

## B.E. CONSTRUCTION ENGINEERING SECOND YEAR FIRST SEMESTER - 2018

Subject : SURVEYING

Time : 3hr

Full Marks : 100

Part -I

**Instructions:**

1. Answer any **TWO** questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Figures to the right indicate full marks.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

1. (i) Illustrate with neat sketches, various types of obstacles encountered in chain surveying. (4)
- (ii) Explain the temporary adjustments of a theodolite. (4)
- (iii) What do you mean by 'Booking and reduction of levels'? Compare the methods that you usually use. (5)
- (iv) The following staff readings were observed in sequence: 1.324, 2.605, 1.385, 0.638, 0.655, 1.085, 2.125 and 1.555. The instrument was shifted after third and sixth readings. The third reading was taken to an arbitrary bench mark of elevation 75.000. Find the RL of all other points, using height of collimation method or rise and fall method with necessary checks. (12)
2. (i) Prepare Gale's traverse table using the data of the closed traverse given below, after checking and balancing the traverse. The bearing of line AB observed was  $222^{\circ}01'30''$ .

(12)

Line	AB	BC	CD	DA
Length	155.25	170.4	202.6	139.4
Station	A	B	C	D
Included Angle	$101^{\circ}39'30''$	$95^{\circ}32'50''$	$75^{\circ}15'30''$	$87^{\circ}32'50''$

(ii) To determine the distance between two points P and Q and elevation of Q, following observation were made: Height of tachometer at P = 1.380 m, Vertical angle at P = + 5° 25' 25", Staff reading (with staff vertical) = 1.545, 1.905, 2.265, R.L. of P = 125.265 m. Calculate the unknown parameters? (5)

(iii) Briefly mention the characteristics of contour. (8)

3. (a) From the given data calculate all the data for setting of a Transition curve with **NECESSARY CHECKS**? Minimum peg interval = 5m and 10m for transition and circular curve respectively, Velocity = 65km/hr Radius = 255m  $\alpha$  = rate of change of radial acceleration = 1.15m/sec<sup>3</sup>, meterage at intersection point=500m, I=Intersection angle = 35°35'35". (12)

(b) Derive an expression for the horizontal distance of a vertical staff from a tachometer if the line of sight of the telescope is inclined upward. (5)

© Calculate the missing data of the closed loop traverse ABCD:

Line	Length (m)	W.C.B.
AB	650	60°
BC	1250	?
CD	890	?
DA	1450	310°

(8)

## Surveying

### PART - II

Answer Q.no.1 and any two from the rest.

1. Choose the correct answer from the following questions:

1 x 5

- (a) Two-point and three-point problems are methods of  
(i) Traversing (ii) Resection only (iii) Resection and orientation  
(iv) Orientation only.
- (b) The angle of dip at the magnetic pole is  
(i)  $0^{\circ}$  (ii)  $90^{\circ}$  (iii)  $45^{\circ}$  (iv) none of the above
- (c) The graduations in a prismatic compass  
(i) are inverted (ii) have zero at south (iii) are from  $0^{\circ}$  to  $360^{\circ}$  (iv) all the above.
- (d) The quadrantal bearing of a line is determined by a  
(i) Prismatic compass (ii) Surveyor's compass (iii) Celestial observations (iv) None of the above.
- (e) Napier's rule is applicable for scalene triangles only  
(i) True (ii) False

2. a) State and explain Bowditch's rule in connection with compass surveying.

b) Explain the variations of magnetic declination.

c) Below are the bearings observed in a traverse survey conducted with a prismatic compass at a place where local attraction was suspected:

<u>Line</u>	<u>F.B.</u>	<u>B.B.</u>
PQ	$124^{\circ}30'$	$304^{\circ}30'$
QR	$68^{\circ}15'$	$246^{\circ}00'$
RS	$310^{\circ}30'$	$135^{\circ}15'$
SP	$200^{\circ}15'$	$17^{\circ}45'$

At what stations do you suspect local attraction? Find the corrected bearings of the lines and also calculate the included angles. 5+5+12

3. (a) Explain the principle of plane table surveying.
- (b) Mention the various methods of plane table traverse. Explain any one of them giving neat sketch.
- (c) Illustrate with neat sketch the three point problem of orientation of plane table survey. 5+7+10

4. (a) What is a satellite station? Explain the various cases.
- (b) Directions are observed from a satellite station S, 62.195m from station C, with the following results:

$$\begin{aligned}A &= 00^{\circ} \\B &= 71^{\circ}54' 32.25'' \\C &= 296^{\circ}12'\end{aligned}$$

The approximate lengths of AC and BC are respectively 16,485 m and 21,733 m. Compute the angle subtended at the centre C. 10 + 10

5. (a) What are the necessary & sufficient conditions for a closed polygon with a central station? State and prove the side condition.
- (b) In a braced quadrilateral ABCD the following angles are known:

<u>Angle</u>	<u>Magnitude</u>
ABD	$57^{\circ}50'$
DBC	$44^{\circ}24'$
BCA	$17^{\circ}16'$
ACD	$55^{\circ}33'$

Find out the angles CAD and BDA.

10+10