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**Programed B.Tech Civil ii Semester**

**Subject Mechanics of Material.**

**Submitted to Engr Marvan Raza**

**Exam Final Term**

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**Q no 1 Ans =**

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$$∝ -11.7 Km \left(MC°\right)and 250 Gpa$$

Temp = 25cº

$$δT=3mm at temprature$$

$$δT= ∝L\left(∆T\right) formula$$

$$=\left(∆T=Tf-T1\right) put in formula formula$$

$$δT= ∝L\left(Tf-Ti\right)$$

3 = (11.7 x $10^{-6}) (10000)(Tf-25°)$

3 = (117000 x $10^{-6})(Tf-25°)$

$$\frac{δ}{0.117}= \frac{0.117}{0.117} \left(TF-25\right)$$

= $Tf-25°$ = 25.641

= Tf = 50.641

$$σ= δT$$

$$\frac{δ}{T}= ∝\left(∆T\right) formula$$

$$δ= ∝E\left(∆T\right)$$

$$δ=(11.7 x 10^{-6})(250 x 10G)( \left(50.641\right)-25°)$$

$$δ=\left(11.7 x 10^{-6}\right)250 x10G \left(250641\right)$$

$$δ=\left(11.7 x 10^{6} x 25\right)\left(25.641\right)$$

$$δ=7499.9925 x 10^{3 }Pa$$

**Q no 3 =**

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**Ans No 3 =**

**Given data =** External Diameter = 600 mm

 Internal Diameter = 300mm

 Twisting Moment = 60 kn-m

Span = 5 m

G =0.8 x $10^{3} N/mm^{2}$

$$θ= ? $$

Sol = Douter 600 x $10^{-3}=0.06$

Dinner = 300 x $10^{-3}$ = 0.03

Formula $\frac{T}{R} = \frac{Gθ}{I}$ T = Toque R = Radius G = Modula’s OF readies

 I = Inertia $θ =Angle of Teisting $

R = $\frac{D}{2 }= \frac{600}{2}=300m$

60 x $10^{3}= \frac{π}{16} x T x \frac{600^{4 }-300^{4}}{400}$

T = $\frac{60000}{π 1265625} $

**T =** 15.2 $N/mm^{2}$

Now putting the value

$$\frac{5.2 x 10^{3}}{300mm}= \frac{0.8 x 10^{3}θ}{5}$$

$$θ=\frac{5.2 x 10^{3} x 5}{300 x10^{-3} 0.8 x 10^{\begin{array}{c}3\\\end{array}}}$$

$$θ= \frac{\left(5.2\right)x(5)}{\left(0.3\right)X (0.8)}$$

$$θ=108.3°$$

**Q no 5 = Find Shear force and bending moment diagram of given beam?**

**Ans =**

 **Sol =**

$\sum\_{}^{}MA$ =0

 180 x 3 +RC (13) – 40 (15) = 0

 -540 + 13RC – 600 = 0

 RC = 87.69 KN

 EFY = 0

 RA + RC = 180+40

 RA =220 -87.69

 **RA= 132.31 KN (diagram of question no 5 is given below)**

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**Q no 2 =**

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**Ans Q no 2 =**

 **Sol =** $ ∆ T= -40c°-20c°$

 $∆T= -60° $

**Stress is not exceed 200mpa**

**Dmin =?** $∝ =11.7 \left(μm / m. c°\right)$

**E = 200 Gpa**

**P = 5000 N**

**Formula p = -**$πr^{2 }E α (∆T)$

$$\sqrt{\frac{P}{-πE x (∆T)}}= \sqrt{r^{2}}$$

**r =** $\sqrt{\frac{P}{-πE x (∆T)}}$

$\frac{D}{2}= \sqrt{\frac{-P}{∆E x ∆T}}$ **= 2** $\sqrt{\frac{-P}{∆E x ∆T}}$

**D = 2** $\sqrt{\frac{-P}{∆E x ∆T}}$

**D = 2** $\sqrt{\frac{+5000}{3.14 x 200 x 10^{3} x 11.7 x\left(+60\right)}}$

D = 1.1134 x $10^{-5}$

**D = 11.134 x** $10^{3}μm$

Q no 4 =

Q no Ans =

 

**Given Data** = Length = 30 fit

 E = 31000 ksi

 I = 1540

 Area = 160 $in^{2}$

To find critical buckling load = per

 Per =?

Slenderness Ratio = $λ$

Critical buckling load

**Formula** Per = $π^{2} EIL^{2}$

Per = $\left(3.14\right)^{2}\left(31000\right)\left(1540\right)\left(30\right) $

Per = $1.4 x 10^{10}$

Now I find Slenderness Ratio = $λ$

Formula $λ= \frac{L }{R }$ = $\frac{L}{\sqrt{\frac{I}{r}}}$

 $λ= \frac{30 }{3.1 }$ = $\frac{30}{\sqrt{\frac{1540}{160 }}}$ = 9.67 Ans