SURVEYING
(CIVL 2203)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) A 2 degree curve of chord length 20 m has a radius of
(a) 573m (b) 286.5m (c) 143m (d) 72.5m.

(ii) A fathometer uses the principle of
(a) Direct levelling (b) Echo sounding
(c) Barometric levelling (d) Hypsometry.

(iii) For roads the maximum value of centrifugal ratio is taken to be
(a) ½ (b) 1/3 (c) ¼ (d) 1/5

(iv) The operation of levelling to determine the elevation between two points is known as
(a) Simple Levelling (b) Fly Levelling
(c) Differential Levelling (d) Reciprocal Levelling.

(v) In Quadrantral Bearing system a line is said to be free from local attraction if FB and BB are
(a) Numerically equal
(b) Numerically equal with opposite quadrants
(c) Discrete values
(d) Numerically equal with same quadrants.

(vi) The contour interval is inversely proportional to the
(a) Steepness of the area (b) Scale of the map
(c) Extent of the area (d) All of the above.

(vii) The spiral angle of a transition curve will be given by the equation
(a) $L^2/2R$ (b) $L/2R$ (c) $2R/L$ (d) $2R/L^2$

(viii) For a maximum velocity of 60kmph for a broad gauge line, find out the super elevation required. Radius of the curve is 350m.
(a) 136mm (b) 146mm (c) 236mm (d) 126mm

(ix) The principle of surveying is to work from
(a) Centre to the boundary (b) Whole to part
(c) Part to whole (d) All of these.

(x) The vertical distance between two adjacent contour lines is called
(a) Contour gradient (b) Contour interval
(c) Vertical equivalent (d) Horizontal line.

Group – B

2. (a) Describe briefly how plane surveying differs from geodetic surveying. How to determine the presence of local attraction in an area?

(b) The following are the observed bearings of the lines of a traverse ABCDEA with a compass in a place where local attractions was suspected.

Line	FB	BB
AB	191˚45'	13'
BC	39˚30'	222˚30'
CD	22˚15'	200˚30'
DE	242˚45'	62˚45'
EA	330˚15'	147˚45'

Find the correct bearings of the lines.

(2 + 2) + 8 = 12

3. (a) What is a two point problem? Explain with a neat sketch the procedure of solving a two point problem in plane table surveying.

(b) Define the following:
(i) Whole circle bearing and reduced bearing.
(ii) Magnetic declination.

(3 + 6) + 3 = 12

Group – C

4. (a) Elaborate the difference between collimation system and rise and fall system used in calculation of reduced level.

(b) The following successive readings were taken with a dumpy level along a chain line at common intervals of 20m. The first reading was taken on a chainage of 140m. The RL of the second change point was 107.215m. The instrument was shifted after the third and seventh readings. Calculate the RLs of all the points.
3.150, 2.245, 1.125, 3.860, 2.125, 0.76, 2.235, 0.470, 1.935, 3.225 and 3.890m.

5 + 7 = 12

5. (a) Define the terms "contour line", "contour interval" and "horizontal equivalent". What is the difference between a theodolite and a tacheometer?

   (b) What are the characteristics of contour lines?

(2 + 2 + 2 + 2) + 4 = 12

Group – D

6. (a) The following offsets were taken at 15 m intervals from a survey line to an irregular boundary line:

   3.8, 5.1, 6.5, 6.8, 5.9, 5.9, 4.2, 7.0, 6.6, 5.8 and 4.2

   Evaluate the area enclosed between the survey line, the irregular boundary line and the first and last offsets by:
   (i) The trapezoidal rule
   (ii) Simpson's rule.

   (b) At a certain section an embankment formed on level ground has a height at its centre line of 3.1m. If the breadth of formation is 12.5m, then determine
   (i) The side widths
   (ii) The area of cross section given that the side slope is 1 vertical to 2.5 horizontal.

6 + 6 = 12

7. A curve has a radius of 400m and a deflection angle of 40°. Evaluate and tabulate the angles to set out the curve using Rankine's method. A 20m chain is used. Assume the starting chainage of the curve to be 0m.

12

Group – E

8. Explain in brief the concept of triangulation. What is grid iron system and central system in triangulation? What is meant by strength of figure?

(4 × 3) = 12

9. (a) Explain briefly the following terminologies used in aerial photogrammetry with sketch where applicable:
   (i) Exposure station
   (ii) Picture plane
   (iii) Photograph nadir
   (iv) Principal point.

   (b) Explain the process of locating soundings by the following methods:
   (i) Location by cross rope
   (ii) Range and time intervals.

8 + 4 = 12

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