Enrollment No:-_____   Exam Seat No:-_____

C.U.SHAH UNIVERSITY
Summer-2015

Subject Code: 2TE04SOM1   **Subject Name: Strength of Materials**
Course Name: DIPLOMA (Civil)   Date: 19/5/2015
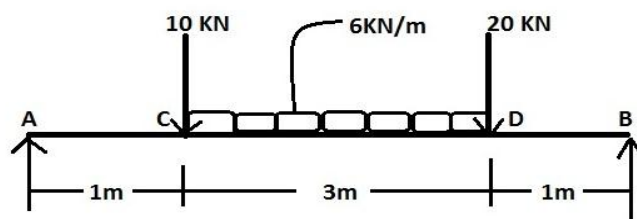Semester: IV   Marks: 70
      Time: 02:30 TO 05:30

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Instructions:
   1) Attempt all Questions in same answer book/Supplementary.
   2) Use of Programmable calculator & any other electronic instrument prohibited.
   3) Instructions written on main answer book are strictly to be obeyed.
   4) Draw neat diagrams & figures (if necessary) at right places.
   5) Assume suitable & perfect data if needed.

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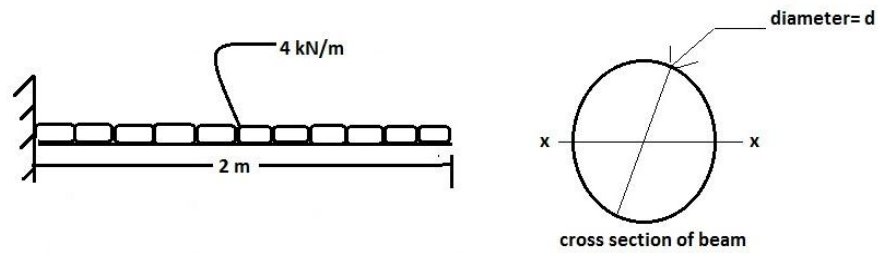|			
Q-1	(i)	Define: Section modulus	1
	(ii)	Define: Permissible bending stress	1
	(iii)	States difference between strut and column.	1
	(iv)	What is mean by eccentricity?	1
	(v)	Define: Angle of twist.	1
	(vi)	What is (a) beam and (b) support?	1
	(vii)	What are assumptions made in the Euler's theory?	2
	(viii)	States Mohr's theorem	2
	(ix)	Explain sign convention for shear force and bending moment.	2
	(x)	What is mean by (a) slopes and (b) deflection?	2

Attempt any four

Q-2 (a) Derive an equation for bending moment and shear force diagrams for simply supported beam subjected to uniformly distributed load. — 7

 (b) Draw shear force and bending moment diagram for a beam shown in figure — 7
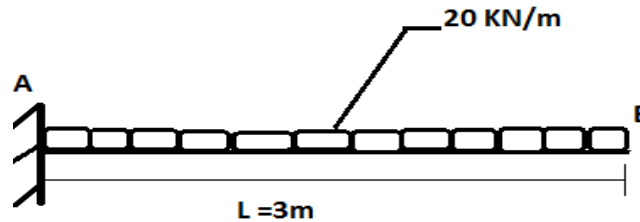

Q-3 (a) Explain theorems of parallel and perpendicular axes with some suitable example. — 7

 (b) 2m long cantilever carries UDL of 4KN/m on entire length. If maximum bending stress in the beam is 160 MPa; then find diameter of circular section for the beam. — 7
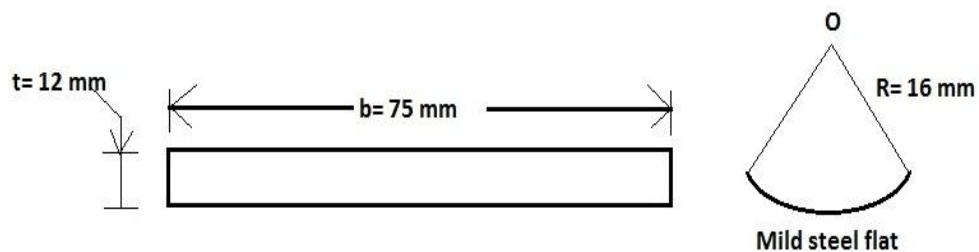
19-5

4 kN/m ... **2 m** ... **diameter= d** ... **x** — **x** ... **cross section of beam**

Q-4 (a) A u.d.l of 20kN/m is acting on a cantilever beam of length 3.0m calculate the deflection of the beam at the free end. Take $E=2*10^5 \, N/mm^2$ & $I=200 \, cm^4$. **5**

20 KN/m

A **B**

L =3m

(b) What are assumptions made in the theory of simple bending? **5**

(c) Explain sagging moment and hogging moment with figure. **4**

Q-5 (a) Derive formula for slopes & deflection for simply supported beam with a central point load by moment area method. **7**

(b) Derive equation for strength of solid shaft. **7**

Q-6 (a) A shaft 50mm in diameter rotates at speed of 150rpm. Calculate the power transmitted by shaft if maximum permissible stress is 80MPa. **7**

(b) Explain limitation of Euler's formula. Also explain how their limitation shall be overcome by Rankin's formula. Derive it. **7**

Q-7 (a) For a given stress, compare moment of resistance of a beam of a square section when placed **7**

   (i) With its two sides horizontal and

   (ii) With its diagonal horizontal.

(b) Explain types of load. **7**

Q-8 (a) 75mm wide and 12mm thick steel flat is bent is a circular from of 16m radius by applying couple at its ends. Determine the maximum stress developed and amount couple. Take E=200 GPa. **7**

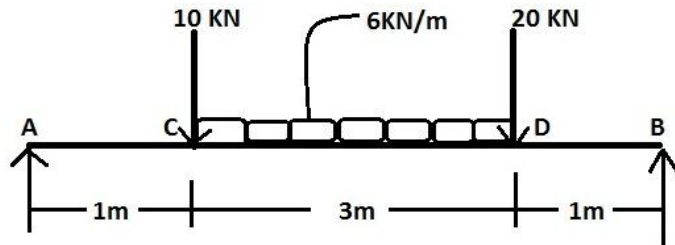**t= 12 mm** ... **b= 75 mm** ... **O** ... **R= 16 mm** ... **Mild steel flat**

(b) Derive equation for stresses (Direct and bending) for symmetrical column with eccentric loading about one axis. **7**
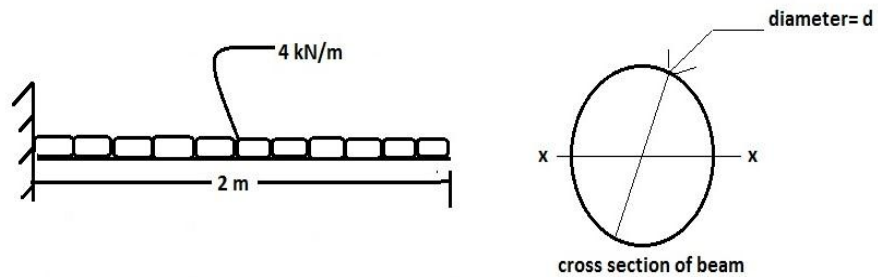
19-5

p/-1 (i) VyaaQya Aapo: seKxn moD\yulx.   1
  (ii) VyaaQya Aapo: SvIkayR beiND>g S3/\es.   1
  (iii) S3/\3 Ane kolm vCce tfavt Aapo.   1
  (iv)]TkeNd/\ta no A4R xu 4ay?   1
  (v) VyaaQya Aapo: mroD ko`.   1
  (vi) A.bIm Ae3le xu? b.Aa2ar Ae3le xu?   1
  (vii) YauilAr na is@2a>tma 2ar`aAo xu 0e?   2
 (viii) Maohrna p/mey dxaRvo.   2
  (ix) ktRnb5 Ane nmn2U`R ma3e ich\n p/`aII smjavo.   2
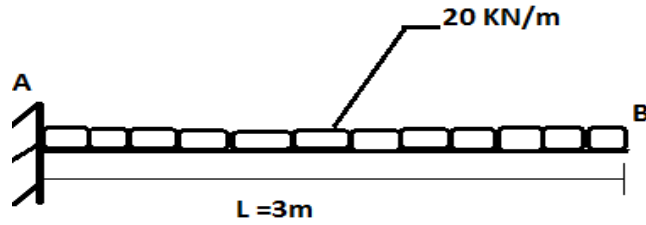 (x) A.!a5 b.iVacln no A4R xu 4ay?   2

Ko[p` car p/&nna jvab Aapo

p/-2 (A) Saadl rIte 3ekvel bIm jena pr smivtrIt war Aai2n 0e, na ma3e ktRnb5 Ane nmn6U`R Aaleq ma3enu SamIkr` tarvo.   7

  (b) NaIce dxaRvel bIm ma3e ktRnb5 Ane nmn2U`R Aaleq doro.   7

p/-3 (A) yoGy]dahr` sa4e sma>tr A9 p/mey Ane l>b A9 p/mey smjavo.   7

  (b) Aek keiN3IIvr bIm 2mI3r la>bo 0e.tena]pr $4\ KN/m$ no smivtrIt war s>pU`R l>ba[ ]pr lage 0e. Jo mh|m nmn p/itb5 $160MPa$ hoy to go5akar AaD0edva5a bImno Vyas xo6o.   7
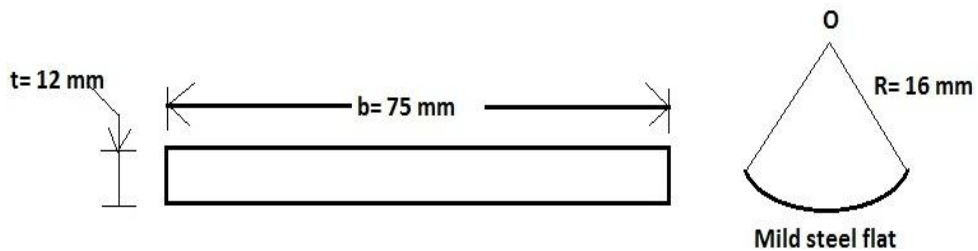

p/-4 (A) $3mI3r$ l>ba[2ravta keiN3IIvr bIm pr $20KN/m$ no smivtrIt war kayR kre 0e. keiN3IIvrna muKt 0eDa pr ivcln xo6o. $E=2*10^5 N/mm^2$ Ane $I=200cm^4$ lo.   5

19-5

20 KN/m

A   B

L = 3m

    (b) sadI beIND>g 4IyrI ma3e k[-k[2ar`aAo bnavI 0e?   5

    (k) segI>g momeN3 Ane hogI>g momeN3 Aak<it sa4e smjavo.   4

p/-5 (A) momeN3 Aeirya p@2it d\vara sa2ar` Aa2airt bIm jena m@ym ma ib>du   7
war 0e, na ma3e !a5

Ane ivcln nu sUt/\ tarvo.

    (b) 6n saF\3 nI S3/\eN4 ma3enu SamIkr` tarvo.   7

p/-6 (A) Aek saF\3no Vyas 50mm 0e, Tae 150rpm 4I fre 0e.jo mh|m ktRn p/itb5   7
80MPa hoy to saF|3 d\vara 3/\aNsmI3 4to pavr xo2o.

    (b) yuilArna sUt/ nI myaRdaAo smjavo. Ane Aa myaRdaAo reiNkn na sUt/   7
d\vara k[rIte dUr 4ay te smjavo. tene tarvo.

p/-7 (A) Aapel S3/\es ma3e, cors wag bImnu p/itro2 2U`RnI tulna kro Jyare tene   7
Ae rIte mukvama Aave ke: (I) be baju i9itj sma>tr hoy Ane
    (II) tenI k`R i9itj sma>tr hoy.

    (b) Waarna p/kar smjavo.   7

p/-8 (A) 75mm pho5I Ane 12mm jaDI p3\3I ne 0eDe b5yuGm AapI 16mI3r nI   7
it/JYaama> va5vama AavI 0e. mh|m p/itb5 Ane b5yuGmna mULy xo2o.
E=200GPa lo.

t= 12 mm

b= 75 mm

O

R= 16 mm

Mild steel flat

    (b) Samimt kolm ma3e S3/\eses(DayreK3 Ane beIND>g) nu SamIkr` tarvo,   7
jene Aek 2rI pr AeseN3/\Ik war Aape 0e.

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19-5