ALPHA COLLEGE OF ENGINEERING &TECHNOLOGY
DEPARTMENT OF CIVIL ENGINEERING
Elements of Civil Engineering
1 st year (ME A and B)

1.what is a hydraluic structure? Classify the dams and discuss them brifely

2.what is hydrological cycle with neat sketch?

3.what are the various modes of transporttion? Discuss them?

4.write a short note on traffic control device?

5.explain design load acting on building?

6.what are the two main building coponents?

7.enumirate variouus principle of planning and expalin any two in detail.

8.disscus the quality of a good timber?

9.disscus the quality of a good bricks?

10.what are the various type of cement?

11.Diffrence between plane surveting and geodetic surveying?

12.explain the fundamental principle of surveying.

13.Explain classification of surveying?

14.Difference between pristmic compass and surverous compass.

15.The following bearing were taken at a closed traverse ABCD

Line	FB	BB
AB	45° 0	225° 0
BC	123° 30	303°3 0
CD	181° 0	1° 0
DA	289° 0	109° 0

16. what are the characteristics of contours

17. If the magnetic bearing of the place is N 30 W and the magnetic declination is 2 E. Find the true bearing

18. Convert the following WCB into RB 1) 190 2) 133 3) 260 4) 335 5) 315

19

Following are the fore bearing observed on a closed traverse ABCDA. (No local attraction). Compute the included angles for traverse and shoe the check.

Line	F. B. of line
AB	124^0 30'
BC	68^0 15'
CD	312^0 45'
DA	197^0 45'

Q.1. What is a hydraulic structure? Classify the dams and discuss them briefly.

→ → A hydraulic structure can be defined as a structure submerged (or) partially submerged in a body of water and its interrupts the natural flow of water

→ A hydraulic structure can be built in a river, a sea or any body of water where there is a need to storage or change in the natural flow.

eg → Dams.

Dams:

A dam is a hydraulic structure constructed across a river or a natural streams to store water on its up stream side. This stored water can be used for different purposes (eg - irrigation, water supply, power generation etc).

Types of Dams:

→ Gravity dam
→ Earth dam
→ Rock fill dam
→ Weir
→ Barrage
→ Arch dam
→ Buttress dam.

Gravity Dam →

It is a concrete structure with its stability is achieved by its shape and size such that it will resist overturning, sliding and crushing at the toe. This type of dam is the most permanent one, requires little maintenance.

and is most commonly used.

Gravity dam may be constructed either of masonry or of concrete.

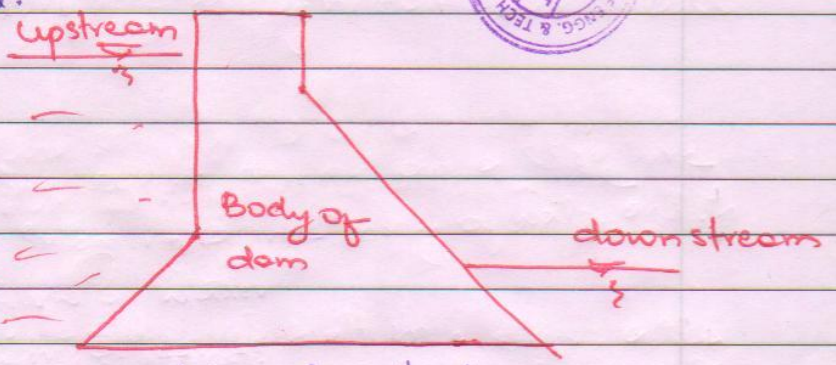


Fig → Gravity dam.

Earth dams:

Earthen dams are made from compacted earth or locally available material. Earth en dams are preferred for lower heights compared to gravity dams. These dams usually provide the most economical and most satisfactory solution for sites at which suitable foundation at reasonable depth may not be available for a dam of concrete or masonry.

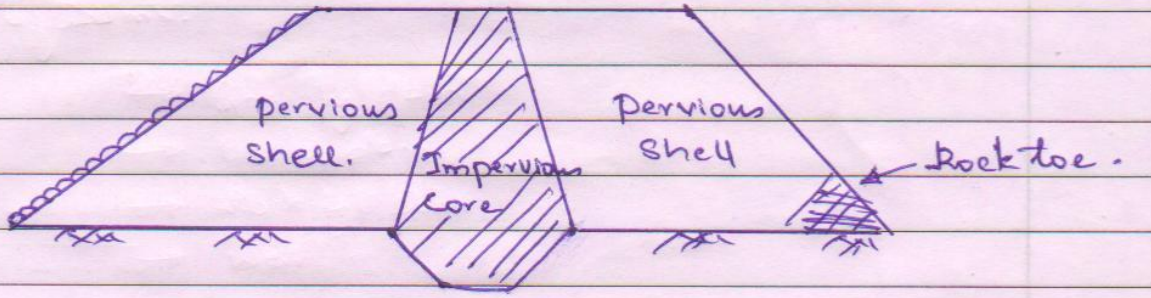


Fig : Earth dam

Rockfill Dams:

A rock fill dam is an embankment which uses variable size of boulders or quarried stones to provide stability and an impervious membrane to provide water tightness.

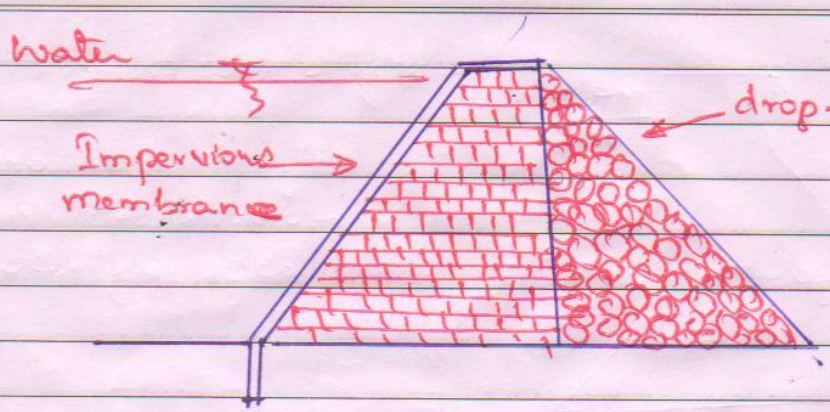


Fig – Rockfill dam

Arch dam

→ A dam which is constructed in the form of an arch supported on abutments is called the arch dam.

→ Arch dam may be constructed in masonry or Concrete.

→ Arch dam is suitable for V-shaped valley.

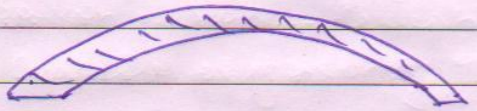


Fig → Arch dam.

Buttress Dams:

→ A buttress dam consists of a number of buttresses or piers dividing the space to be dammed into a no. of spans. To hold up water and store the water between these buttresses, panels are constructed of horizontal arches or flat slabs.

Weirs. → A weir is a barrier across a river designed to alter its flow characteristics. The weir is a solid obstruction put across the river to raise its water level and divert the water into the canal.

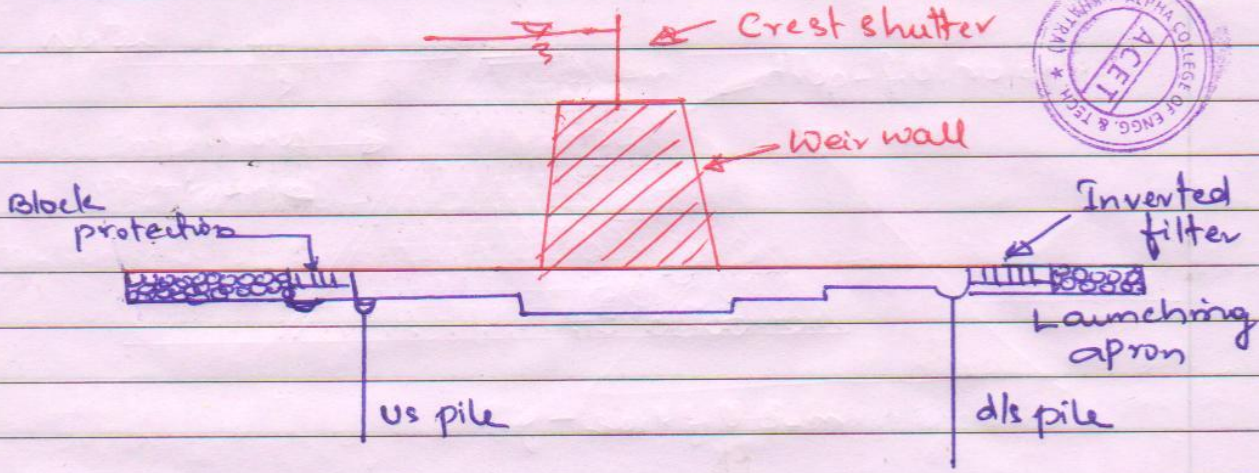


Fig → vertical drop weir.

Barrage:

A barrage is a type of low head, diversion dam which consist of a no of large gates that can be opened or closed to control the amount of water passing through the structure, and thus regulate and stabilize river water in the upstream for use in irrigation and other system.

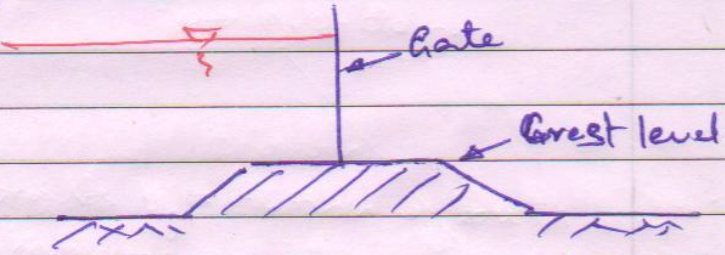


Fig- Barrage with a small raised crest.

Check Dams:

A check dam is a small dam, which can be either temporary or permanent, built across a minor canal or drainage ditch.

Q2. What is hydrological cycle with neat sketch?
(or) Water cycle.

⇒

The hydrological cycle (or) water cycle ; is expressed as the constant movement of water on above and below the surface of the water. This constant circulatory system of water is known as the hydrological cycle.

Hydrologic cycle is the process of transfer of moisture from the atmosphere to the earth in the form of precipitation (or) rainfall.

The precipitation or rainfall which falls on earth is conveyed by streams and rivers to ocean and lakes etc and evaporation of water back to the atmosphere.

Steps of hydrological cycle:

↳ step-1- Surface sources like lakes, rivers, ocean etc e water get evaporated due to solar heat. And also some from plants in form of transpiration.

↳ step-2 → this water vapour goes high into the atmosphere

↳ step-3 → This vapour is again condensed due to the sudden fall of temperature and pressure. Thus clouds are formed.

↳ step-4 → These clouds again cause the precipitati (ie rainfall).

Step-5 :→ Some part of rainfall falls on ocean itself and some part on land.

Step 6 → First the water will start Infiltrating inside the ground and later on it will start flowing on surface in form of surface water (or) runoff water

Step-7 → This runoff water will meet streams and rivers. And Infiltrated water will meet ground water. Ground water it self moving in downward direction and meet ocean.

Step-8 → Again this process repeat. The continus in our atmosphere.

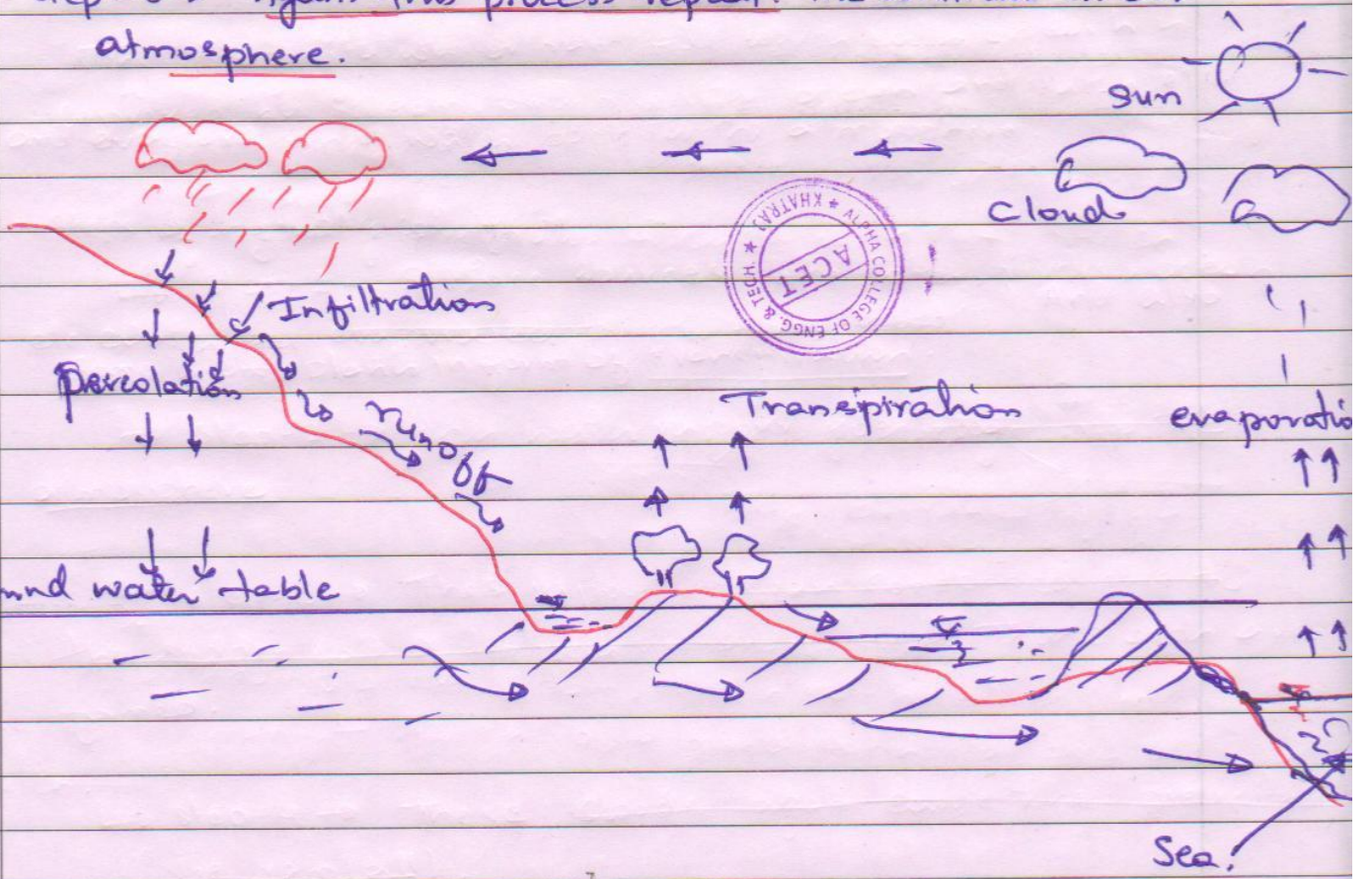


Fig → hydrological cycle

Q3 What are the various modes of transportation? Discuss them?

⇒ Modes of transport (or means of transport or ways of transport) is a term used to distinguish substantially different ways to perform transport.

The basic modes are land, water and air.

Major ways or modes of transportation.

- (1). Surface transportation
  - (a). Land transportation
    - (I) Rail transportation
    - (II) Road transportation.
  - (b) Water transportation
- (2). Air transportation

(1). Surface transportation plays a key role in development of a nation. In India, there are separated by highways and railways. Rail minister tables a separate budget for railways every year and its 7 to 8% of GDP of India

Land Surface transportation → highways
→ Railways.

Road Transportation.

Road transport or road transportation is the transport of passengers or goods on roads.

Roads may be classified in several ways –

(1). National highways – are main highways running through the length and breadth of nation, connecting major ports, capitals of state and large industrial area etc.

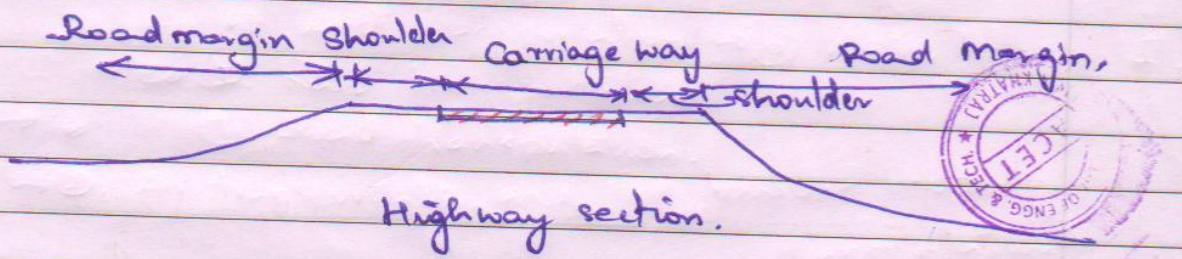
(2). State highways. – Are arterial road of a state. Connect national highways, district head quarters and important

cities within the state.

(3). Major District Roads – important Roads within district

(4). other District Roads (ODR) → Connect market centres, block headquarters or other main roads.

(5). Village Roads → Connect village or group of villages



Highway section.

Rail transportation →

Railways is energy - efficient long - distance transportation mode in India. Indian railways is fourth largest railway system in the world.

→ There exists three type of gauges in India

(1). Broad gauge – 1.676 m
(2). Meter gauge – 1.0 m
(3). Narrow gauge – 0.762 m

Major components of Rail network
↳ railway track, signals, locomotive platform .etc.

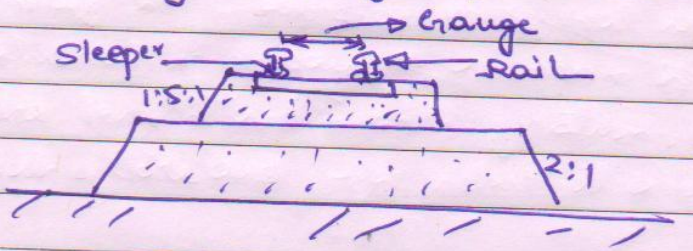


Fig → typical cross - section for a Railway.

Water ways:

→ India has a long coastline. It is serviced by 13 major ports.

→ · So in water transportation it the process of transporting watercraft such as a boat, ship, sail boat etc. form one place to another in the body of water such as sea ocean, lake, canal or river etc.

→ Transportation by water is possible between the harbours and ports on the sea routes or along the rivers or canals where inland transportation facilities are available.

Air transportation

↳ transportation by Air is called Air transportation eg- Aircrafts and helicopters. Different type of Airports

↳ Three main types are international airports, domestic airports and military aerodromes.

↳ Components are runway, taxiway apron, terminal building etc

Q4. Write short note on traffic control devices?

⇒ To measure used to control, regulate and direct the free and effective traffic flow are called traffic control devices.

types are:

(1). traffic signs (2). Traffic signals, (3) Marking.
(4). Islands.

1. Traffic signs.

→ They are provided to direct, warn and inform the road users, They are in the form of symbol or caption. They should be placed such that road users can identify them easily.

three types → (1) Regulatory sign.
(2) warning sign
(3). Informatory sign.

(1) Regulatory sign

↳ they are called mandatory signs.

↳ They provide information regarding certain laws, Regulations and prohibitions to the road users.

eg → (a) Stop signs, (b). Give way signs
(c). prohibitory signs. (d) No parking sign
(e). No-stopping sign (f). Speed limit sign.
(g). Restriction end sign (h). Compulsory direction Control sign.

(2). Warning Sign:→ To warn the road users of certain un safe condition existing on or near to the roadway.

eg → narrow bridge, pedestrian crossing, men at

work, unguarded railway crossing etc.

(3). Informatory sign.

↳ These signs provide guidance to road users along the way and information to make travel easier, safe and enjoyable.

types →

↳ (1). Direct and place identification sign.
(2). sign like hospital, petrol pump etc.
(3) parking signs, Taxi stand cycle, stand etc.

(2). Traffic signals:

↳ They are the safety devices installed at intersection to direct the traffic for easy and safe movements.

↳ They use red and green lights to direct traffic to stop and proceed alternatively.

→ Types of traffic signals
1. Fixed time signals
2. Traffic actuated signal or automatic signal.
3. Pedestrian signals.

Road markings:

↳ Road markings are the lines, patterns, symbols marked on the pavement, kerbs and side of islands within the road way.

↳ These markings are done using paints in contrast to the colour and brightness of the pavement or other background.

various types are →
↳ pavement marking.
↳ kerb markings
↳ Object markings.

↳ Reflector markings.

(4). Traffic Islands. →

Traffic Islands are the raised area built within the roadways to set up physical channel for guiding the vehicular traffic safety.

↳ channelised islands.

↳ Rotary island / central island.

* Qs Explain design loads acting on a building.

⇒ Various types of loads are acting on the structural components of the buildings which are finally transmitted to the ground through foundation. Foundation of a building should be strong enough to support the following type:

(i) Dead load (ii). Live load, (iii) Wind load. (iv). Snow load (v). load due to rain (vi). Earthquake load.

(i) Dead Load:

It is permanent immovable and untransferable load of a structure. The dead load in a building comprises of the weight of all walls, partitions, floors, roofs and all other permanent constructions in the building

This load can be calculated by multiplying the unit weight of material with the volume of material used in different components (walls, slabs, roofs etc) in the building

2. Live Load:

They are also called super-imposed load or it consists of moving or moving loads due to occupants of buildings, their furniture, temporary stores, snow load etc

- Live loads on floors
- Live loads on Roofs.
- Snow loads.

3. Wind load:

In case of tall building, the eff due to wind should be considered. Tall building are subjected to wind pressure on their exposed faces and inclined or slopy roof surfaces.

The effect of wind pressure is to reduce the pressure on the foundation on the windward side and to increase the pressure on the foundation on the leeward side.

Wind pressure $P = kv^2$

- v → velocity of wind (Km/hr)
- k → Co-efficient.

(4). Snow load.

Snow load acts on roofs, ~~and its capacity to retain the snow~~. Actual load due to snow will depend upon the shape of the roof and its capacity to retain the snow. Roofs should be designed for actual load due to snow or for the imposed loads, whichever is more severe.

(5). Load due to rain

On surfaces of roofs whose positioning, shape and drainage system are such as to make accumulative of rain water possible, load due to such accumulation of water and the live loads for the roofs shall be considered separately and the more severe of the two shall be Considered in the design.

(6). Earthquake force

Q6. What are the two main building components? Explain with a sketch.

⇒ A building has two main components.

↳ Sub-structure (or) foundation.

↳ super structure.

Sub-structure (or) foundation.

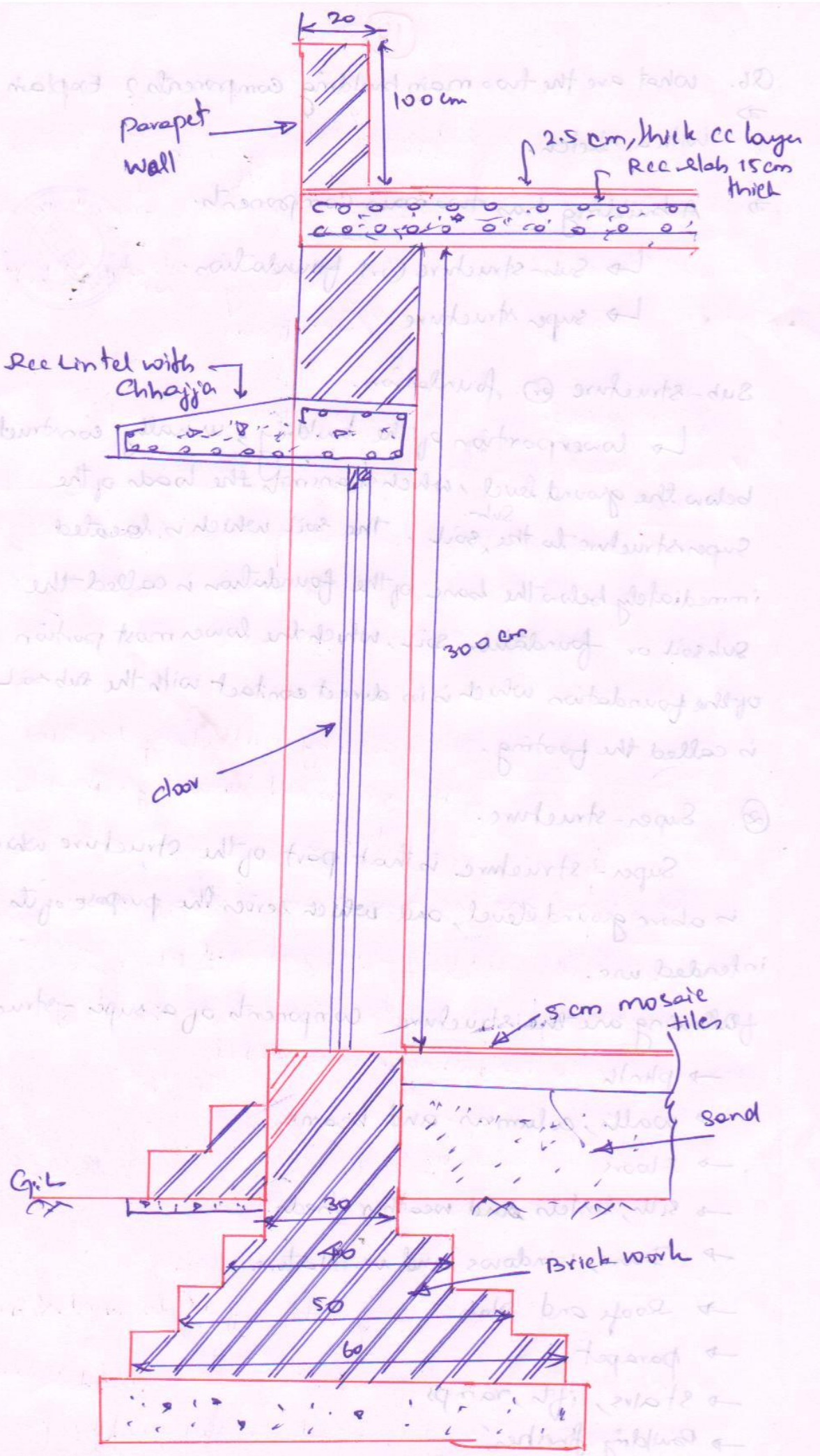
↳ lower portion of the building, usually constructed below the ground level, which transmits the loads of the superstructure to the sub-soil. The soil which is located immediately below the base of the foundation is called the sub soil or foundation soil, which the lower most portion of the foundation which is in direct contact with the sub-soil is called the footing.

(2). Super-structure.

Super-structure is that part of the structure which is above ground elevel, and which serves the purpose of its intended use.

following are the structure components of a super-structures

→ plinth
→ walls, columns and beams.
→ Floors
→ sills, lintels and weather sheds.
→ Doors, windows and ventilators
→ Roofs and slab
→ parapet
→ stairs, lifts, ramps
→ Building finishes


20
100 cm
Parapet Wall
2.5 cm, thick CC layer
RCC slab 15 cm thick
RCC Lintel with Chhajja
300 cm
door
5 cm mosaic tiles
sand
G.L
30
50
50
60
Brick work

Q7 What are the various types of cement?

⇒ Besides the ordinary portland cement, a no. of other type of cement are also manufactured by varying the ratio of the raw materials or by adding some additional materials.

different types of cement;

(1). Quick setting cement: It is produced by adding a small percentage of aluminium sulphate and by finely grinding the cement. It contains very little or no retarding substance like gypsum.

(2). Rapid hardening cement: It is also known as high early strength cement. It is manufactured with such adjustments in proportions of raw materials so that the cement produced gains maximum strength within in 2 - 4 days.

(3). High alumina cement:

High alumina cement is manufactured by fusion of bauxite and limestone. specially used ~~for~~ against corrosive action of sea water.

(4). Blast furnance cement

For this cement, the slag as obtained from blast furnace is used → (slow rate of hardening and less heat of hydration.

(5). Low heat cement: This type of cement in which very low amount of heat of hydration is liberated during setting and hardening.

(6). White Cement: manufactured from china clay and white chalk in place of limestone and clay. used for interior decoration and its very costly.

(7). Coloured Cement: pigments etc are used.
↳ (oxide of lead)

(8). water proofing cement → this is produced by mixing water proofing agent in the Cement during its grinding.

(9). Acid resistance Cement.

It has a predominant base of high silicates and a high resistance to acids.

(10). Pozzolana Cement:

Pozzolana Cement is a natural and artificial material containing silica and alumina in a reactive form.

Q8. Discuss the requirements of good quality bricks?

Ans → A good brick should have the following qualities or properties or characteristics or requirements →

→ It should have uniform colour (i.e red)

→ It should have a compact uniform texture.

→ It should have regular size and shape.

→ It should be hard enough. No impression should be left when scratched.

→ The brick should not break into pieces when dropped from a height of 1 m.

→ When two bricks are struck together they should produce metallic ringing sound.

→ The brick should have low thermal conductivity and should be sound proof.

→ The brick should be table moulded, well burnt and free from cracks with sharp and straight edges.

→ It should not absorb more than one sixth of its weight of water when immersed in water for one hour.

→ It should have good strength. No bricks should have the crushing strength below 5.50 N/mm^2.

→ ten layers of brick laid in morter will form masonry of 1-metre height.

Q9. Discuss the qualities of a good timber?

⇒

Ans The Followings are the characteristics or qualities or requirements or properties of a good timber.

→ Timber should be easily workable.

→ A freshly cut timber should Exhibit a hard and shining appearance.

→ A freshly cut timber should smell sweet.

→ It should be free the heart wood.

→ A good timber should given a clear sonorous sound when struck.

→ a good timber should be free from all defects.

→ A good timber should be durable

→ It should have straight, close fibres,

→ It should be reasonably heavy in weight.

→ A good timber should be tough.

→ A good timber should be capable of retaining the shape during conversion or seasoning.

→ A good timber should be strong for working as a structural member.

Q10. Enumerate various principles of planning and explain any two in details.

⇒ There are certain general principles (or) factors which an engineer should bear in mind while planning a building. While planning a building, the principles of planning should be considered in close association with the theoretical and practical aspects. All the principles may not be rigidly possible to adopt and there should be some scope of flexibility.

Following are general principles of planning -

↳ ①. Aspect ②. prospect, ③ privacy ④ Grouping ⑤. Roominess ⑥. Circulation ⑦. Elegance ⑧ Flexibility ⑨. Sanitation ⑩. Economy and practical considerations ⑪. Furniture requirement.

1. Aspect →

Different rooms of a building should be located as per their function utility keeping in view the direction of sun and wind. Rooms must get maximum advantages of these natural sources.

A room which receives light and air from particular directions is said to have aspect of that direction. This is important consideration in planning of building from

Comfort as well as hygienic considerations. Each room of a residential building particularly should have a particular aspect because certain rooms need morning sun whereas other rooms do need light at all.

Type of room	Aspect
kitchen	E
Dining room	S
Drawing room	S or SE, or NE
Bed room	SW, W or SE
Study room	N or NW
Store	N
Both, W.C,	N or NE

2. prospect →

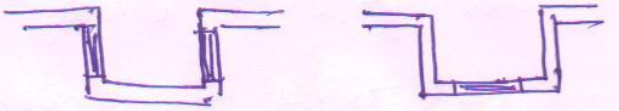
↳ It gives how a building will look if it is viewed from outside and placement of opening in the front wall to give aesthetic appearance and on one of the other hand should conceal some undesirable views.

Doors and windows should be so located that pleasant and notable features are revealed and undesirable views concealed.

One must feel the sense of pride in having

a house which is pleasing in appearance and is reflecting its individuality.

eg:-



FAQ ECE · Pooja Patel

(1) Plane surveying V/s Geodetic surveying

Plane surveying	Geodetic surveying
→ The earth surface is considered as a plane surface	→ The earth surface is considered as a curved surface
→ The curvature of the earth is ignored	→ The curvature of the earth is taken into account
→ Line joining any two stations is considered to be straight.	→ The line joining any two stations is considered as a curved line.
→ The triangle formed by any three points is considered as a plane	→ The triangle formed by any three points is considered as spherical
→ The angle of the ~~triangle~~ triangle are considered as plane angles.	→ The angles of the triangles are considered to be spherical angles.
→ Carried out for a small area $< 250\ km^2$	→ Carried out for a large area $> 250\ km^2$.

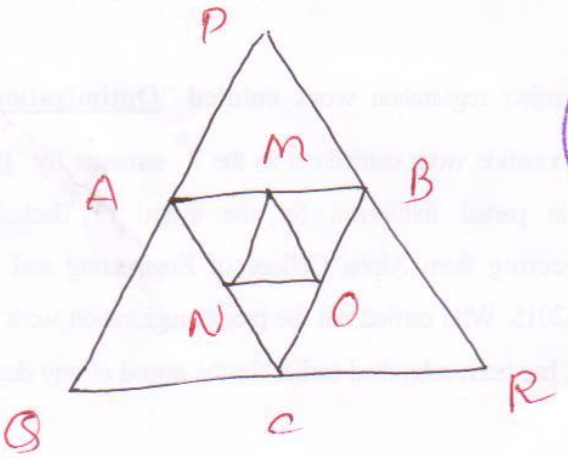
(2) Explain Fundamental Principle of surveying:

→ Two basic Principles of surveying are

(1) Always work from the whole to the part. and

(2) To locate a new station by at least two measurements. (Linear or angular from fixed reference points)

→ * always work from the whole to the part.



According to the first Principle the whole survey area is first enclosed by main stations and main survey lines. The area is then divided into a number of division by forming well conditioned triangles.

→ The main survey lines are measured very accurately with Precise survey instrument.

→ Then the remaining sides of the triangle are measured. The Purpose of this method of working is to control accumulation of errors

→ During measurement. if there is any error then it will not affect the whole work But if the reverse process is followed then the minor error in measurement will be magnified.

→ *(2) To Locate a new station by at least two measurements. (linear or angular from fixed reference points)

→ According to the second Principle the Points or stations are located by linear or angular measurement or by both in surveying.

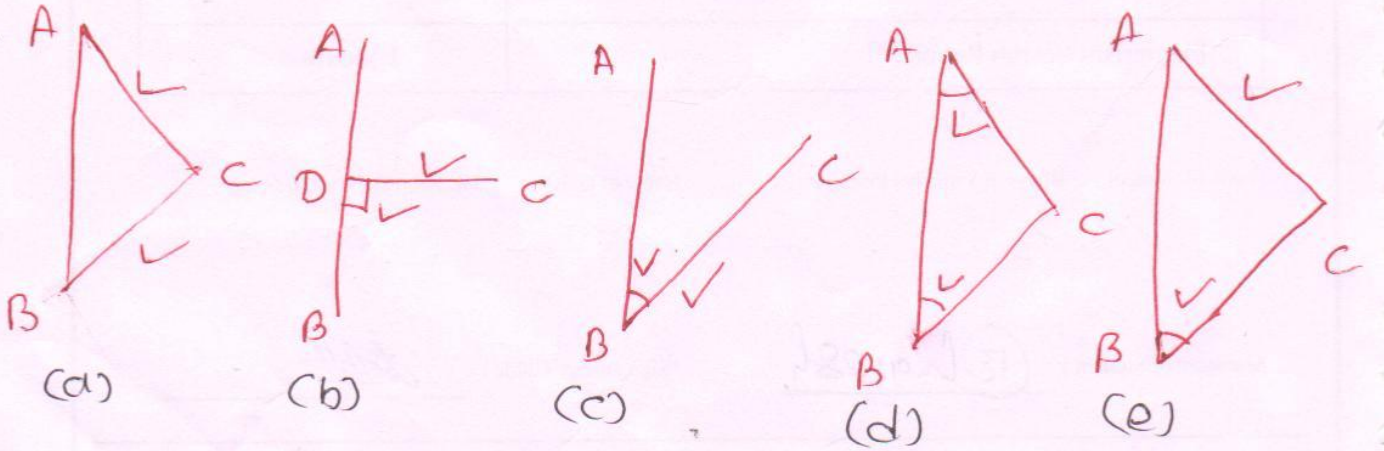
→ two control Points are established first. then a new station can be located by two linear or two angular measurements.

→ or by one linear and one angular measurement

→ Let A and B are control Points.

→ C new Point can be established.

→



→ (a) taking linear measurements from A and B for C.

→ (b) taking linear measurements. of Perpendicular from D to C.

(c) Taking one linear measurement from B and one angular measurement as ∠ABC.

(d) Taking two angular measurements at A and B as angles ∠CAB and ∠ABC.

(e) taking one angle at B as ∠ABC and one linear measurement from A as AC.

Explain
*(3) Classification of surveying:

(a) classification based on Instruments:

(1) chain survey: This is the simplest type of surveying in which only linear measurements are made with a chain or a tape. Angular measurements are not taken.

(2) compass survey: In compass survey, the angles are measured with the help of a magnetic compass.

(3) chain and compass survey: In this survey linear measurements are made with a chain or a tape and angular measurements with a compass.

(4) Plane table survey: It is a graphical method of surveying in which field works and plotting both are done simultaneously.

(5) Theodolite survey: In theodolite survey, the horizontal angles are measured with a theodolite more precisely than compass and the linear measurements are made with a chain or tape.

(6) Tacheometay survey: A special type of theodolite known as tacheometer is used to determine horizontal and vertical distances indirectly.

(7) Levelling survey: This type of survey is used to determine the vertical distances and relative heights of points with the help of an instrument known as level.

(8) Photogrammetric survey: Photogrammetay is the science of taking measurements with the help of photographs taken by aerial camera from the air craft.

(9) EDM: In this type of survey, all measurements are made with the help of EDM instrument

(B) Classification based on methods.

(1) Triangulation: Triangulation is a basic method of surveying. when the area to be surveyed is large. triangulation is adopted. The entire area is divided into a network of triangles.

(2) Traversing: A traverse is a circuit of survey lines. It may be open or closed. when the linear measurements are done with a chain and a tape and the directions or horizontal angle are measured with a compass or a theodolite respectively the survey is called traversing.

(C) Classification based on purposes:

(1) geological survey :→ In this both surface and subsurface surveying are conducted to locate different minerals and rocks. In addition, geological features of the terrain such as folds and faults are located

(2) mine survey: mine surveys include both surface and underground surveys. It is conducted for mineral deposits and to avide tunnelling and other operations associated with mining.

(3) Archaeological survey : It is conducted to locate relics of antiquity. Civilization, kingdoms. forts. etc.

(4) Military survey: It has very important and critical application in the military

(II) Classification based on Nature of fields:

(1) Land survey: done on land to prepare plans and maps. of a given area

(2) Hydrographic survey: conducted on or near the body of water such as lake, river. area

(3) Astronomic ~~sur~~ survey: conducted for the determination of latitudes, Longitudes, azimuths.

(4) Aerial survey: conducted from aircraft.

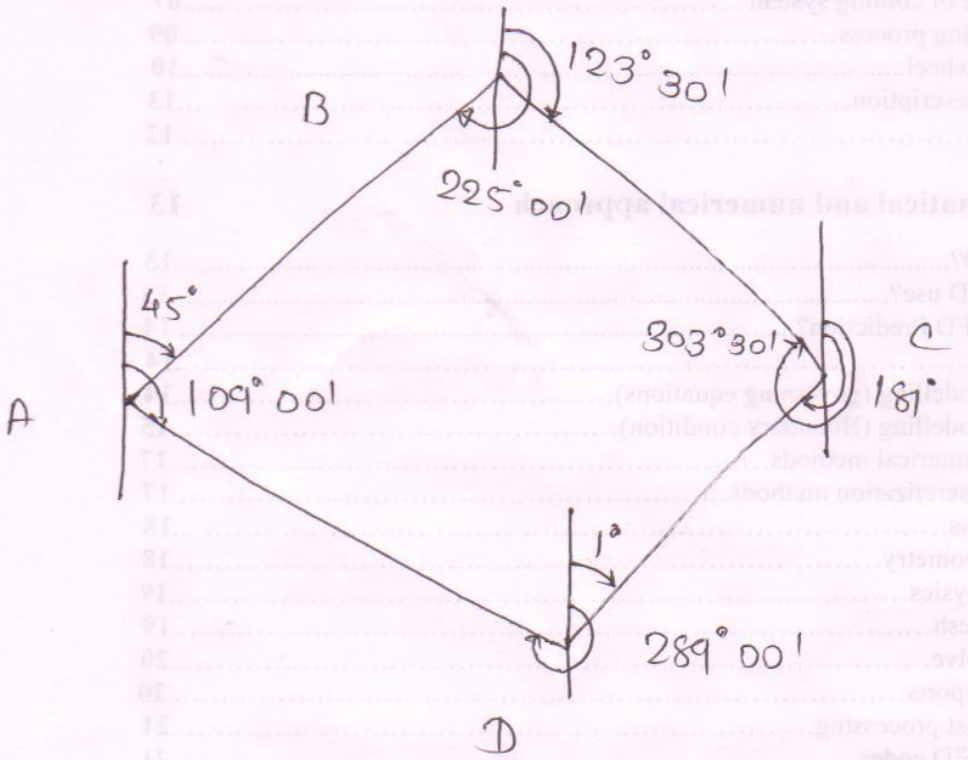
(4)* Difference between Prismatic compass and surveyor's compass.

Prismatic compass	Surveyor's compass
→ The graduated ring is attached to the magnetic needle.	→ The graduated ring and needle are free to move independently with respect to each other.
→ Graduations are marked 0° and 360° in clockwise direction.	→ graduations are marked 0° to 90° in each quadrant
→ 0° is marked at South 180° at North 90° at west 270° is marked at east	→ In this compass, East and west is inter-changed.
→ Tripod may or may not be provided	→ The instrument cannot be used without a tripod.
→ It measures or gives W.C.B of a line	→ It measures or gives S.B of a line.

(5) The following bearing were taken of a closed traverse ABCD

Line	FB	B.B
AB	45° 00'	225° 00'
BC	123° 30'	303° 30'
CD	181° 00'	1° 00'
DA	289° 00'	109° 00'

→ First plot the traverse ABCD



Station	Line	FB	Line	BB.	Diff. of FB & BB
A	AB	45° 00'	DA	109° 00'	64° 00'
B	BC	123° 30'	AB	225° 00'	101° 30'
C	CD	181° 00'	BC	303° 30'	122° 30'
D	DA	289° 00'	CD	1° 00'	288°

Calculation of interior angles,

Interior $\angle A$ = BB of DA − FB of AB

= 109° 00′ − 45° 00′

= 64° 00′

Interior $\angle B$ = BB of AB − FB of BC

= 225° 00′ − 123° 30′

= 101° 30′

Interior $\angle C$ = BB of BC − FB of CD

= 303° 30′ − 181° 00′

= 122° 30′

Exterior $\angle D$ = FB of DA − BB of CD

= 289° 00′ − 1° 00′

= 288°

∴ Interior $\angle D$ = 360° − 288°

= 72°

Sum of angles = $\angle A + \angle B + \angle C + \angle D$

= 64° 00′ + 101° 30′ + 122° 30′ + 72° 00′

= 360°

Check = (2N − 4) × 90

= (2 × 4 − 4) × 90°

= (4 × 90°)

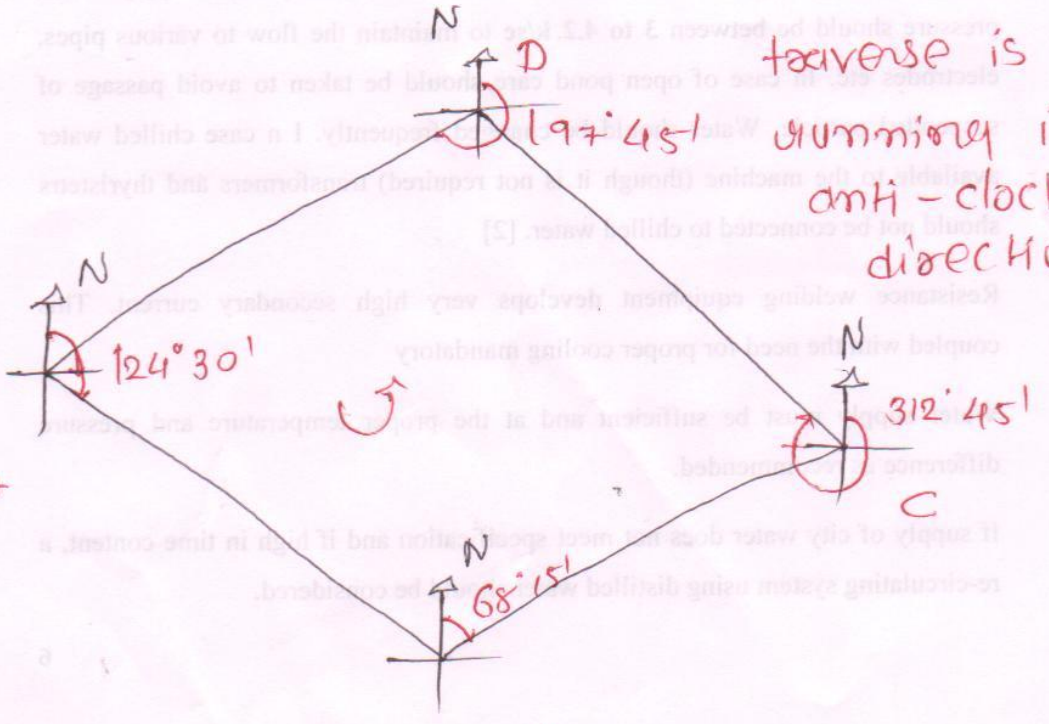
= 360° ok

(6) following are the fore bearing observed on a closed traverse ABCD. compute the included angles for traverse and show the Check.

Side	FB.
AB	124°30'
BC	68°15'
CD	312°45'
DA	197°45'

Ans

Side	F.B	B.B	Remark
AB	124°30'	124°30' + 180° = 304°30'	FB < 180
BC	68°15'	68°15' + 180° = 248°15'	FB < 180
CD	312°45'	312°45' - 180° = 132°45'	FB > 180
DA	197°45'	197°45' - 180° = 17°45'	FB > 180



traverse is running in anti-clockwise direction.

Included angle = FB of forward (next) line − BB of previous line

$\angle A$ = FB of AB − BB of EA

= 124°30′ − 17°45′

= 106°45′

$\angle B$ = FB of BC − BB of AB

= 68°15′ − 304°30′

= − (236°15′) Exterior angle

$\angle B$ = − 236°15′ + 360° = 123°45′

$\angle C$ = FB of CD − BB of BC

= 312°45′ − 248°15′

= 64°30′

$\angle D$ = FB of DA − BB of CD

= 197°45′ − 132°45′ = 65°

Sum of all included angles:

$\angle A + \angle B + \angle C + \angle D$

= 106°45′ + 123°45′ + 64°30′ + 65°

= 360°

Check: (2n − 4) × right angle

= (2n − 4) × 90°

= 360°

(1) The following is the Page of level Book. Fill the missing data and calculate the RL of all Points. Apply the usual checks.

St.	Chainage	BS	IS	FS	Rise	fall	HI	RL
1	0	2.485						
2	20		?				?	?
3	40		0.625		1.035			?
4	60	2.450		?	?			?
5	80		2.155			3.175	?	?
6	100		1.945		?			?
7	120	1.255		0.645	?		?	?
8	140			2.450	?	?		100.00
Check		ΣBS = ?		ΣFS = ?				

SOLUTION:

Let us first work out the missing reading

(1) The IS reading at ST 2 is missing

IS at ST 2 = BS − Rise = 2.485 − 1.035

= 1.450

(2) The FS reading at ST 4 is missing

FS at ST 4 = IS + Fall = 0.625 + 3.175

= 3.800

After calculating missing readings find out rises and falls as usual way.

(3) Rise at ST 5 = 1.450 - 0.625 = 0.825

(4) Rise at ST 5 = 2.450 - 2.155 = 0.295

(5) Rise at ST 6 = 2.155 - 1.945 = 0.210

(6) Rise at ST 7 = 1.945 - 0.645 = 1.300

(7) R. fall at ST 8 = 2.450 - 1.255 = 1.195

After calculating Rises and falls get arithmetic check and find out first R.L

$\Sigma BS - \Sigma FS = \Sigma Rise - \Sigma fall = Last\ RL - First\ RL$

$\therefore 6.190 - 6.895 = 3.665 - 4.370 = 100.000 - First\ RL$

$\therefore -0.705 = -0.705 = 100.000 - First\ RL$

$\therefore First\ RL = 100.000 + 0.705 = 100.705$

→ After calculating first RL substitute this value for the RL of the first point and calculate the other RLs in the usual way.

→ same way after knowing the RL of the first point, calculate the first HI and HI for the CP_1 and CP_2 points.

→ At Last RL of the Last point should be checked as 100.00 as B.M (given)

St.	Chainage	BS	IS	FS	Rise	fall	HI	RL	Remark
1	0	2.485					103.190	100.705	
2	20		1.450		1.035			101.740	
3	40		0.625		0.825			102.565	
4	60	2.450		3.800		3.175	101.840	99.390	CP1
5	80		2.155		0.295			99.685	
6	100		1.945		0.210			99.895	
7	120	1.255		0.645	1.300		102.450	101.195	CP2
8	140			2.450		1.195		100.00	Bm
Check:		ΣBS. 6.190		Σfs 6.895	Σ Rise 3.665	Σfall 4.370			

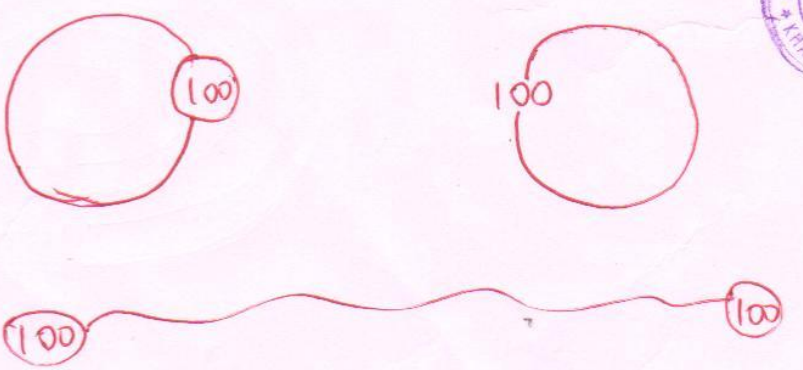
(8) What are the characteristics of contours:

→ Since every point on a contour line has the same elevation, a contour map with a constant interval portrays the configuration of the ground in a characteristics manner.

→ The knowledge of contour characteristics helps in identifying the natural features of the area from the given map and in avoiding mistake in plotting the contours correctly

→ The following characteristics help in plotting or reading a contour map.

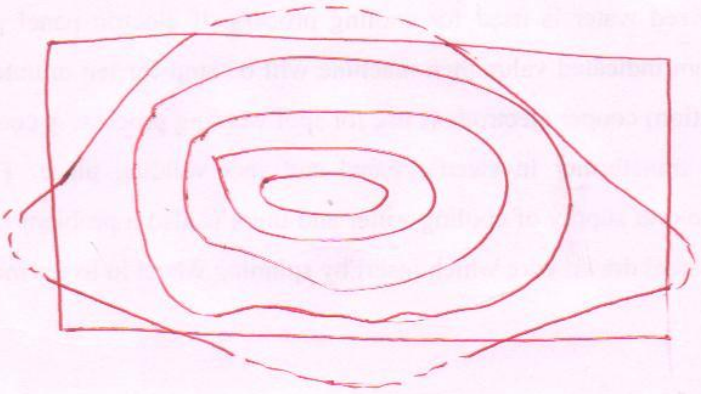
(1) all the points on a contour line have the same elevation. The elevations of the contours are indicated either by inserting the fig. in a break in respective contour or printed close to the contour.



(2) Two contour lines do not intersect with each other.

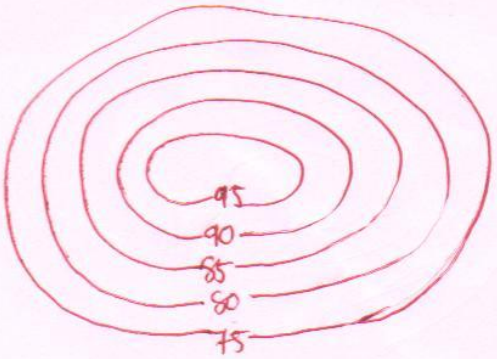
(3) Contour lines always form a closed circuit. But these lines may be within or outside the limits of the map

A contour line must close itself but cannot end on the plan



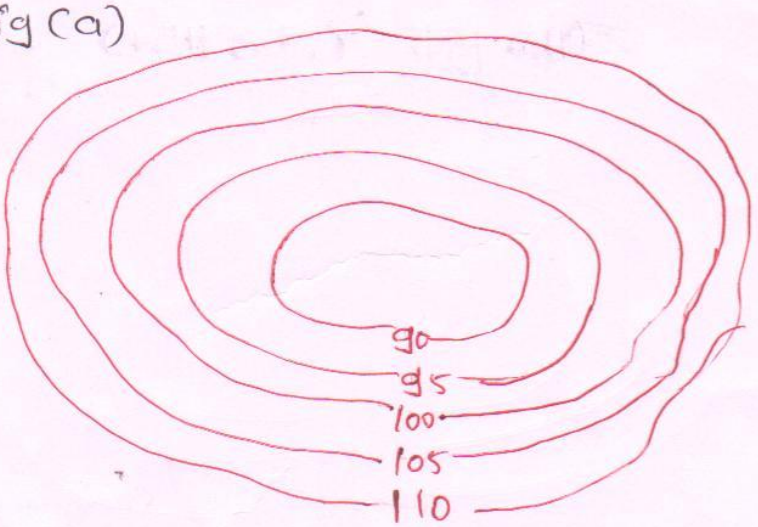
(4) Contours do not have sharp turning.

(5) The contour lines are closer near the top of a hill or high ground and wide apart near the foot. This indicates a very steep slope towards the peak and a flatter slope towards the foot. fig (a)



Hill

(a)

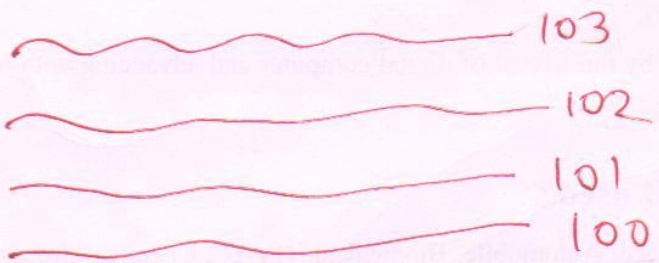


Depression

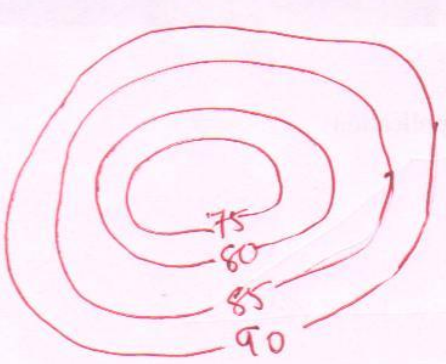
(b)

(6) The contour lines are closer near the bank of a pond or depression and wide apart towards the centre. This indicates a steep slope near the bank and a flatter slope at the centre ~~(b)~~ fig (b)

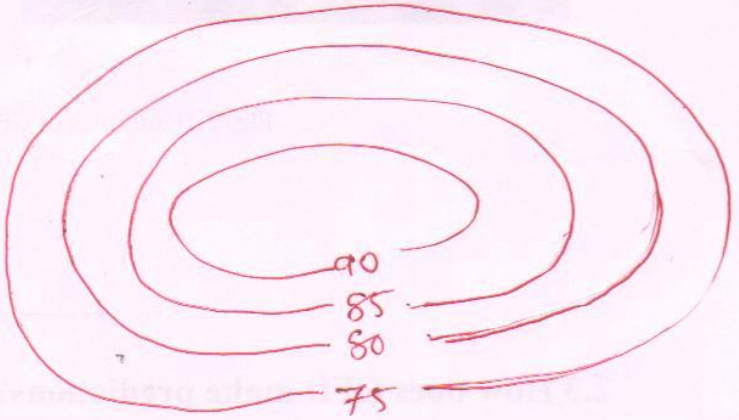
(7) uniformly spaced, contour lines indicate a uniform slope fig (c)



(8) A series of closed contour always indicates a depression or summit. The lower value being inside the loop indicates a depression and the higher values being inside the loop indicates a summit (Hillock) fig (d)

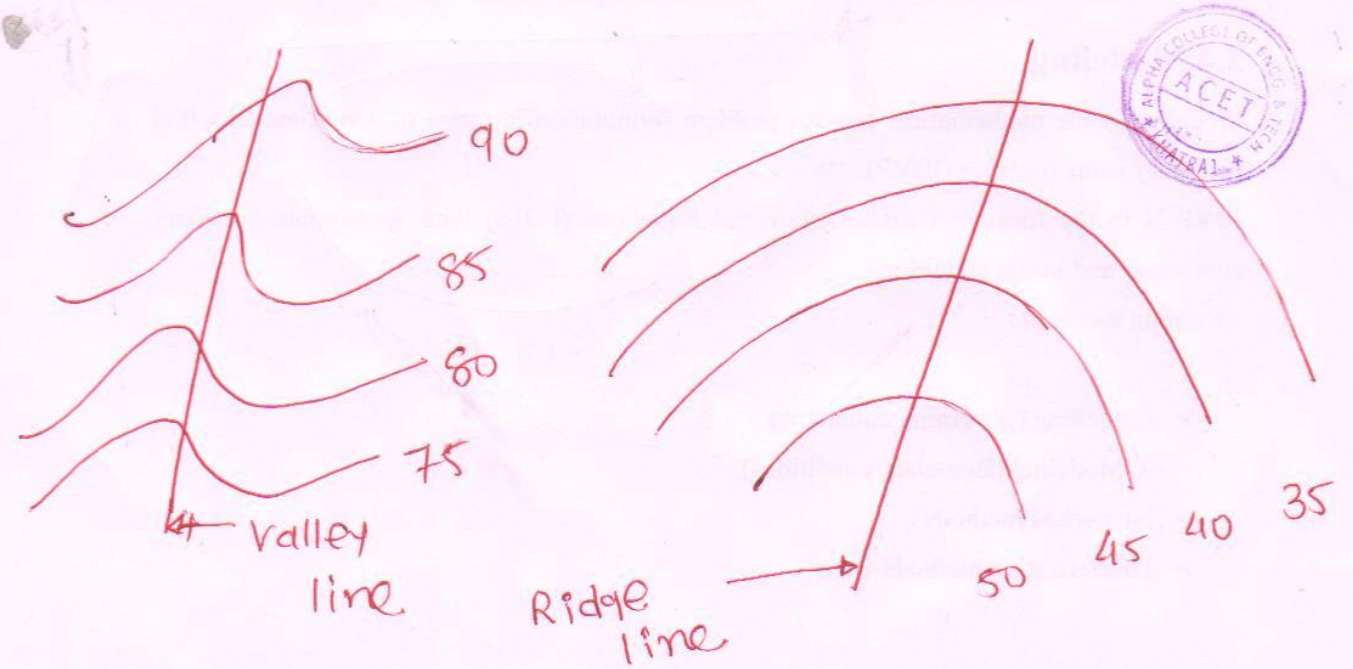


Depression

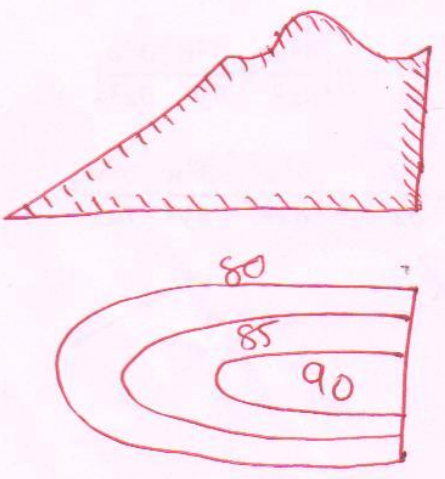


Summit (Hillock)

(9) Contours deflect uphill at valley lines and downhill at ridge lines. contour lines in U-shape cross a ridge and V-shape cross a valley at right angle. The concavity in contour lines is towards higher ground in the case of ridge and towards lower ground in the ~~as~~ case of valley fig (e)

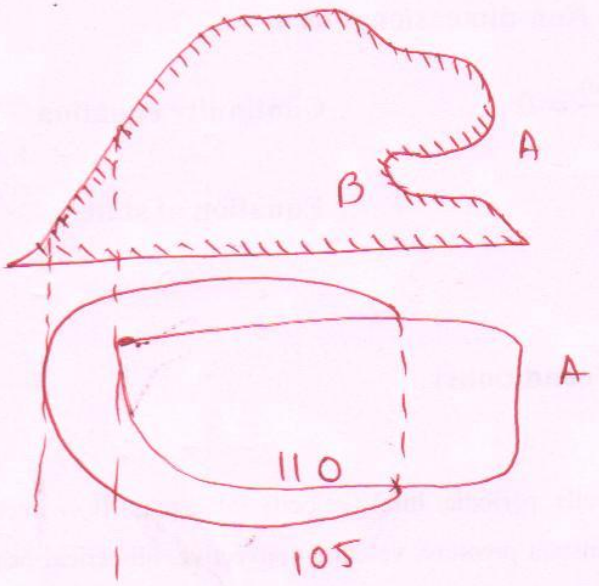


(10) Contour lines meeting at a point indicate a vertical cliff fig (f)



Vertical cliff

(11) Contour lines cannot cross one another, except in the case of an overhanging cliff. But the overhanging portion must be shown by a dotted line.



overhanging cliff

(g) Convert the following WCB into RB

(i) 190° (iv) 133°

(ii) 260° (v) 335°

(iii) 315°

(i) 190°

RB = WCB − 180°

= 190° − 180°

= S 10° W

(ii) 260°

RB = WCB − 180°

= 260° − 180°

= S 80° W

(iii) 315°

RB = 360° − WCB

= 360° − 315°

= N 45° W

(iv) 133° = RB = 180 − 133°

47°

= S 47° E

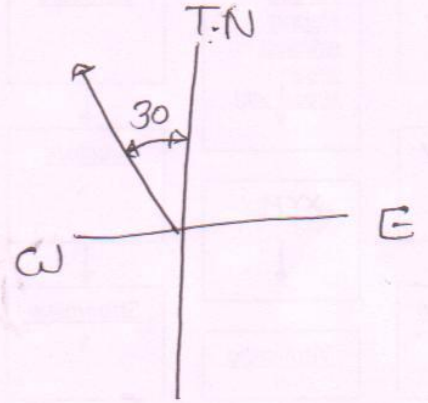
(v) 335° = 360° − W.C.B

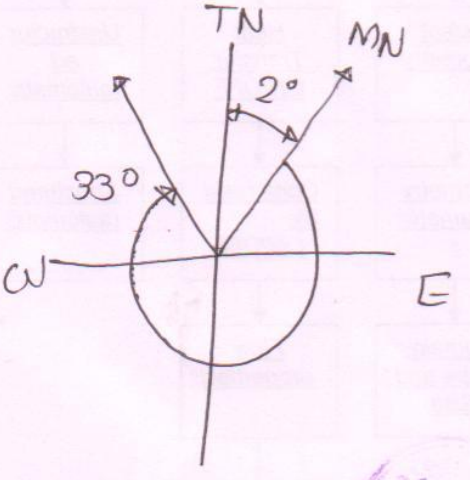
= 360° − 335

= N 25° W

(10) If the magnetic bearing of the place is N 30° W and the magnetic declination is 2° E. Find the true bearing.

Solution:





$N\ 30^\circ W = 360^\circ - 30^\circ$

$= 330^\circ$ in terms of WCB

Draw a vertical line as TN. Draw MN in east of TN by 2°. From MN Bearing of line measures 330°

True bearing $= 330^\circ + 2^\circ$

$= 332^\circ$

$= N\ 28^\circ W$ (Ans)