GOVERNMENT POLYTECHNIC JAJPUR

Lecture Note on

Mine Survey-1

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Chapter-2
Compass Survey

Prismatic Compass :-

In this compass the reading are taken with the help of prism.

The following are the essential parts of this compass:-

(a) Compass box:-

It is a circular metallic box of diameter 8-10 cm. A pivot with sharp point is provided at the centre of the box.

(b) Magnetic need & Graduated ring:-

The magnetic needle is made up of a broad magnetised iron bar. The bar is pointed at both ends. The magnetic needle is attached to a graduated aluminium ring. The ring is graduated from 0° - 360° clockwise and the graduation begins from south end of the needle. Thus 0° is marked at north, 90 at East, 180 at west and 360° at north.

(c) Sight vane & Prism:-

The sight vane and the reflecting prism are fixed diametrically opposite to the box. The sight vane is hinged with the metal box & consist of a horse hair at the centre.

(d) dark glass:-
The dark glass are provided with the prism the red glass is meant for sighting luminous at night and the blue glass for reducing the strain on the observer eye in bright day light.

(e) Adjustable mirror:-
→ A mirror is provided with the sight vane the mirror can be lower or rise, can also be inclined.
→ If any object is too low or too hight wrt the line of sight the mirror can be adjusted to observed it through reflection.

(f) Breakpin:-
A break pin is provided just at the base the sight vane. If pressed gently it's stops the oscillation of the ring.

(g) Lifting pin:-
A lifting pin is provided just below the sight vane. when the sight vane is folded it press the lefting pin.

(h) Glass Cover:-
A glass cover is provided on the top of the bod to protect the aluminium ring from the dust.

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Adjustment of prismatic compass:-

(1) Fixing the compass with tripoid stand:
The tripoid stand is placed at the required station with it's leg well apart. Then the prismatic compas is held by the left hand & placed over the threaded top of the stand.

(2) Centering :-
Normally the compass is centred by droping a piece of stone from the bottom of the compass box.
→ It is also be done with by the using of Plumbbob.

(3) Levelling:-
Levelling is done with the help of a ball-shocket arrangement provided on top of the tripoid stand.

(4) Adjustment of prism:-
A prism is move up & down till the figures on the graduated ring are seen truly & sharp.

(5) Observation of bearing:-
The line passing through the geographical north pole. Geographical north pole or any point on the

~~surface of the earth is known as~~

(5) Observation of bearing :-
After centering and levelling the compass box over the station, the ranging rod at the required station is bisected perfectly by sighting through the slip of the prism and horse hair at the sight vane.

(1) TRUE MERIDIAN :-
* The line passing through the geographical north pole, geographical south pole or any point on the surface of the earth is known as "true meridian".

(2) MAGNETIN MERIDIAN :-
* When the magnetic needle is suspended freely and balanced properly, unaffected by magnetic substances, it indicates a direction, the direction is known as "magnetic meridian".

* Bearing :-
→ The angle between magnetic meridian and a line known as the "magnetic bearing" or "Bearing of the line".

* True Bearing :-
The angle between the true meridian and a line is known as "True bearing".

③ ARBITARY MERIDIAN:—
Some times for the survey of small area a convenient direction is assumed as a meridian known as the "arbitary meridan".

Arbitary bearing:—
The angle between arbitarry meridian and a line is known as the arbitary meridian & the line is called arbitary bearing".

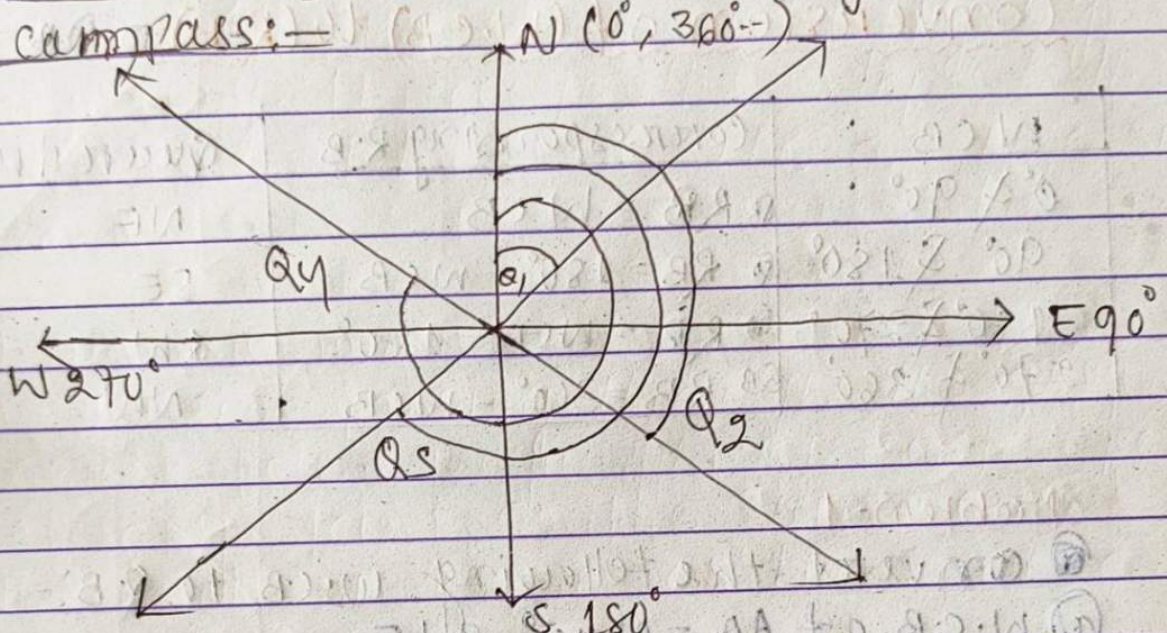
④ GRID line MERIDIAN:—
→ for preparing a map some state agency assume several lines parallel to the true meridian for a particular zone this line is termed as "Grid meridian".
→ The bearing of a line w.r.t. the grid bearing".

DEGINGNATION of MAGNETIC BEARING:—

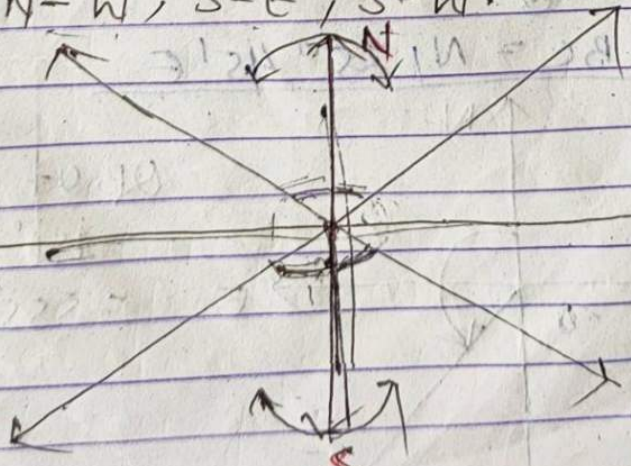
→ Magnetic bearingare disigneted by 2 systems.
(1) Whole circle Bearing (W.C.B).
(2) Quadrantial Bearing (Q.B).

(1) Whole Circle Bearing (W.C.B):—
→ The magnetic bearing of a line measure clockwise from the north

Pole towards the line is known as "whole circle Bearing" (WCB).
→ Such a bearing may have any value between 0° & 360°.
→ The W.C.B is obtained by prismatic compass:—



② Quadrantial Bearing (Q.B):—
The magnetic bearing of a line measure clockwise or anticlockwise from the north pole or south pole (which ever nearer the line) towards the east or west is known as quadrantial bearing.
→ This system consist of four quadrant N-E, N-W, S-E, S-W.



Reduced Bearing (R.B):—

→ When the W.C.B of a line is converted into Q.B. It is termed as R.B.

→ It is value is lies bet^n 0° & 90°.

Conversion of (W.C.B) to (R.B) & QB

W.C.B	Corresponding R.B	Quadrant
0° & 90°	RB = WCB	NE
90° & 180°	RB = 180° − WCB	SE
180° & 270°	RB = WCB − 180°	SW
270° & 360°	RB = 360° − WCB	NW

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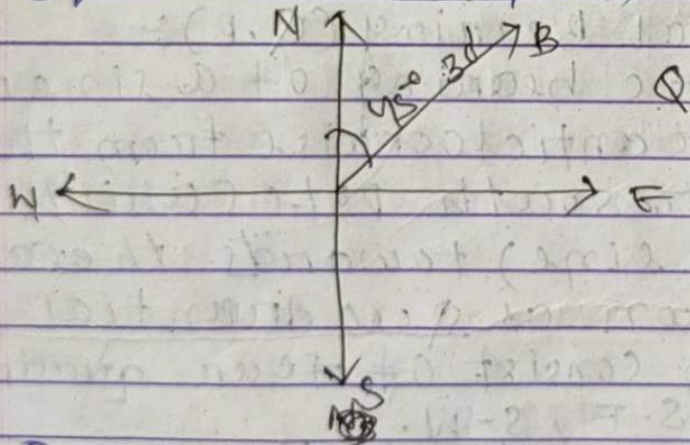
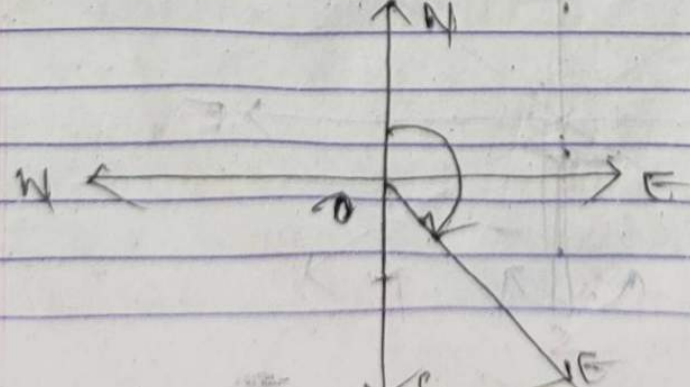
Convert the following W.C.B to Q.B:—

(a) W.C.B of AB = N 45° 30' E



QB of line AB
= N 45° 30' E

(b) WCB of BC = N 125° 45' E



QB of a line OA
= 180° − 125° 45'
= 555° 45' E.

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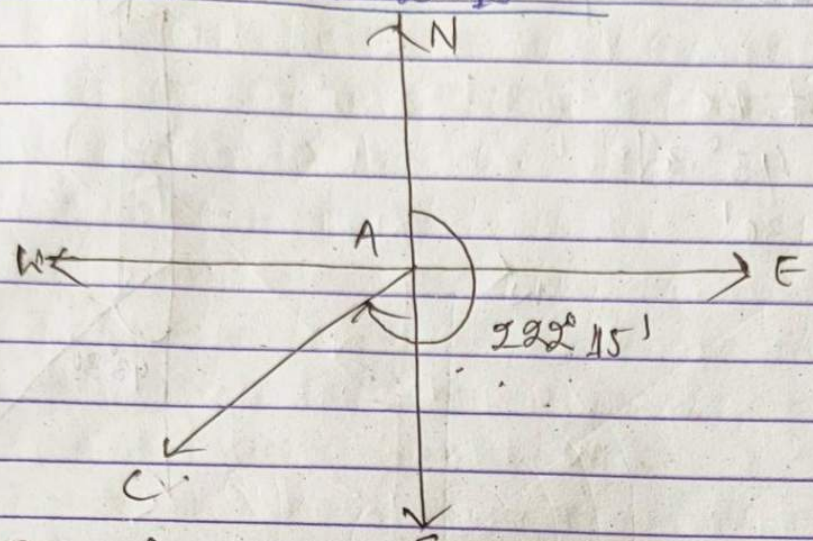
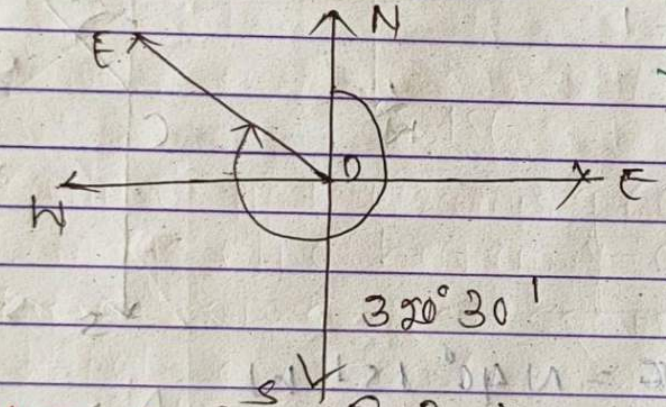
(c) WCB of AC = 222° 15'



QB of line AC = 222° 15' - 180° = S 42° 15' W

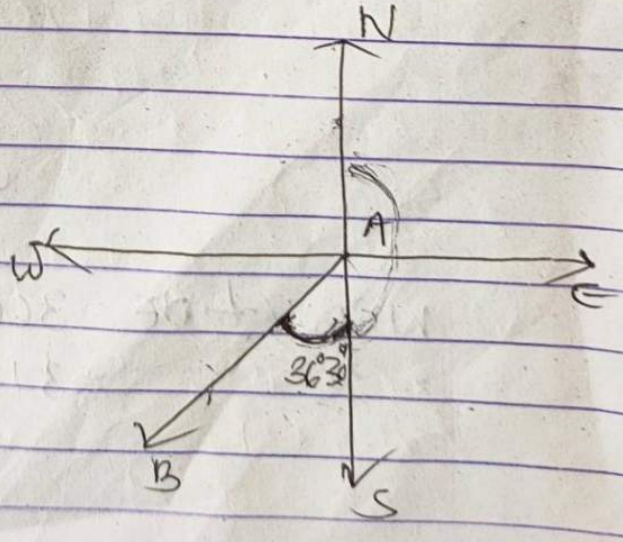
(d) WCB of DE = 320° 30'



QB of DE = 360° - 320° 30'
= N 39° 30' W

Problem - 2 Convert QB into WCB

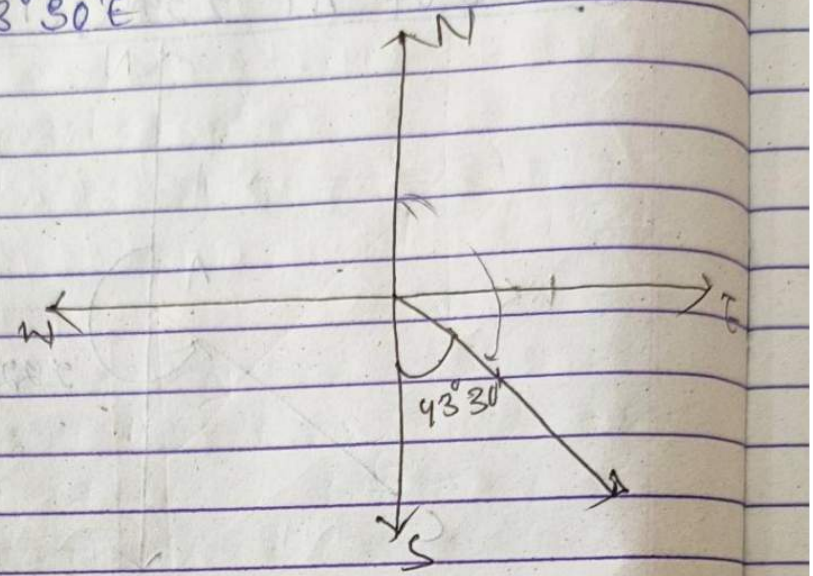
(a) QB of AB = S 36° 30' W



WCB of AB
= 180 + 36° 30'
= 216° 30'

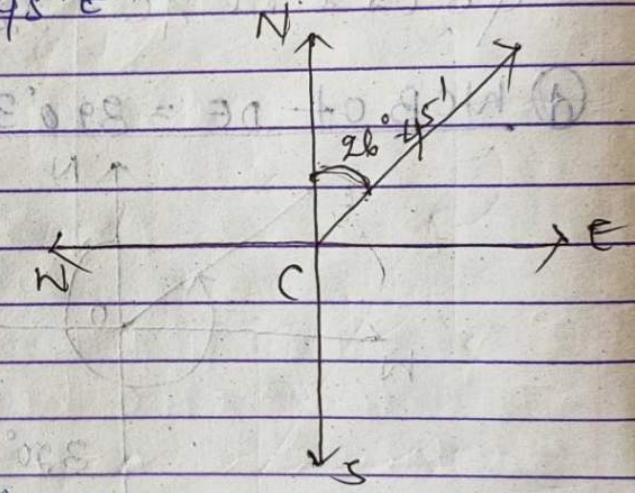
(b) QB of BC = S 43° 30' E

WCB of BC
= 180° - 43° 30'
= 136° 30'

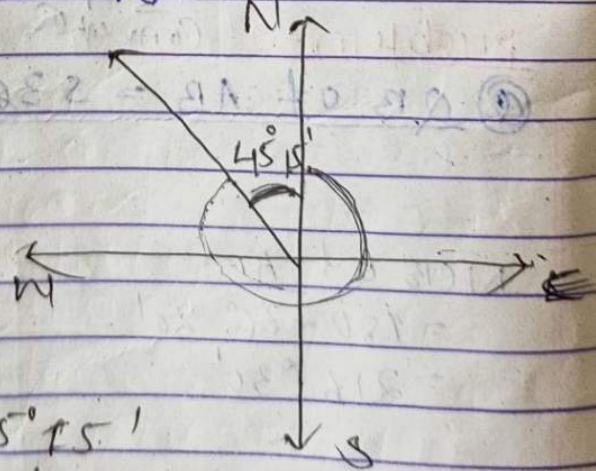


(c) QB of CD = N 26° 45' E

WCB of CD
CD = 26° 45'



(d) QB of DE = N 40° 15' W



WCB of DE = 360° - 45° 15'
= 319° 45'

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* **Fore Bearing:-**
The bearing of a line measured in the direction of progress of survey called fore bearing.

* **Back Bearing:-**
The bearing of a line measured in the direction opposite to survey is called back bearing.

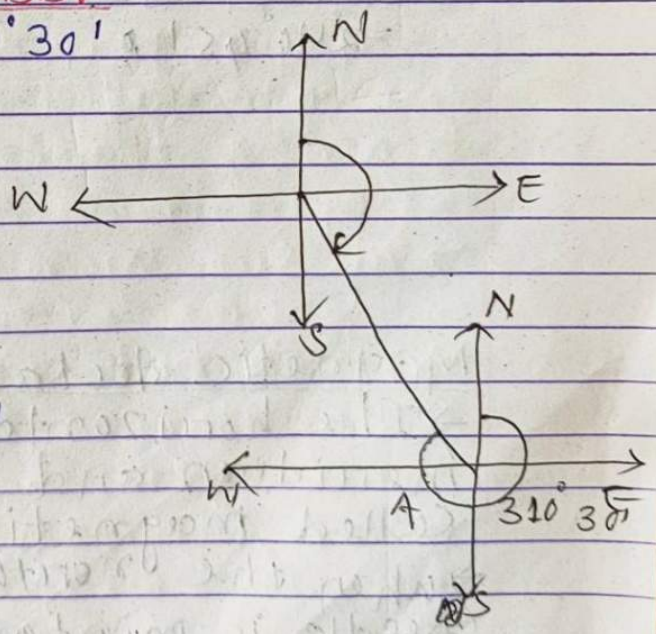
→ In the WCB system the difference between FB and BB should be exactly 180°.

$$\boxed{BB = 180 \pm FB}$$

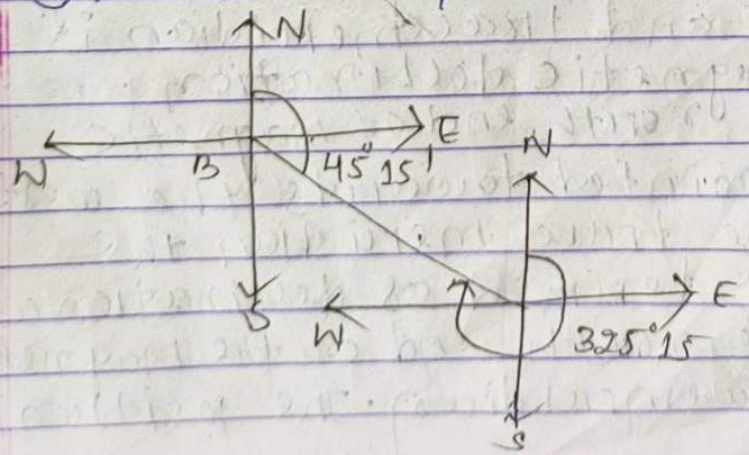
Problem on FB & BB:-

(a) FB of AB = 310°30'

Ans:-
B.B of AB
= 310°30' − 180°
= 130°30'



(b) FB of BC = 145°15'



BB = 145°15' + 180°
= 325°15'