Code : 011404

B.Tech 4th Semester Exam., 2016

FIELD MEASUREMENT (SURVEYING)

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

*(ii) There are **NINE** questions in this paper.*

*(iii) Attempt **FIVE** questions in all.*

*(iv) Question No. **1** is compulsory.*

1. Answer any *seven* of the following questions : 14

   (a) What is the main principle of surveying?

   (b) What is the fundamental difference between surveying and leveling?

   (c) What is reconnaissance survey?

   (d) In a chaining operation, who is the leader and who is the follower?

   (e) What is change point?

   (f) What is transiting?

(g) What is baseline of survey?

(h) What is tacheometry?

(i) What is the principle of tacheometry?

2. (a) Construct a diagonal scale representing 1 cm = 2·5 m and show a distance of 42·7 m on it. 6

(b) A 20 m steel tape was standardized on flat ground at a temperature of 20 °C and under a pull of 15 kg. The tape was used in catenary at a temperature of 30 °C and under a pull of P kg. The cross-sectional area of the tape is 0·22 cm^2 and its total weight is 400 g. The Young's modulus and coefficient of linear expansion of steel are $2{\cdot}1\times10^6$ kg/cm^2 and 11×10^{-6} per °C respectively. Find the correct horizontal distance, if P is equal to 10 kg. 8

3. (a) Describe briefly how plane surveying differs from geodetic surveying. 6

(b) A chain line ABC crosses a river, B and C being on the near and distant banks respectively. A line BD of length 60 m is set out at right angles to the chain line at B. If the bearings at D to the stations C and B were 65°30′ and 110°30′ respectively, find the width of the river. 8

4. (a) Define the following : 5

(i) Whole-circle bearing and reduced bearing

(ii) True meridian and magnetic meridian

(b) The bearings of the sides of a traverse $ABCDE$ are as follows :

Side	*Fore bearing*	*Back bearing*
AB	12°00′	192°00′
BC	271°30′	91°30′
CD	189°15′	9°15′
DE	124°45′	304°45′
EA	97°15′	277°15′

Calculate the interior angles of the traverse and check it. 9

5. (a) What is the principle of plane table survey? Name the different instruments and accessories used in it. 7

(b) What is a two-point problem? Explain with a neat sketch the procedure of solving a two-point problem in plane table surveying. 7

6. (a) Name the different types of levelling operations and explain any one. 5

(b) The following readings are successively taken with a level :

0·255, 0·457, 0·760, 1·750, 1·985, 2·530, 1·980, 0·845, 0·680 and 2·535

The position of the instrument was changed after the third and eighth readings. Prepare a level book and calculate the RLs of different points. The RL of first point is 105·750. Apply the usual checks. 9

7. (a) Define the terms 'contour line', 'contour interval' and 'horizontal equivalent'. 6

(b) While measuring a chain line *AB*, the following offsets are taken :

(i) A telegraph post is 10 m perpendicularly from 2·5 m chainage to the right of the chain line

(ii) A road crosses obliquely from left to right at 10 m and 14 m chainage. Perpendicular offsets are 2 m and 3 m to the side of the road from 5 m and 20 m chainage respectively

(iii) A tube well is 5 m perpendicularly from 30 m chainage to the left of the chain line

(iv) Total chainage of *AB* is 45 m

How would you enter the field book? 8

8. (a) What is the temporary adjustment of a theodolite? Describe the process of such adjustment. 6

(b) A tacheometer was set up at a station *P* and the following readings were obtained on a staff vertically held :

Inst. station	*Staff station*	*Vertical angle*	*Hair readings*	*Remarks*
P	*BM*	− 4° 20′	1·40, 1·60, 2·35	*RL* of *BM* = 720·50 m
P	*Q*	+ 7° 12′	0·65, 1·40, 2·15	

Calculate the horizontal distance *PQ* and *RL* of *Q*, when the constants of instrument are 100 and 0·15. 8

9. Write short notes on any *three* of the following : 14

(a) Leveling staff

(b) Optical square

(c) EDM

(d) Dumpy level

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