Swami Keshvanand Institute of Technology, Management &Gramothan, Jaipur
I Mid Term Examination, Dec-2022

Semester:	I	Branch:	AI/IT/IOT/EC/EE
Subject:	Basic Civil Engineering	Subject Code:	1FY3-09
Time:	1.5 Hours	Maximum Marks:	20
Session (I/II/III): I			

PART A (short-answer type questions)
(All questions are compulsory)　　　　　　　　(3*2=6)

Q.1 What is the **principal of surveying**?

Q.2 Write short note on:

　　A. **Local attractions** B. **Magnetic declination**

Q.3 What is **Object of levelling**?

PART B (Analytical/Problem solving questions)
(Attempt any 2 Questions)　　　　　　　　(2*4=8)

Q.4 Explain the **differences** between the Prismatic and Surveyor compass.

Q.5 (A) Convert the following **whole circle bearing** to quadrantal bearing.

(i) 22°30′ (ii) 170°12′ (iii)211°54′ (iv) 327°24′

(B) Convert the following **quadrantal bearing** to whole circle bearing.

(i) N 12°24′ E (ii) S 31°36′ E (iii) S 68°6′ W (iv) N 5°42′ W.

Q.6 To measure a **base line**, a steel tape 30 m long, standardised at 15° C with a pull of 80 N was used. Find the **correction per tape length**, if the **temperature** at the time of measurement is **25°** C and the **pull** exerted is **150 N.** Take Young's modulus $E = 2 \times 10^5 N/mm^2$ and coefficient of thermal expansion $\alpha = 11.2 \times 10^{-6}/°C$. Cross-sectional area of tape is 8 mm^2.

Q.7 The following bearings were taken in running a **compass traverse**

Line	Fore bearing	Back bearing
AB	$124^O 30'$	$304^O 30'$
BC	$68^O 30'$	$246^O 0'$
CD	$310^O 30'$	$135^O 30'$
DA	$200^O 0'$	$17^O 30'$

At what stations do you suspect **local attraction**? Find the **correct bearings** of the line and compute the included angle at station B.

Q.8 Define Levelling. What are the uses of leveling? Explain the process of Height of Instrument Method and Rise and Fall method.

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Submitted By: Manmohan sharma			

PART A (short-answer type questions)

Q.1 What is the **principal of surveying**?

Answer: Fundamental Principles of Surveying • Two basic principles of surveying are:

• Always work from whole to the part, and • To locate a new station by at least two measurements (Linear or angular) from fixed reference points

The area is then divided into a number of divisions by forming well-conditioned triangles.

Q.2 Write short note on:

A. Local attractions B. Magnetic declination

Local attraction is the phenomenon by which the magnetic needle is constantly prevented to point towards the magnetic north at a place. This is because that these magnetic compass is influenced by other magnetic objects at that locality such as wires carrying electric current, rails, steel and iron structures, steel tapes etc.

Magnetic declination at a place is the horizontal angle between the true meridian and the magnetic meridian shown by the needle at the time of observation.

Q.3 What is **Object of levelling**?

Answer: 1. To determine the elevation of the given points with respect to the given/assumed reference line or datum.

2. To establish the points at a provided elevation or at various elevations with respect to a given or assumed datum.

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PART B (Analytical/Problem solving questions)

Q.4 Explain the **differences** between the **Prismatic and Surveyor compass**.

Answer:

Prismatic Compass	Surveyor Compass
The magnetic needle in this compass is broad.	The magnetic needle in this compass is of edge bar type.
As the graduated ring is fixed to the needle, it does not rotate with the line of sight.	The graduated ring is fixed to the box and is independent of the needle. Therefore, it rotates with line sight.
Prism is provided at the viewing end.	There is no prism in this compass.
The graduated is read through a prism and the graduations are engraved inverted.	The graduated ring is read directly and the graduations are engraved erect
Graduations are in the whole circle bearing system showing 00 at south, 900 at the west, 1800 at the north, and 2180 at west.	Graduations are in a reduced bearing system, showing at north and south and 900 in east and west. Interchanging of east and west takes place.
Tripod is not be required because the can be held in hand.	Tripod is essential to use the instrument.
Sighting and reading can be done concurrently from the point of the observer.	Sighting and reading cannot be carried out concurrently.
Graduation in the prismatic compass is marked from $0\circ$ to $360\circ$	The Surveyor compass is divided into four quadrants and graduation is marked from $0\circ$ to $90\circ$ in each quadrant.
In a prismatic compass, a mirror is provided with the sight vane.	Sighting the object as well as reading the graduated circle cannot be done simultaneously without changing the position of the eye.

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Q.5 (A) Convert the following **whole circle bearing** to **quadrantal bearing**.

(i) 22°30′ (ii) 170°12′ (iii)211°54′ (iv) 327°24′

(B) Convert the following **quadrantal bearing** to **whole circle bearing.**

(i) N 12°24′ E (ii) S 31°36′ E (iii) S 68°6′ W (iv) N 5°42′ W.

Ans (A)

(i) R.B. = WCB = 22°30′ = N 22°30′ E

(ii) R.B. = 180° − W.CB = 180° − 170°12′ = S 9°48′ E

(iii) R.B. = WCB − 180° = 211°54 − 180° = S 31°54′ E

(iv) R.B. = 360° − WCB = 360° − 327°24′ = N 32°36′ W

(B)

(i) WCB = R.B. = 12°24′

(ii) WCB = 180° − R.B. = 180° − 31°36′ = 148°24′

(iii) WCB = 180° + R.B. = 180° + 68°6′ = 248°6′

(iv) WCB = 360° − R.B. = 360° − 5°42′ = 354°18′

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Q.6 To measure a **base line**, a steel tape 30 m long, standardised at 15° C with a pull of 80 N was used. Find the **correction per tape length**, if the **temperature** at the time of measurement is **25° C** and the **pull** exerted is **150 N.**

Take Young's modulus $E = 2 \times 10^5 N/mm^2$ and coefficient of thermal expansion $\alpha = 11.2 \times 10^{-6}/°C$. Cross-sectional area of tape is 8 mm².

$\underline{Sol^n}$ - $l = 30m$, $\alpha = 11.2 \times 10^{-6}/°c$, $T_o = 15°C$, $P_o = 80N$

$T_m = 25°c$, $P = 150N$

$\therefore$ Correction for temperature

$$C_t = l\alpha(T_m - T_o)$$

$$= 30 \times 11.2 \times 10^{-6}(25-15)$$

$$= 3.360 \times 10^{-3}m$$

correction for pull

$$C_p = \frac{(P - P_o) \times l}{AE}$$

$$= \frac{(150-80) \times 30}{2 \times 10^5 \times 8}$$

$$= 1.3125 \times 10^{-3}m$$

Total correction $= C_t + C_p$

$$= 3.360 \times 10^{-3} + 1.3125 \times 10^{-3}$$

$$= 4.6725 \times 10^{-3}m \text{ per chain length}$$

Q.7 The following bearings were taken in running a **compass traverse**

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Line	Fore bearing	Back bearing
AB	124° 30'	304° 30'
BC	68° 30'	246° 0'
CD	310° 30'	135° 30'
DA	200° 0'	17° 30'

At what stations do you suspect **local attraction**? Find the **correct bearings** of the line and compute the included angle at station B.

Answer:

Line	Fore bearing	Back bearing	Local attraction	Corrected FB	Corrected BB
AB	124° 30'	304° 30'	NO	124° 30'	304° 30'
BC	68° 30'	246° 0'	YES	68° 30'	248° 30'
CD	310° 30'	135° 30'	YES	313° 0'	133° 0'
DA	200° 0'	17° 30'	YES	197° 30'	17° 30'

Interior Angle at station B = 360° − (304° 30' - 68° 30') = 124°

Q.8 Define Levelling. What are the uses of leveling? Explain the process of Height of Instrument Method and Rise and Fall method.

Answer: • Levelling or leveling is a branch of surveying, the object of which is to establish or verify or measure the height of specified points relative to a datum.

• It is widely used in cartography to measure geodetic height, and in construction to measure height differences of construction artifacts.

• Leveling is the general term applied to any of the various processes by which elevations of points or differences in elevation are determined.

uses of leveling

(i). To find the elevations of given points with respect to a given or assumed datum, and

(ii). To establish points at a given elevation or at different elevations with respect to a given or assumed datum.

(A) Height of Instrument Method :-

The basic equations are :-

(B) • Height of instrument for the first setting= RL of BM + BS(at BM)

(C) • Subtract the IS and FS from HI to get RL of intermediate stations and change points.

(D) • Checking: ∑BS - ∑FS = Last RL − First RL. This is −ve for FALL and +ve for RISE.

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(B) Rise and Fall method :-

A. • In this method the difference of the present staff reading is subtracted from the previous staff reading.

B. • Previous reading – present staff reading = +ve, denotes RISE

C. • Previous reading – present staff reading = -ve, denotes FALL

D. • Checking: $\sum BS - \sum FS$ = Last RL – First RL = $\sum Rise - \sum Fall$