No. of System

No. System →

1 Real No. (which exists like (0, 1, 2, -1, -2))

2 Complex No (which does not exists like (2i+5))

1 Real No →

A Rational No → which can be represent in $\frac{P}{q}$. for ex = $\frac{3}{5}, \frac{4}{7}$

B Irration No → Can not be represented in $\frac{P}{q}\left(\neq \frac{P}{q}\right)$

for Ex $\frac{22}{7}$ (wrong) Value of π = (3.14597 ----)

A Rational No →

i Integers

ii Fraction

i Integers → Classification into two methods :-

a +ve Integers → 1, 2, 3 ---- ∞

b -Ve Integers → -1, -2, -3 ---- ∞

Note → 0 is not an ~~integers~~ +ve & -ve integer.

ii Fraction →

a Proper Fraction → In which the numerator is less than denominator

(N < D) For ex = $\frac{3}{4}, \frac{4}{7}, \frac{7}{9}$ ---

b Improper Fraction → In which the numerator is greater than denominator

(N > D) = $\frac{4}{3}, \frac{7}{4}, \frac{9}{7}$ ---

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* Types Of Integers →

* 1. Natural No. (N) → 1, 2, 3, 4 ---- ∞

2. Even No (E) → 0, 2, 4, 6, 8 ---- ∞

3. Odd No (O) → 1, 3, 5, 7 ---- ∞

* 4. Whole No (W) → 0, 1, 2, 3, 4 ---- ∞

* Natural No. Types Are →

* a. Prime No → A No. which is divisible by 1 or itself & not divisible by any other no.

Ex → 2, 3, 5, 7, 11, 13, 17, 19, 23 ----

* b. Composite No → 4, 6, 8, 9, 10, 12 ----

*Note → 1 is neither a prime No. nor a composite no.

⇒ 2 is the only even no. which is a prime no. & rest all prime no. are odd no.

Q = 151 is a prime No?

Sol Step-1 → Find out the nearest square Root to the given no. (Smaller One)

$12 = \sqrt{144} \leq 151$

$13 = \sqrt{169} > 151$

So,

→ 12 is smaller one

Step-2 → Write down all the Prime no. less than 12 that is 2, 3, 5, 7, 11

∴ If the number 151 is not divisible by 2, 3, 5, 7, 11 then it will a prime no. other wise not.

→ 151 is not divisible by 2, 3, 5, 7, 11 hence 151 is a prime no.

imp ** Co-Prime No → Two no. which have H.C.F as 1 is set to be Co-Prime No

Ex

→ (2, 3) = (2×1) (3×1)
= 1 is common

→ (3, 7) = (3×1) (7×1)
= 1 is common

→ (8, 9) = (2×2×2×1) (3×3×3×1)
= 1 is common

* Divisiblity Rule

A 2 → If the unit digit of a no. is 0, 2, 6, 8, 4 then it will be divisible by 2
Ex → 1332, 120, 1548

B 4 → If the last two digit is divisible by 4, then the whole no. is divisible by 4.
Ex → 2652, 3772

C 8 → If the last three digit is divisible by 8, then the whole no. is divisible by 8
Ex 47472

D 3 → The Sum of the digits of the given no, should be divisible by 3
Ex → 2553 → 2+5+5+3 = 15, which is divisible by 3.

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E → 9 → The sum of the digit of the given no. should be divisible by 9.
Ex → 108936 → 1+0+8+9+3+6 = 27, which is divisible by 9.

F → 5 → The unit digit should be 0, 5
Ex 150, 505, 10005

G → 10 → The unit digit should be 0
Ex 2000, 1000, 500, 50

H → 6 → The no. should be divisible by 2, 3
* Where (2,3) → Co-Prime No

I → 12 → The no. should be divisible by 3, 4

* → (2, 3) → Co-Prime No. (2x1)(3x1)
* → (3, 4) → Co-Prime No. (3x1)(4x1)
* → (2, 6) → Not a Co-Prime No (2x1)(2x3x1)

J - 11 → 1331

From left side
Step-1 Ranking as even & odd 1331 → 1 3 31
① ② ③④

Sum
↳ → add Even No = ④ + ② which are → 1 + 3 = 4
↳ → add odd No = ① + ③ which are → 1 + 3 = 4

Step-2
Difference = Odd - Even
= 4 - 4
= 0

If D = 0 or Multiple of 11, then the no. is divisible

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B.M.C

- Structure ⇌ 5 to 10
- Transportation ⇌ 4 to 6
- E.P ⇌ 10
- Services ⇌ 5 to 6
- B.M.C ⇌ 11 to 18
- UP, UD & Landscaping] God knows
- PMT & Housing
- Aptitude – 15
- HOA – 10
- Design – 15

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B. Mc

(2)

3

tan

$\sqrt{3}$

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B.M&C

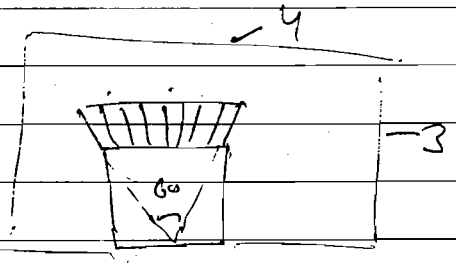
B.M&C

A brick wall 4m long, 3m height & 30cm wide, has door opening of clear span 1m, & clear height 1m. Door opening has flat-stone arch of thickness 20cm & width 30cm. Substending an ∠ 60° at the centre.

Vol of stone work in arch is :- m^3

① Vol of brick work in m^3

Sol Given Data



① Vol of stone work = Area of Base × ht × ~~width~~ width
= Area of Base × ht × 0.3

Area of Base = Area of sect + 2 (Area of Δ)
$= (1 \times 0.2) + 2\left(\frac{1}{2} \times 0.115 \times 0.2\right)$

$\tan 60 = \frac{opp}{adj}$

$= 0.2 + 0.023$
$= 0.223$ sqm

$\sqrt{3} = \frac{0.2}{x}$

$= 0.223 \times 0.3$
$= 0.0669\ m^3$

$x = \frac{0.2}{\sqrt{3}} = \frac{2}{17.32}$

$x = 0.115$

② Vol of brick work = Vol of wall − vol of opening/stone
$= (4 \times 3 \times 0.3) - (1 \times 2.1 \times 0.3) - 0.0669$
$= 3.6 - 0.63 - 0.0669$
$= 2.9031\ m^3$

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(1)

Students Personal Record

Name [illegible]

Class / Sec. ________ Roll No. ________ Subject P.T.M

Class Teacher ________ Subject Teacher E.P

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S.No.	Date	Topic	Page No.	Teacher's Sign. & Remarks

S.No.	Date	Topic	Page No.	Teacher's Sign. & Remarks

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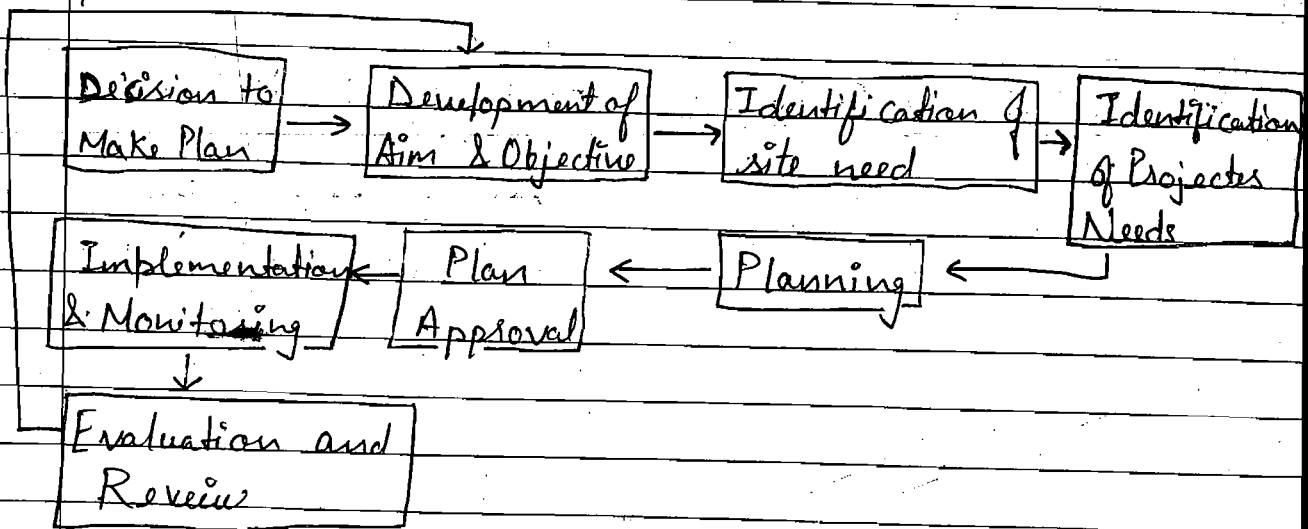
Date 6 Oct 2018

* Theory
  - Planning Process
  - Types of Plans
  - Survey Techniques
    - Types of Survey
    - Types of Question
    - Sampling Techniques
  - Analysis Techniques
  - Projection Techniques
  - Legislation
  - Urban Governance
    - Structure of Urban local Body (ULB)
    - Urban Finance
  - GIS

* Numerical
  - Scale of Map
  - Scale of Photograph
  - Population Projection

* PTM *

* Planning Process → Special development planning is a continuous time oriented and cyclic process.



Cycle Chart

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* Planning System → Types of Plan →

1. Perspective Plan → It is long term plan that provides goals, policies, strategy and general programe of Urban local Body
⇒ Duration is 20 to 30 year (URDFI).

2. Regional Plan → Duration is 20 years

Region → Area larger than local goverment authority but smaller than the state or nation.

3. Development Plan / Master Plan → Duration 20 to 30 yr (Reviewed After every 5 year)

4. Local Area Plan → Duration 5 to 20 yr (Reviewed after every 5 yr)

5. Annual Plan - Duration is 1 year

6. Special Purpose Plan → 5-20 year Duration
Ex → HRIDAY
City Sanitation Plan
Disaster Management Plan

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Structure Analysis

.1 Som (Strength Of Material.
.2 Truss
.3 R.C

.1 SOM -

1 Basic of strength of material
* imp → 2 B.M.D & S.F.D.
2 to 4 marks → 3 Bending Stresses, Shear Stresses and Torsional stress
4 Deflection of Beam
5 Columns

.2 Truss →

1 Basic of Trusses (2 to 1 marks)

.3 R.C →

1 Basic of R.C
2 to 4 marks
2 R.C Beams
3 R.C Slabs
4 R.C columns.

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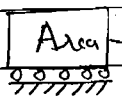
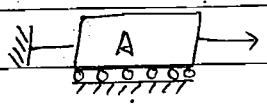
Basic Of Som

∴ Stress → It is the ratio of force. It is generated as Area.
a resistance to applied external force. Stress = Load / Area

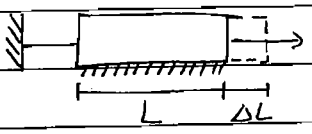
① 

Stress = 0



Stress = P/A

∴ Strain → It is the ratio of deformation per unit length.



Strain = ΔL/L

imp ∴ Hook's Law = $\sigma = E \times \varepsilon$
where,
E = Modulus of Elasticity
σ = Stress
ε = Strain

Stress Unit = $\frac{N}{mm^2}$, $\frac{N}{m^2}$, $\frac{N}{cm^2}$, $\frac{kN}{mm^2}$ ---

Strain Unit = Unit less $\left(\frac{\Delta L}{L}\right)$

So, E = $\frac{N}{mm^2}$, $\frac{N}{m^2}$ --- so on.

☆ Imp Unit Conversion

m = 100 cm
m = 1000 mm

1	2	3	4
$Pa = \frac{N}{m^2}$	$KPa = 10^3 \times \frac{N}{m^2}$	$MPa = 10^6 \times \frac{N}{m^2}$	$GPa = 10^9 \times \frac{N}{m^2}$

* $MPa \rightarrow \frac{N}{mm^2} \Rightarrow 10^6 \times \frac{N}{m^2} = \frac{10^6 \times N}{10^3 \times 10^3 \times mm^2}$

So ⇒ unit will be same

Assumption Of Hook's Law → 1 It is valid, when a material is isotropic & homogenous (same composition through out the material)

2 It is valid, for linearly elastic materials (will in propo-rtional limit).

* Isotropic → Vale through out oblique in all direction is same.

Gate 2006

Q While testing the strength of steel beam it is found that the longitudinal strain is 0.33 unit & young modulus of elasticity 2.1×10^6. what will the stress generated in the steel beam?

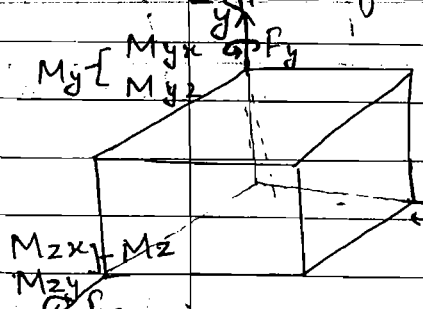
Sol $\sigma = E \times \varepsilon$

$= 2.1 \times 10^6 \times 0.33$

$= .69 \times 10^6$

$= .7 \times 10^6$ unit.

Types Of Stress →



* Total No. of forces → in Case Of 3D

$= 3 + 3$ $(f_x, f_y, f_z) + (M_x, M_y, M_z)$

$= 6$

* In Case Of 2D OR Internal forces

$= 3$ (f_x, f_y & M_{xy})

1* Axial Force (f_x) → Normal to the plain, it will reduce normal stress = $\frac{P}{A}$

→ P (Normal Stress OR Axial force)

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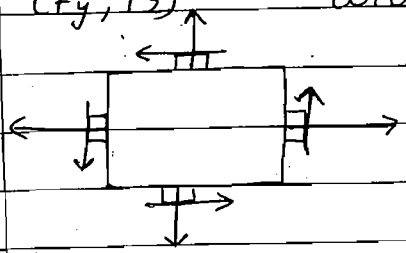
* Fx = Longitudenal Axis.
* Fy / Fz = Lateral Axis

*2 Shear Forces = Perpendicular to the longitudenal axis, it (Fy, Fz) will produce transverse shear stresses.

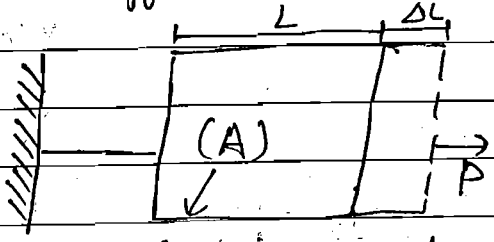


*3 Torsional Movement = (Mx) ⇒ In the plain of cross-section as the moment in longitudenal axis, it will produce torsional shear stresses.

*4 Bending Movement = Perpendicular to the plan of cross-section, that is moment produce (My, Mz) in the lateral direction, it will produce bending stresses.

Same happens in shear but the difference is, it will happens by deformation

imp # Axial Deformation → $\boxed{\sigma = E \times \varepsilon}$



(Cross-Section Area)

$\Rightarrow \frac{P}{A} = E \times \frac{\Delta L}{L}$

$\Delta L = \frac{PL}{AE}$,

where,

ΔL = Axial deformation & unit in (m, mm etc)

P = Axial forces & unit in (N, KN ___)

L = Length after Cross Section (m, cm, mm ---)

A = Area after Cross Section (m^2, cm^2, mm^2)

E = Modulus of Elasticity ($\frac{N}{m^2}$, $\frac{N}{mm^2}$)

TRANSPORTATION

COURSEMATE
PAGE 1
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Topic :-

- Geomatric Design
  - Cross Sectional of road
  - Vertical Alignment
  - Horizontal Alignment
- Planning
  - Types of transportation Survey analysis model (terms)
- Pavement design
  - Structural design
  - material specification
- Traffic Engineering
  - Signals
  - parking

Introduction of Highway

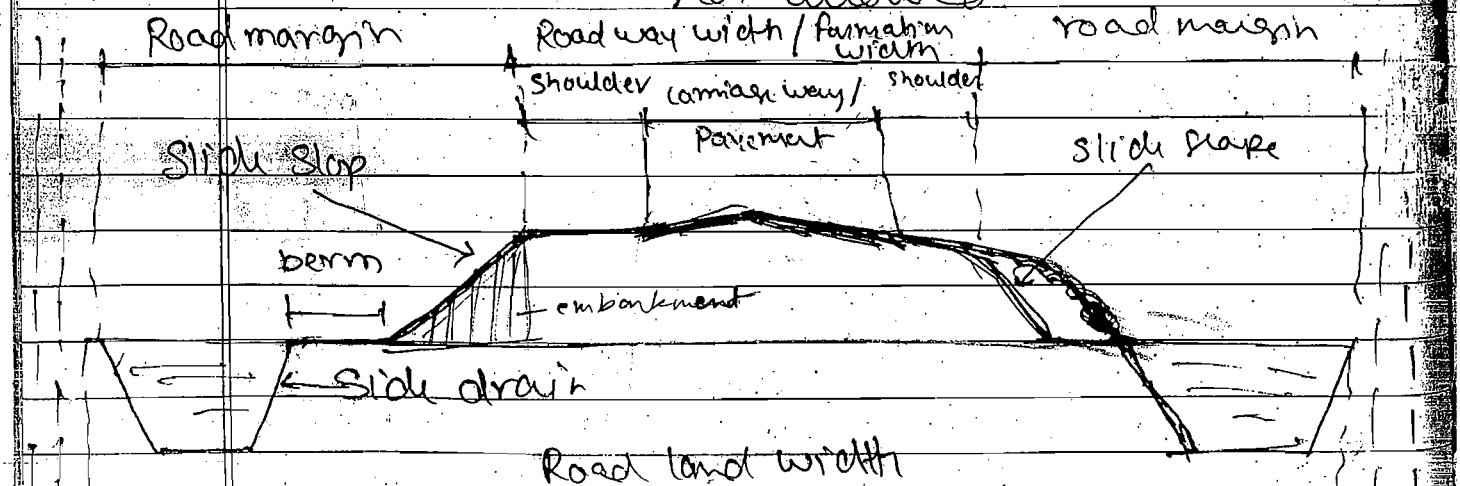
COURSEMATE
PAGE
DATE

Nagpur Road Congress 1943

→ A wide way leading from one place to another having specially prepared surface for vehicle to use

Types of Road

Colour code		connecting
Yellow	*	National Highway – state highway
Green & white	*	state Highway – District
Blue, Black & white	*	District Road – Imp. location in district
orange white	*	Village Road – village
	*	Other district Road – other loc. on district
	*	Expressway – Speed should be more 120 km/h – only fast moving vehicle is allowed & two-wheeler not allowed



Overall width b/w building lines

Overall width b/w control lines

Cross Sectional element

COURSEMATE
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Terms :-

* Carriage Way / pavement / Crust

→ The portion of road way constructed for movement of vehicle leaves is called carriage way, pavement or Crust

→ * (IRC → Indian Road Congress)

Class of road	Carriage way
- Single way	→ 3.75m
- Two lane without Kerb	→ 7.0m
- Two lane with Kerb	→ 7.5m
- Intermidate carriage way	→ 5.5m
- Multi-lane pavement	→ 3.5m / lane

* Shoulder :- min width 2.5m for two lane highway

→ The portion of the road b/w the outerage edge of the pavement & edge of top surface of embankment is known as shoulder

* Should have rough surface.

COURSEMATE
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Objective of shoulder

→ Shoulder act as service lane for break down vehicle
→ They provide lateral stability to the carriage way
→ They serve as a parking place in case of emergency.

* Road way width / formation width
→ 12m width for state/national highway (two lane)
→ Sum of width of carriage way and shoulder

* Right of way / land width (ROW)
→ 45m width
→ Is the width of land acquired for the road
margin + Shoulder + carriage way → ROW

* Road Margin
→ The portion of land width on either side of the road way are known as road margin

* Berm
The portion of land width left in b/w the toe of road embankment and the innerage of side drain.

* Syllabus.

1. Defination
2. Elements
3. Evolution of Urban Design
4. Theory of Urban Design
5. Urban Design Theorist - [Books, Theory]
6. Urban Conservation - [AMSAR Act, Organisation]
7. Tools and principle of Urban Design
8. Theory of Proxemics.

URBAN DESIGN

- The art of creating & shaping cities & town. OR
- It is the process of giving form shape & character to group of building or the whole neighbourhood & the city.

* It operates at two scales →

1. Macro-Scale → Urban Structure is decided.
2. Micro-Scale → Street lighting & street furniture is decided.

P.T.O

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* Element of U.D. [Urban form Macro to Micro)

→ Urban Structure
→ Urban Grain → Urban Form
→ Density + Mix → Scale/Intensity of Development
→ Massing + Height
→ Streetscape + Landscape → Public Realm / Streetscape Design.
→ Facade + Interface
→ Details + Materials.

→ Some other element of U.D →
1. Environment, topography
2. Social fabric
3. Economic fabric
4. Landscape

\# Public Realm → It refers to all the areas to which public has excess like road, street, park, bridges, open spaces.

* Defination

(i) Urban Structure → The overall framework of a region, or town, showing relationship b/w zones of built form, land forms, natural environments, activities & open spaces.

(ii) Urban Grain → The balance of open space to built form, and the nature and extent of subdividing an area into smaller parcels or blocks.

(iii) Density + Mix → The intensity of development & the range of different uses (such as residential, commercial, institutional or recreational uses).

(iv) Height + Massing → The scale of buildings in relation to height and floor area, and how they relate to surrounding land forms, buildings and streets.

(v) Streetscape + Landscape → The design of public spaces such as street, open spaces and pathways

(vi) Facade + Interface → The relationship of building to the site, street and neighboring building (alignment, setbacks, boundry treatment) and the architectural expression of their facades (projections, openings, patterns and materials)

(vii) Details + Materials → The close-up appearance of objects and surface. It includes street furniture, paving, lighting and sign-age.

A Public-Realm → Much of urban design is concerned with the design and management of publicly used space (also referred to as the public realm or public domain) and the way this is experienced and used.

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B Topography, Landscape And Environment:- The natural environment includes the topography of landforms, water courses, flora and fauna. whether natural or introduced.

C Social + Economic fabric → The non-physical aspects of the urban form which include social factors (Culture, participation, health and well-being) as well as the productive capacity and economic prosperity of a community

D Scale → The size and perception of a building and spaces.

Objectives [Why Urban Design]?

(i) Legibility → A clear and simple development pattern within a city and neighborhood enables residents and visitors to understand how an area is organized and to make their way around.

(ii) Charater → A recognizable images can identify a city or neighborhood to its residents or visitors. This image can includes historic buildings, village precints, and building with a distinct architecture, public art and public spaces etc.

(iii) Diversity → Successful neighborhoods within a city provide for diversity and choice through a mix of compatible housing and building types and land uses.