calculatoratoz.com unitsconverters.com

Design of Curved Beams Formulas

Calculators! Examples! Conversions!

Bookmark **calculatoratoz.com**, **unitsconverters.com**

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

Please leave your feedback here...

List of 20 Design of Curved Beams Formulas

Design of Curved Beams

1) Area of cross section of curved beam given bending stress at inner fiber

Open Calculator

fx $$A = \frac{M_b \cdot h_i}{e \cdot (\sigma_b i) \cdot R_i}$$

ex $$896.2693\text{mm}^2 = \frac{985000\text{N*mm} \cdot 10\text{mm}}{2\text{mm} \cdot 78.5\text{N/mm}^2 \cdot 70\text{mm}}$$

2) Area of cross section of curved beam given bending stress at outer fiber

Open Calculator

fx $$A = \frac{M_b \cdot h_o}{e \cdot (\sigma_b o) \cdot R_o}$$

ex $$772.549\text{mm}^2 = \frac{985000\text{N*mm} \cdot 12\text{mm}}{2\text{mm} \cdot 85\text{N/mm}^2 \cdot 90\text{mm}}$$

3) Bending moment at fibre of curved beam given bending stress and eccentricity

Open Calculator

fx $$M_b = \frac{\sigma_b \cdot (A \cdot (R - R_N) \cdot e)}{y}$$

ex $$2422.857\text{N*mm} = \frac{53\text{N/mm}^2 \cdot (240\text{mm}^2 \cdot (80\text{mm} - 78\text{mm}) \cdot 2\text{mm})}{21\text{mm}}$$

4) Bending moment at fibre of curved beam given bending stress and radius of centroidal axis

Open Calculator

fx $$M_b = \frac{\sigma_b \cdot (A \cdot (R - R_N) \cdot (R_N - y))}{y}$$

ex $$69051.43\text{N*mm} = \frac{53\text{N/mm}^2 \cdot (240\text{mm}^2 \cdot (80\text{mm} - 78\text{mm}) \cdot (78\text{mm} - 21\text{mm}))}{21\text{mm}}$$

5) Bending moment in curved beam given bending stress at inner fibre

Open Calculator

fx $$M_b = \frac{(\sigma_b i) \cdot A \cdot e \cdot R_i}{h_i}$$

ex $$263760\text{N*mm} = \frac{78.5\text{N/mm}^2 \cdot 240\text{mm}^2 \cdot 2\text{mm} \cdot 70\text{mm}}{10\text{mm}}$$

6) Bending moment in curved beam given bending stress at outer fibre

Open Calculator

fx $$M_b = \frac{(\sigma_b o) \cdot (A) \cdot e \cdot (R_o)}{h_o}$$

ex $$306000\text{N*mm} = \frac{85\text{N/mm}^2 \cdot (240\text{mm}^2) \cdot 2\text{mm} \cdot (90\text{mm})}{12\text{mm}}$$

7) Bending stress at inner fibre of curved beam given bending moment

Open Calculator

fx $$(\sigma_b i) = \frac{M_b \cdot h_i}{(A) \cdot e \cdot (R_i)}$$

ex $$293.1548\text{N/mm}^2 = \frac{985000\text{N*mm} \cdot 10\text{mm}}{(240\text{mm}^2) \cdot 2\text{mm} \cdot (70\text{mm})}$$

8) Bending stress at outer fibre of curved beam given bending moment

Open Calculator

fx $$(\sigma_b o) = \frac{M_b \cdot h_o}{(A) \cdot e \cdot (R_o)}$$

ex $$273.6111\text{N/mm}^2 = \frac{985000\text{N*mm} \cdot 12\text{mm}}{(240\text{mm}^2) \cdot 2\text{mm} \cdot (90\text{mm})}$$

9) Bending stress in fiber of curved beam

Open Calculator

fx $$\sigma_b = \frac{M_b \cdot y}{A \cdot (e) \cdot (R_N - y)}$$

ex $$756.0307\text{N/mm}^2 = \frac{985000\text{N*mm} \cdot 21\text{mm}}{240\text{mm}^2 \cdot (2\text{mm}) \cdot (78\text{mm} - 21\text{mm})}$$

10) Bending stress in fibre of curved beam given eccentricity

Open Calculator

fx $$\sigma_b = \left(\frac{M_b \cdot y}{A \cdot (e) \cdot (R_N - y)}\right)$$

ex $$756.0307\text{N/mm}^2 = \left(\frac{985000\text{N*mm} \cdot 21\text{mm}}{240\text{mm}^2 \cdot (2\text{mm}) \cdot (78\text{mm} - 21\text{mm})}\right)$$

11) Bending stress in fibre of curved beam given radius of centroidal axis

Open Calculator

fx $$\sigma_b = \left(\frac{M_b \cdot y}{A \cdot (R - R_N) \cdot (R_N - y)}\right)$$

ex $$756.0307\text{N/mm}^2 = \left(\frac{985000\text{N*mm} \cdot 21\text{mm}}{240\text{mm}^2 \cdot (80\text{mm} - 78\text{mm}) \cdot (78\text{mm} - 21\text{mm})}\right)$$

12) Diameter of circular curved beam given radius of centroidal axis

Open Calculator

fx $d = 2 \cdot (R - R_i)$

ex $20\text{mm} = 2 \cdot (80\text{mm} - 70\text{mm})$

13) Distance of fibre from neutral axis of rectangular curved beam given inner and outer fiber radius

Open Calculator

fx $y = (R_i) \cdot \ln\left(\frac{R_o}{R_i}\right)$

ex $17.59201\text{mm} = (70\text{mm}) \cdot \ln\left(\frac{90\text{mm}}{70\text{mm}}\right)$

14) Distance of fibre from neutral axis of rectangular curved beam given radius of centroidal axis

Open Calculator

fx $y = 2 \cdot (R - R_i)$

ex $20\text{mm} = 2 \cdot (80\text{mm} - 70\text{mm})$

15) Distance of inner fiber from neutral axis of curved beam given bending stress at fibre

Open Calculator

fx $h_i = \frac{(\sigma_b i) \cdot (A) \cdot e \cdot (R_i)}{M_b}$

ex $2.677766\text{mm} = \frac{78.5\text{N/mm}^2 \cdot (240\text{mm}^2) \cdot 2\text{mm} \cdot (70\text{mm})}{985000\text{N*mm}}$

16) Distance of outer fibre from neutral axis of curved beam given bending stress at fibre

Open Calculator

fx $$h_o = \frac{(\sigma_b o) \cdot (A) \cdot e \cdot (R_o)}{M_b}$$

ex $$3.727919\text{mm} = \frac{85\text{N/mm}^2 \cdot (240\text{mm}^2) \cdot 2\text{mm} \cdot (90\text{mm})}{985000\text{N*mm}}$$

17) Eccentricity between central and neutral axis of curved beam

Open Calculator

fx $$e = R - R_N$$

ex $$2\text{mm} = 80\text{mm} - 78\text{mm}$$

18) Eccentricity between centroidal and neutral axis of curved beam given bending stress at inner fibre

Open Calculator

fx $$e = \frac{M_b \cdot h_i}{(A) \cdot (\sigma_b i) \cdot (R_i)}$$

ex $$7.468911\text{mm} = \frac{985000\text{N*mm} \cdot 10\text{mm}}{(240\text{mm}^2) \cdot 78.5\text{N/mm}^2 \cdot (70\text{mm})}$$

19) Eccentricity between centroidal and neutral axis of curved beam given bending stress at outer fibre

Open Calculator

fx $$e = \frac{M_b \cdot h_o}{(A) \cdot (\sigma_b o) \cdot (R_o)}$$

ex $$6.437908\text{mm} = \frac{985000\text{N*mm} \cdot 12\text{mm}}{(240\text{mm}^2) \cdot 85\text{N/mm}^2 \cdot (90\text{mm})}$$

20) Eccentricity between centroidal and neutral axis of curved beam given radius of both axis

Open Calculator

fx $e = R - R_N$

ex $2\text{mm} = 80\text{mm} - 78\text{mm}$

Variables Used

- **A** Cross Sectional Area of Curved Beam *(Square Millimeter)*
- **d** Diameter of Circular Curved Beam *(Millimeter)*
- **e** Eccentricity Between Centroidal and Neutral Axis *(Millimeter)*
- h_i Distance of Inner Fibre from Neutral Axis *(Millimeter)*
- h_o Distance of Outer Fibre from Neutral Axis *(Millimeter)*
- M_b Bending Moment in Curved Beam *(Newton Millimeter)*
- **R** Radius of Centroidal Axis *(Millimeter)*
- R_i Radius of Inner Fibre *(Millimeter)*
- R_N Radius of Neutral Axis *(Millimeter)*
- R_o Radius of Outer Fibre *(Millimeter)*
- **y** Distance from Neutral Axis of Curved Beam *(Millimeter)*
- σ_b Bending Stress *(Newton per Square Millimeter)*
- σ_bi Bending Stress at Inner Fibre *(Newton per Square Millimeter)*
- σ_bo Bending Stress at Outer Fibre *(Newton per Square Millimeter)*

Constants, Functions, Measurements used

- Function: **ln**, ln(Number)
  The natural logarithm, also known as the logarithm to the base e, is the inverse function of the natural exponential function.
- Measurement: **Length** in Millimeter (mm)
  Length Unit Conversion
- Measurement: **Area** in Square Millimeter (mm²)
  Area Unit Conversion
- Measurement: **Torque** in Newton Millimeter (N*mm)
  Torque Unit Conversion
- Measurement: **Stress** in Newton per Square Millimeter (N/mm²)
  Stress Unit Conversion

Check other formula lists

- **Design of Curved Beams Formulas**

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

11/19/2024 | 4:18:54 PM UTC *Please leave your feedback here...*