I Midterm Solution Paper

PART-A

Ans-1 Role of Civil Engineer in Society:-

Civil Engineers have a great role in the society. They make the life of people better. There are many roles of a civil Engineer. Some of them are listed below.

(1) Design and construction of a building like houses, offices.

(2) Construction of the transportation modes like Roads, Railways, highways.

(3) Water supply like treatment plants.

(4) Prevention of floods by the construction of dams, and storage bodies.

Ans-2 Principle of survey

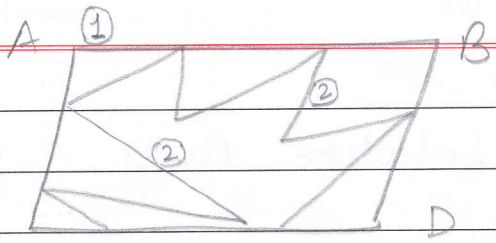
There are two basic principles of surveying

(1) working from whole to part.

(2) location of the point with Reference to atleast two points.

(1) working from whole to part include survey of an area, first a large framework with widely spaced control points is established with great accuracy. With this large network, small frameworks are established with Relatively less accuracy.

Name of Lecturer : Subham

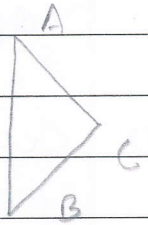


① - First Measurement

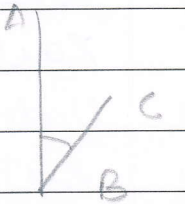
② - secondary measurement.

(2) Location of the point with Reference to at least two points. It include Reference from two different points like these cases.

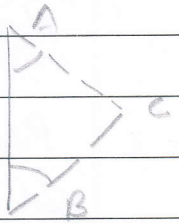
(1) In this case we know distance AB & BC. and location of point C can be verified.



(2) If we know angle ABC & distance BC. the location can be calculated.

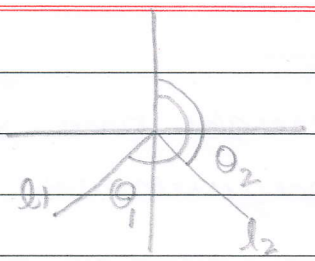


(3) If we know angle ∠A and ∠B then also the location can be calculated.

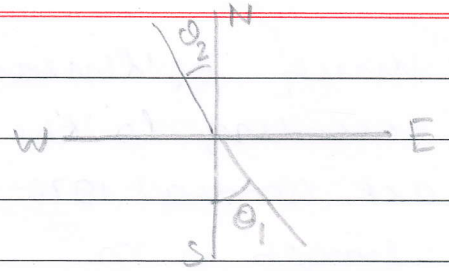


m-3 Whole circle bearing :-

In this system of bearing measurement, the angles is measured clockwise from the point of Reference Meridian. The value of angle varies between 0° to 360°.



WCB



QB

Quadrantal Bearing :- In this system of bearing measurement the angle is measured from north or south direction in clockwise and anticlockwise direction

In this method only a quadrant of a circle is used. hence it is known as quadrant system. It values from 0° to 90°. The bearing measured is called Reduced bearing or quadrant Bearing.

ns-4 A plan graphically Represents the features on or near the earth surface as projected on a horizontal plane. Plans are a set of two dimensional diagram or drawings used to describe a place or an object or to communicate building instructions. Usually plans are drawn on paper and it is drawn on a small scale.

A map is generally drawn on Relatively large scale. A map is a diagrammatic Representation of an area of land or sea showing physical features, cities, Roads etc. and indicates the uneven nature of the ground.

Q-5 Units of linear Measurement.

According to the Standard of weight and measures act. (India), 1976 the unit of measurement of length is m.

Metric units	British units
10 mm = 1 cm	12 inches = 1 foot
10 cm = 1 decimeter	3 feet = 1 yard
10 decimeter = 1 m	5½ yard = 1 Pole
10 m = 1 decameter	4 Pole = 66 feet = 1 chain
1 decameter = 1 hectometer	10 chain = 1 furlong
10 hectometer = 1 Km	8 furlong = 1 mile.

Part - B.

Q-1 The scale of a plan or a map is defined as the fixed Ratio of the distance between 2 points on the sheet and their corresponding distance on the ground.

Following are the types of scale

(i) Plain Scale

→ plain scale is used to measure distance in 2 digits (units and length) for example cm & mm, metre and decimeter etc.

for engineers and architect, plain scale are recommended in the IS 1419-1959.

Scale part	Scale	R.F
A	full size	1:1
	50 cm to a m	1:2
B	40 cm to a m	1:2.5
	20 cm to a m	1:5
C	10 cm to a m	1:10
	5 cm to a m	1:10
d	2 cm to a m	1:50
	1 cm to a m	1:100
e	5 mm to a m	1:200
	2 mm to a m	1:500
f	1 mm to a m	1:1000
	0.5 mm to a m	1:2000.

(2) diagonal scale

The diagonal scale can measure distance upto 3 digits (unit tenth and hundredth) for eg. meter, decimeter and centimeter.

for diagonal scale the Indian Std IS: 1562 :1962 has four types of diagonal scale.

Scale part.	Scale	overall length
A	1/1	152 cm
B.	1/100000	102 cm
	1/50000	
	1/25000	

C. 1/1000000 — 52cm
1/50000
1/25000

D. 1/100000 — 152cm
1/8000
1/4000

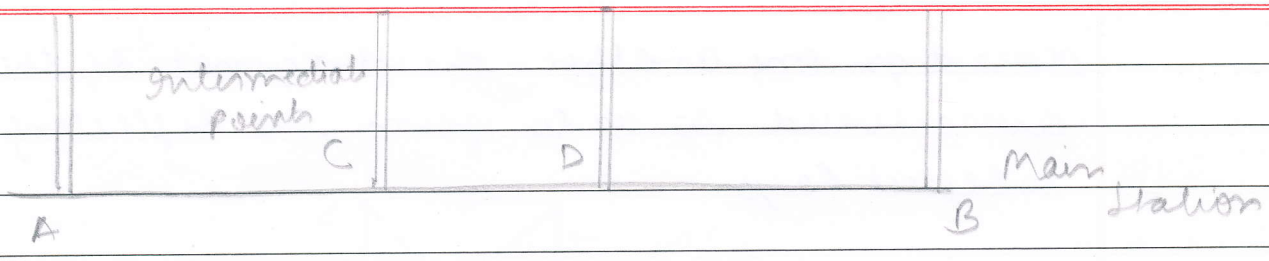
(3) Scale of chords.
This scale is used for angular measurements. If we have to make an angle on drawing sheet and we do not have a protactor, then this scale is very useful.

ns - Direct Ranging on plain ground.
The method of laying the intermediate points in between the main station points to measure the distance is called Ranging.

Direct Ranging means the ends of a line are intervisible and can be measured by a chain or tape.

It is done by two methods
(a) by eye judgement (b) by line Ranger.

(a) by eye judgement method.
This method is done by the surveyor and the assistant on the field with the help of a Ranging Rods and tape.



Procedure

let say there are 2 point as stations A and B. and we need to mark the intermediate points C, D in between them.

(1) Ranging Rods are erected at point A and B.

(2) A surveyor stands at point A and the assistant will stand in between point A & B. holding the Ranging Rod.

(3) The assistant is directed to move to left or Right until the 3 Ranging Rod are in line.

(4) The surveyor will check the bottom of 3 Ranging Rod that they are in line or not

(5) The point C is marked at that point and chain is measured by stretching it on the ground.

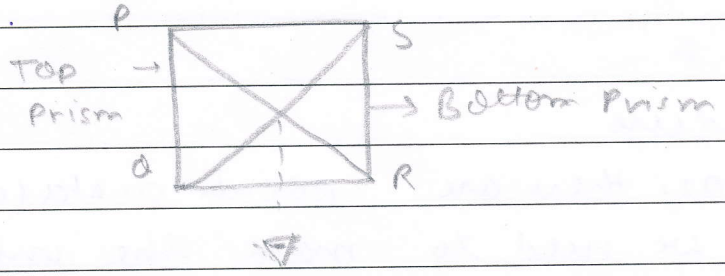
(6) Now the Ranging Rod is plugged out from A point and marked in between points of C & B. and the process is followed in same manner.

(b) By a line Ranger

a line Ranger is a surveying instrument used for establishing intermediate point during Ranging without actually going to the either end of the Survey line.

A line Ranger consist of two prism Right angle

placed on one another. the diagonal of the two prism are silvered so as to form the Reflecting surfaces to Reflect Rays.



Procedure

1) two Ranging Rod are marked at point A and B.
2) The surveyor will hold the line Ranger at the level of his eye and will stand at any point C.
3) Now he will observe Ranging Rod at A through the upper prism POR. The light Ray gets Reflected and and enter the eye at Right angle to the line AB.
4) In the same manner the surveyor will observe the Ranging Rod at B.
5) if the images from Rod A and B match then the point C is in line with the line AB.

u- Technical Jobs in Civil Engineering

The technical jobs are categorised on the bases of two categories

(a) On the baris of employer agency.

(1) Government Sector:- A civil Engineer has the highest chances of getting a jobs in the government sector as many dept. recruit the Civil Engineer like
Central Water commission (WRD)

Central Public Works dept CPWD
Military Engineering Services MES.
Railways, Central Pollution Board
State level dept include like Public works dept PWD, Water resources dept WRD etc.

(b) Public Sector
In India there are many Private Sector undertakings (PSUs). These companies recruit the Engineers for the construction and execution work like.
(1) Bharat Petroleum corporation limited (BPCL)
(2) National Thermal Power Corporation (NTPC)
(3) Coal India limited (CIL)
(4) Steel authority of India (SAIL)

(c) Private Sector:-
Private Sector companies are those which are owned by any person or group of persons. There are many companies like Larson & Turbo (L&T), Delhi land and finance (DLF), Tata Projects limited etc.

On the basis of type of work:
(a) Design work:- It includes every type of structural work with the aid of software like autoCAD, StaadPRO, etc.

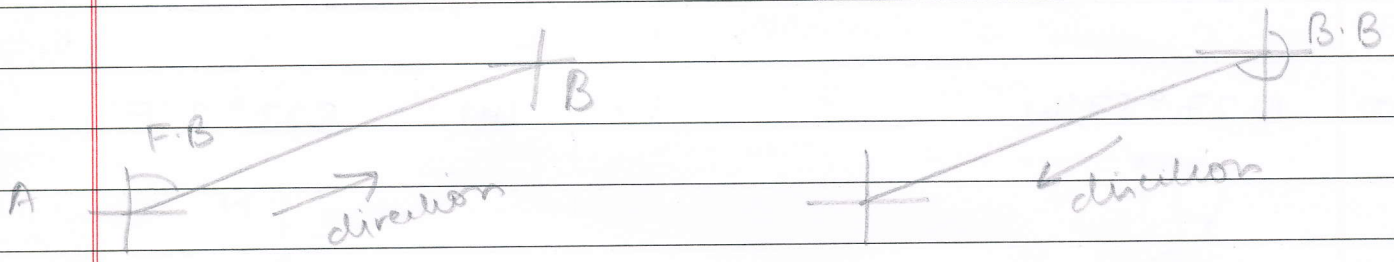
(b) Site Work.

A civil Engineer is Responsible for Execution of the design of any building or bridge etc. he perform a technical, Organisational and Supervisory Role on the construction projects. telling out the survey work and installing the construction operations.

	Prismatic	Surveyor
(1)	It contains a prism that is 45° Reflecting type to take Reading.	The Reading is taken by the seeing on top of the glass cover.
(2)	The Angles are in Whole circle bearing	The angles are in Quadrantal bearing.
(3)	The needle is broad shaped.	The needle is edge bar shaped
(4)	The graduation are inverted on the Ring.	The graduation are simply engraved on the Ring.
(5)	It is mostly not used on a tripod.	It is generally used on the tripod.

Ans- FORE bearing :- The bearing measured along the line of work in progress that is called fore bearing.

Back Bearing :- The bearing a angle measured in the direction of opposite to the working direction is called Back Bearing



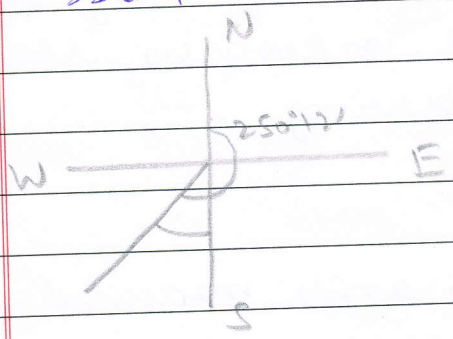
Bench Mark (B.M)

It is a Relatively permanent point that is taken as a Reference for measuring the elevation of other points. Any point whose elevation is known can be taken as a B.M.

Reduced Level. (R.L).

The height of any point Relative to a datum is called Reduced level. The elevation, altitude and Reduced level carry the same basic meaning.

M- 250°12'

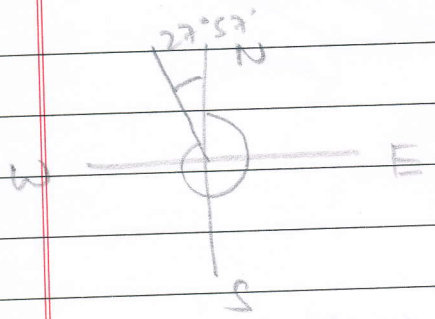


OB = 250°12' − 180°00

= 70°12'

S70°12'W

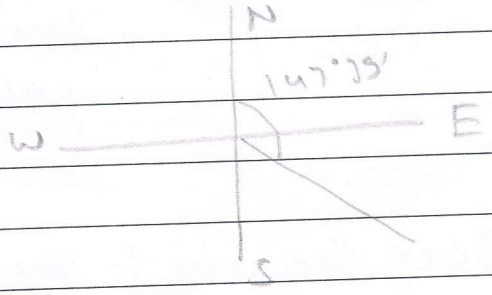
(3) N 27°57'W



WCB = 360° − 27°57'

= 332°3'

(2) 147°39'

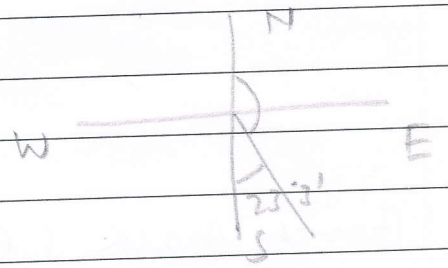


OB = 147°39' − 180°

= 32°21'

S32°21'E

(4) S23°3'E



WCB = 180° − 23°3'

= 156°57'

PART - C

m-1 Levelling.

Levelling is a branch of Surveying used for finding the elevations of points with Reference to a point whose elevation is Known or assumed.

There are defferent instruments used for levelling but some are basic fundamental which are used in one or another form
They are as fellows

(i) Level instrument
(ii) Levelling staff.

(i) Level Instrument

The basic purpose of a levelling instrumen is to provide a horizontal line of sight. any levelling instrument consist essentially fellowing parts.

1. A telescope used to provide a line of sight
2. A level tube to ensure that line of sight is horizontal
3. A levelling head used to make the level the Instrument
4. A tripod is used to mount the level instrument.

There are many types of levelling Instrument like

(a) Dumpy level: It consist of a telescope fixed on a vertical simple. The spindle revolves in the socket of the levelling head.

Name of Lecturer : .....

The dumpy level is set on a tripod stand and adjust the level tube with the help of levelling screw and foot screws.

(2) Tilting level :- for precise and quick levelling it is used. It can be tilted on the horizontal axis or a pivot in the plane upwards or downwards through a small angle by means of a tilting screw.

(3) Auto level :- It is a popular level and surveying instrument. It depend upon the line of collimation perpendicular to the direction of gravity. The levelling of the bubble tube is necessary for the working of the instrument. It contain mirror and prism.

Levelling Staff

It is a straight rectangular Rod. On which graduation are marked to take the Reading. The foot of the staff represent zero Reading. The Reading on levelling staff shows the amount by which the station is above or below the line of sight.

It is classified in two types

(1) Self Reading Staff.

(2) Target Staff.

(1) Self Reading staff :- They are the most common the staff is put on the station whose elevation needs to be determined

Self Reading staff are of 3 types

(1) Solid Staff.
This is of the length of 3m. They are generally of seasoned timber. As there are no joints or hinges in staff so the reading is quite accurate

(2) Folding staff:
It comprises 2 meter wooden pieces with the joint assembly. The joint is of detachable type. with a locking device at the back.

(3) Telescopic staff:
This staff is available in different size even greater than 5m and 4m. different sections contain length of different measurements.

(b) Target staff
This staff is helpful to the surveyor as the staff contain moving target. The target is a circular or oval shape, painted Red and white in alternate quadrant. - It is a fitted with a vernier at its Centre.

ws-2 Given data for the solution

length of tape = 20m.

total length measured = 612.6m.

Remaining distance = 612.6m - (300 + 200) = 112.6m

area of cross section = 0.0725 cm^2

Correction for temperature

$$C_t = \alpha (T_m - T_0) L$$
$$= 612.6 \times 9.4 \times 10^{-6} \times (32 - 18)$$
$$= 0.081\ m \text{ (additive)}$$

Correction for pull

The applied and standard pull are given in kg, area of cross-section in cm^2 but modulus of elasticity (E) is given in N/mm^2. So either we need to convert the pull to Newton and area to mm^2 or we can convert the value of E to kg/cm^2.

So, $E = 2.06 \times 10^5\ N/mm^2$

$$= \frac{2.06 \times 10^5}{9.81}\ kg/mm^2 \text{ (dividing by value of 'g')}$$

$$= \frac{2.06 \times 10^5 \times 100}{9.81}\ kg/cm^2$$

$$= 2.1 \times 10^6\ kg/cm^2$$

Now correction for pull is given by

$$C_p = \frac{(P - P_0)L}{AE}$$

$$= \frac{(14-19) \times 612.6}{0.0725 \times 2.1 \times 10^6}$$

$$= 0.0020\,m \text{ (subtractive)}$$

correction for Slope

$$C_s = \Sigma L (1 - \cos\theta)$$

$$= 300 \times (1 - \cos 3°15') + 200 \times (1 - \cos 2°6') + 112.6 \times (1 - \cos 6°8'')$$

$$= 1.26\,m \text{ (subtractive)}$$

So the actual length of the survey line is

$$L_{true} = 612.6 + 0.081 - 0.020 - 1.26$$

$$= \boxed{611.4\,m}$$

ns - Following are the branches of civil eng. :—

(a) Structural engineering :-

S.E focuses on the framework of the structure and on designing those structures to withstand the stress and pressure of their environment and remain safe, stable and secure throughout their life.

- Structural engineers make sure that the structure doesn't pull or break.
- Structural engineering includes the design of Reniforced concrete cement (RCC) structure as well as steel structure design.

(b) Geotechnical engineering.

Geotechnical engineering or soil engineering is the branch of civil Engineering which involves the study of soil, its behavior and application as a building material.

- Karl Terzaghi is known as the father of soil Mechanics. According to him "geotechnical engineering is the application of laws of Mechanics and hydraulics to engineering problem dealing with sediments produced by the desigtegration of Rocks.
- The good of geotechnical engines could range from design of foundation and temporary excavation support on work for highways and railways.

- it also involves the testing of soil in field and laboratory to calculate the properties of soil.

(c) Environmental Engineering :—

Environmental engineering includes protection from the environment from the adverse effects of human activities by the application of scientific and engineering principls They use the principle of engineering. soil science biology and chemistry to develop soultion to environmental problems.

Environmental engineering can be divided into 2 parts

(i) water supply engineering.
(ii) Waster water engineering.

(d) Transportation engineering :—

Transportation engineering can be defined as the application of technology and scientific principles for the planning, designing, Construction and maintainence of any mode of transportation. the solution to transportation problems should be economic, environmentally friendly, durable along with safety and comfortability.

Transportation engineering includes all types of transportation and can be divided into 4 major categories.

(1) Highway engineering :— it is a sub branch of transportation engineering which deals with planning designing, construction, operation and maintainence of Roads, bridges tunnels etc.

(2) Railway engineering :— it deals with planning, designing construction, operation, management of Rail transport system A civil engineer in Railways make sure that the aligement of track correct.

(3) Airport engineering :— It deal wit planning designing and construction of terminals runways and plan bases etc.

(4) water way engineering :— It deals with transportation system with water. it includes the design and operation of harbor & duks. etc in comideration of both human and goods.

(E) Water Resource engineering :—
It deals with the collection and management of water and also take care of

supplying of water for human use. Removal of waste water and to develop methods to avoid damage due to floods.

Irrigation engineering — Dam engineering comes under water Resource engineering It also deals with the scentific study of movement distribution and quality of water. it also deals with the study and design of works in connection with River control water logging and generation of hydroallectric power from dams.

(F) Surveying

Surveying is required at the starting of work and also at the during the construction.

Land Surveying is the detailed study or inspection by gathering information through observation fields measurements, use of legal instruments and datal analysis for planning designing and establishing of property boundaries and marking construction points.

Surveying user electronic devices like Theodolite levels, aeval photography. GPS for gathering info. about the earth.

(6) Construction Management

It is a discipline of civil engineering which deals with the design planning & const. of every type of structure it is sub divided into following categories.

(1) Building material :-

it deals with the study of all types of building material like stones bricks, mortar, cement steel glass etc with respect to their properties.

(2) Building construction :- it deals with various aspects of the construction of building elements like floor, Roofs column etc.

(3) Building Technology :- it deals with the planning aspect of Building or structure like Building by laws, The orientation of the structure, various building amenities entries like ventilation more insolution etc.

Role of civil engineer in Society :-

Civil engineers have a great Role They make the life of people better. there are many the life of people better. There are many fol. of a civil engineer

RTU ROLL NO. .....

ARYA GROUP OF COLLEGES

I MID TERM EXAMINATION 2018-19 (I Sem.)

1FY3-09_Basic Civil Engineering

BRANCH: Common to All

Max Marks:- 40 **Time:- 2 hrs.**

PART A (Attempt All)

Q.1	(a)	Explain the role of civil engineer in society.	
	(b)	Explain the principal of surveying.	
	(c)	Explain Whole circle bearing and Quadrantal bearing.	5*2
	(d)	Differentiate between Plans and Maps.	
	(e)	Explain the units of linear measurement.	

PART B (Attempt any Four)

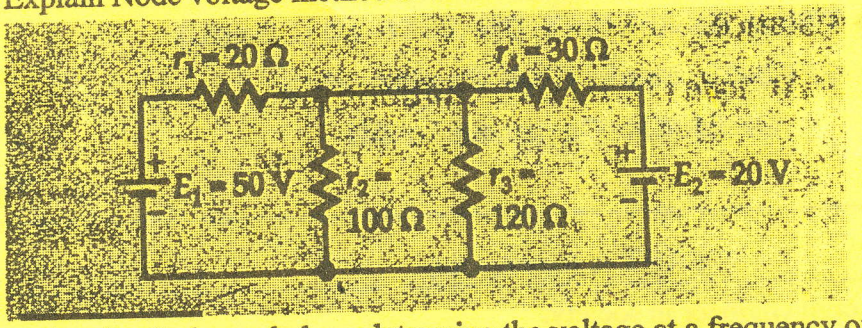
Q.2	(a)	What are the different types of scales used in surveying?	
	(b)	Explain direct ranging on plain ground with the help of a diagram.	
	(c)	Explain the scope of civil engineering with reference to the area of technical jobs.	
	(d)	Explain the difference between prismatic compass and surveyor compass.	4*4
	(e)	Explain following terms : (i) Fore Bearing & Back Bearing (ii) Bench Mark & Reduced level	
	(f)	Convert the following WCB into QB and Vice versa: (i) 250°12' (ii) 147°39' (iii) N27°57'W (iv) S23°3'E	

PART C (Attempt any Two)

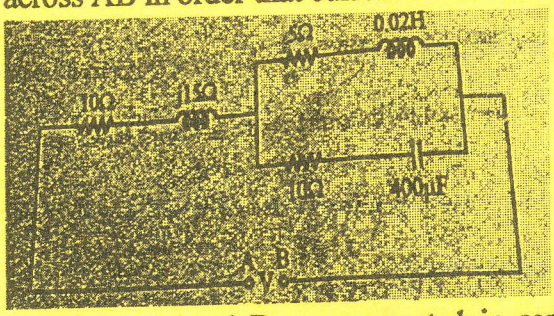
Q.2	(a)	Explain the different branches of civil engineering in brief.	
	(b)	Explain different instrument used for levelling in detail.	
	(c)	A 20m long tape was set at a temp of 18C ° and the pull of 19 kg. The distance measured by the tape was 612.6 m. The pull applied was 14 kg and the mean temp was 32°C. The area of cross section of tape is 0.0725cm^2, the coefficient of thermal expansion is 9.4*10^{-6} per °C. For the first 300m the slope was 3°15', for next 200 m the slope was 2°6′and for the remaining distance the slope was 6°8′. Find the actual distance of the survey line. (E=2.06*10^5 N/mm^2)	2*7

PART C (Attempt any Two)

Q.2 (a) Explain Node voltage method and Mesh current method with example.



(b) In the circuit shown below, determine the voltage at a frequency of 50Hz to be applied across AB in order that current in the circuit drawn is 10A. 2*7



(c) Two coils A and B are connected in series across A 240V, 50Hz power supply. The resistance of coil A is 5Ω and inductance of B is 0.015H. If the input from the supply is 3KW and 2K VAR. Find the inductance of A and resistance of B. Also calculate the voltage across each coil.