $R_1 + R_2 = \underline{14715}\ (N)$ The algebraic sum of moments (2) can be expressed as

$(500\ kg)(9.81\ m/s^2)(1\ m) + (1000\ kg)(9.81\ m/s^2)(6\ m) = ?R_1(0\ m) + R_2(10\ m) \Rightarrow R_2 = \underline{6377}\ (N)$ F_3 can be calculated as: $R_1 = (14715\ N) - (6377\ N) = \underline{8338}\ N$

Let us solve the same question using the online tools , while solving the question online , the solution has the below mentioned procedure / steps .

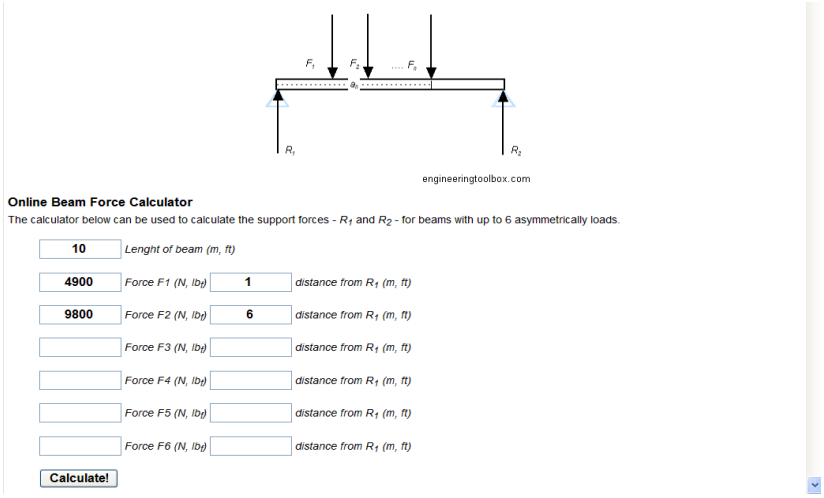
Length of the Beam = 10 meters

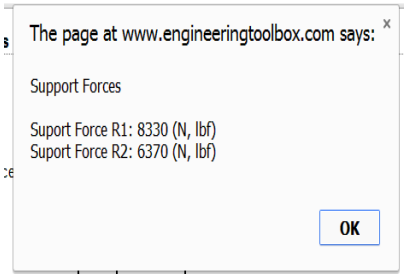
A force of (500 * 9.8) N –acting at a distance of 1 meter.

CONCLUSION:

1. The online method of solving the numerical problem also shows the same results and ultimately could be tried out for solving many problems during the field works in the least time with the same accuracy and moreover the complete data could be obtained paperless also .
2. The only requirement is to insert the data and to click calculate , so that the results are obtained automatically .

Another force of (1000 * 9.8) N –Acting at a distance of 6 meters .





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3. http://www.cbmapps.com/
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5. http://www.engineeringtoolbox.com/beams-support-forces-d_1311.html

Additional Information(S):

1	http://www.efunda.com/calculator.cfm
2	http://sodaplay.com/creators/soda/items/constructor
	By altering physical properties like gravity, friction, and speed, curiously anthropomorphic models can be made to walk, climb, wriggle, jiggle, or collapse into a writhing heap.
3	http://www.diracdelta.co.uk/science/source/c/a/calculations/source.html#.UqldS9IW1FY
	Aerodynamics ,Algebra ,Architectural Accoustics ,Architecture ,Audio ,Automotives ,civil Engineering ,Classical Mechanics ,Electronics , Engines , Fluid Dynamics ,Geometry , Mathematics , Mechanical Engg. , Optics , Physics , Tools , Transport , Trigonometry , units .
4	http://kowalczuk_r.tripod.com/eng/static/simplbm3.xls
5	http://www.mesys.ch/?page_id=54&lang=en
	For the calculation of the Contact Stress .

6	http://www.mesys.ch/?page_id=152&lang=en
	For the Calculation of the Fits .
7	http://www.mesys.ch/?page_id=126&lang=en
	For the Calculation of the Deep Grove Ball Bearing .
8	https://www.efatigue.com/
	Fatigue Technologies[Constant Amplitude,VariableAmplitude,Finite Element Model,Multiaxial,Probabilistic,HighTemperature,WeldedStructures,CastIron,Small Defect ,√ Area]Utilities[Loading History,3D Viewer]Constant Amplitude[Fatigue Calculators,Stress-Life,Strain-Life,Crack Growth] Finders[Stress Concentration,StressIntensity,Materials]Technical Background Stress-Life[Strain-Life,Crack Growth]
9	http://www.engineersedge.com/Calulators_Online.htm
	Calculators for acceleration conversion, velocity conversion, energy to work conversion, area, triangle, square, circle etc., length conversion, fluids flow, aerodynamics , mass conversion, automotive horsepower, power conversion, kinetic energy, pressure conversion, tolerance calculator (fixed fastener), temperature conversion, tolerance calculator (projection zone), tolerance calculator (2 mating features @ MMC), metrology conversion.
10	http://www.the-engineering-page.com/nav/pump.html
	Online engineering calculations for pressure drop, line sizing, pump applications, centrifugal pump sizing and heat exchangers including thermal rating.
11	http://www.soft4structures.com/products.html
	collection of powerful and easy to use online calculations and models: beams, trusses, plates and shells.
12	http://www.novelconceptsinc.com/calculators.htm
	1 & 2-D steady state conduction & capacitance calculators for various geometries.
13	http://www.firecad.net/Boiler-Calculations/
	Combustion Calculations,EfficiencyCalculations,%Volume to % Wt conversion,%Wt to % volconversion,GasProperties,WaterProperties,Steam Properties
14	http://www.poweresim.com/
	Online power supply simulation software severe restrictions for non-registered users to only the automatic design feature, Magnetic Builder, loop analysis & loss analysis.
15	http://www.buildingsguide.com/calculators/structural/
	Structural CalcMain,Snow Loading Analysis,Ice Loading (WT, MT & ST), Ice Loading (W, M, S & HP),Ice Loading (C & MC),Seismic Base Shear,Wind LoadingThermal EffectsBeam on Elastic Foundation,Concrete Slab on Grade, Axial Load CapacitiesSteel Beam Web Stiffener,Steel Beam & Column Analysis, Steel Joist Analysis,X-Braced Bent Analysis.
16	http://en.sopromat.org/2009/
	2D truss & frame element FEA