TED (15) – 2011 Reg. No. ....

(REVISION — 2015) Signature ....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2019

SURVEYING - I

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer *all* questions in one or two sentences. Each question carries 2 marks.

1. Differentiate base line and tie line.
2. Define magnetic dip.
3. Give the purpose of arithmetic check in leveling calculations.
4. Define fly leveling.
5. Draw contour representation of uniform sloping ground. (5×2 = 10)

PART — B

(Maximum marks : 30)

II Answer any *five* of the following questions. Each question carries 6 marks.

1. Describe reference sketch for selection of stations for a survey work.
2. List methods of plane table survey and give the situation for selecting each method.
3. Tabulate the difference between the prismatic compass and survey's compass.
4. The fore bearing of one outside boundary of a foot ball court is 45°20′. Calculate fore bearings and back bearings of other three boundary lines taken in clock wise direction.
5. Explain back sight and fore sight in leveling survey and write the purpose of equalization of back sight and fore sight.
6. Explain sensitiveness of bubble tube.
7. Briefly explain uses of contour maps. (5×6 = 30)

Marks

PART — C

(Maximum marks : 60)

(Answer one full question from each unit. Each full question carries 15 marks.)

UNIT — I

III (a) Illustrate and explain types of obstructions both for chaining and vision while measuring a chain line. 8

(b) Explain points kept in view in booking of field book in chain survey observations. 7

OR

IV (a) List and explain instrument for setting out right angles in chain survey. 7

(b) Explain with neat sketch the method of resection in plane table survey. 8

UNIT — II

V (a) List and explain the different types of compass used in compass survey. 7

(b) The following bearings were observed in running a compass traverse. Determine places where local attraction suspected. And also calculate corrected bearing.

Line	*Fore bearing*	*Back bearing*
PQ	044° 30′	226° 30′
QR	124° 30′	303° 15′
RS	181° 00′	001° 00′
SP	289° 30′	108° 45′

8

OR

VI (a) Differentiate magnetic dip and declination. 7

(b) The following are the bearing of the line of closed traverse ABCD. Sketch the traverse and calculate the included angle with suitable check.

Line	*Fore bearing*
AB	N45° 10′ E
BC	S 60° 40′ E
CD	S 09° 50′ W
DA	N 80° 40′ W

8

UNIT — III

VII (a) List and explain different types of leveling staff used in leveling survey. 7

(b) The staff readings were observed for a leveling survey work as follows : 1.820, 2.150, 1.230, 1.460, 0.905, 2.345, 1.995, 1.860. The staff readings at 3rd and 4th are inverted and after 5th reading instrument shifted. Reduced level of first staff point was 50.000. Calculate reduced level of all other points in collimation method. 8

OR

Marks

VIII (a) Explain important axes of dumpy level and specify their relations. 7

(b) The staff reading was observed for a leveling survey work as follows. 1.820, 2.150, 1.230, 1.460, 0.905, 2.345, 1.995, 1.860. The staff reading at 3rd and 4th are inverted. Reduced level of first staff point was 50.000. Calculate reduced level of all other points in collimation method. 8

UNIT — IV

IX (a) Write the purpose of permanent adjustment in dumpy level. Explain different methods of permanent adjustment. 8

(b) List and explain different methods of interpolation of contour. 7

OR

X (a) Explain Indirect methods of contouring. 7

(b) Prepare field book tabulation and cross section of road alignment at chainage 110.00 of road alignment with following field observation details.

Chainage 110.00

Reduced level of chainage 110.00 is 55.050

Staff observation at 110.00 chainage 1.440

Left side staff observations at 3.0m, 6.0m, 9.0m and 10.70m are 1.560, 1.630, 1.800 and 1.990 respectively.

Right side staff observations at 3.0m, 6.0m, 8.50m and 10.00are 1.300, 1.10, 0.995 and 0.850 respectively.

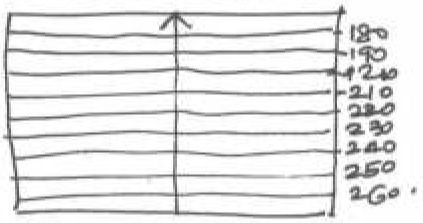
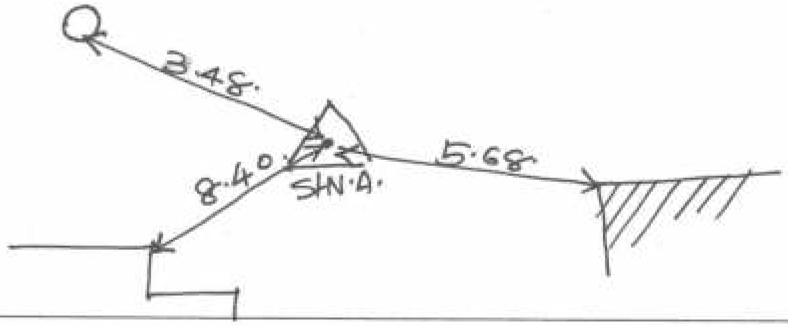
Proposed road level at chainage 110.00 is 54.995. 8

⑩

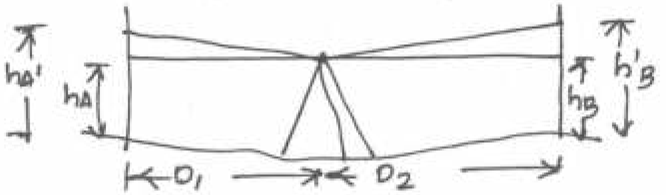
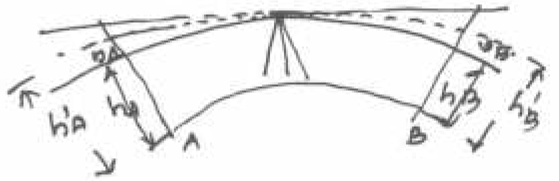
SCORING INDICATORS

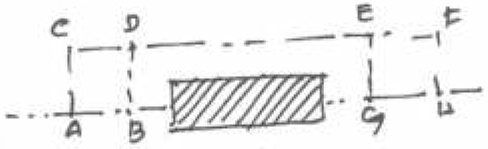
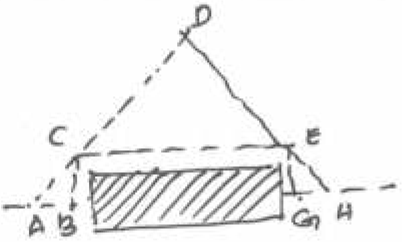
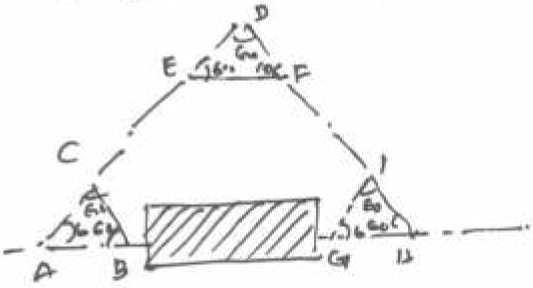
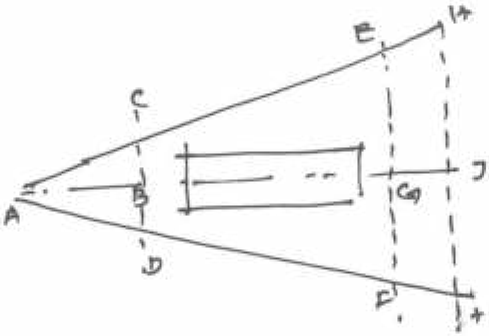
CODE :2011 (15)

VERSION :Q

Qn No	Scoring indicators	Split score	Total score
	Part A		
I 1	Base line – The biggest of the main survey line Tie line – a line in which joins tie stations on the main line	1 1	2
2	The angle which the lines of force of earth's magnetic field makes with the surface of earth	2	2
3	Arithmetic check affords a check for the H. I. and R. L. of turning points. And in case of Rise and fall method it provides a complete check on the intermediate sights. Arithmetic check for checking arithmetic calculations	2	2
4	Fly leveling is a leveling that is done to connect benchmark to the starting point of the survey line. In this leveling only back sight and fore sight readings are taken and auto level is moved strictly on the line joining benchmark and starting point of survey line.	2	2
5	Contour representation of uniform sloping ground 	2	2
	Part B		
II 1	Sketch 	2 4	6

	Marking distance of minimum 3 nos of measurements to permanent objects near to station point All main stations should be referenced from at least three permanent points such as a) Corners of building b) Posts of gates c) Corners of compound walls d) Post of fence e) Trees It is necessary to locate the stations in case station marks are lost or required in future.		
2	➢ Radiation method For survey small area can ne commanded from single station ➢ Intersection method When the objects are inaccessible from the plane table station ➢ Traversing Used for running survey lines between stations which have been previously fixed ➢ Resection To locate the plotted position of survey station by drawing resectors from plotted position of object	2 4	6
3	➢ Prismatic compass 1. The needle is of broad needle type 2. The graduated ring is attached to the needle. 3. The graduations are in W. C. B. system, having 0 at south end. 4. The graduations are engraved inverted. 5. The reading is taken with the help of a prism. 6. tripod may or may not be provided ➢ Surveyor's compass 1. The needle is of edge bar type 2. Graduated ring is directly attached to the box 3. The ring is graduated in quadrantal system. having 0 at north & south 4. The graduated ring is not oriented in the magnetic meridian. 5. Eye vane is a simple metal vane with a fine slit (no prism). 6. The instrument cannot be used without a tripod.	3 3	6

4	sketch Fore bearing of one outside boundary = 45° 20’ Fore bearing of 2ND side of boundary in clockwise direction = 45° 20’ + 90° = 135° 20’ Corresponding back bearing = 180 ° - 135° 20’ = 44° 40’ Fore bearing of 3rd boundary in clockwise direction = 135° 20’ + 90° = 225° 20’ Corresponding back bearing = 225° 20’- 180 ° = 45° 20’ Fore bearing of 4th side of boundary in clockwise direction = 225° 20’+ 90° = 315° 20’ Corresponding back bearing = 315° 20’- 180 ° = 135° 20’	2 4	6
5	Keep back sight and fore sight equal distance from the instrument station to reduce the following errors 1. Error due to non-parallelism of line of collimation and axis of bubble tube(sketch) 2.  $D_1 = D_2$ $h_A' - h_B' = h_A - h_B.$ 2 Error due to curvature and refraction(sketch) 	3 3	6
6	Angular rotation of bubble tube to move bubble by one division Sensitive bubble move more division It can increased by 1. Increasing lenth of bubble 2. Increasing diameter of bubble 3. Increasing internal radious of bubble 4. Decreasing viscosity of liquid 5. Decreasing roughness of wall	6	6

7	Drawing sections Determination of indivisibility between two points. Tracing of contour gradients and location of route. Measurement of drainage areas. Calculation of reservoir capacity. Intersection of surfaces and measurement of earth work.	6	6
	Part C		
III a	Obstacle to both chaining and ranging Description with sketch 4 cases    	4x2	8
b	(sketch) The book in which the chain or tape measurements are entered is called the field book. It is an oblong book of size about 20 x 12 cm. It should contain good quality stout opaque paper. The chain line may be represented either by a single line or by two lines spaced out 1.5 to 2 cm apart, ruled down the middle of each page. The distance along the chain being entered between the two lines of the page. A chain line is started from the bottom of the page and works upward.	2 5	7

<table>
<tr><td></td><td>The offsets are entered either to the left or to the right of the chain line.
Offsets are entered in the order they are appear in the chain line.
Every chain line must be started from a fresh page.</td><td></td><td></td></tr>
<tr><td>IV
a</td><td>Cross staff
Open cross staff
French cross staff
Adjustable cross staff
Optical square
Prism square
Site square
(sketchs)</td><td>3+4</td><td>7</td></tr>
<tr><td>b</td><td>Resection is the process of determining the plotted position of the station occupied by the plane table, by means of sights taken towards known points, locations of which have been plotted.
➢ Resection after orientation by compass
➢ Resection after orientation by back sighting
Any one method with sketch and description</td><td>3
5</td><td>8</td></tr>
<tr><td>V
a</td><td>Prismatic compass and survey's compass</td><td>3.5
3.5</td><td>7</td></tr>
<tr><td>b</td><td><table>
<tr><th>Line</th><th>Observed bearing</th><th>Correction</th><th>Corrected bearing</th><th>Remarks</th></tr>
<tr><td>PQ</td><td>44°30′</td><td>+0°45′ at P</td><td>45°15′</td><td>Stations P& Q Are</td></tr>
</table></td><td></td><td>8</td></tr>
</table>

QP	226°30′	-1°15′ at Q	225°15′	effected by local attraction
QR	124°30′	-1°15′ at Q	123°15′	
RQ	303°15′	0°00′ at R	328°45′	
RS	181°00′	0°00′ at R	181°00′	
SR	1°00′	0°00′ at S	1°00′	
SP	289°30′	0°00′ at S	289°30′	
PS	108°45′	+0°45′ at P	38°15′	

VI a	Magnetic declination at a place is the horizontal angle between the true meridian and the magnetic meridian. If the magnetic meridian is to the right of the true meridian, declination is said to be eastern or positive. If it to be the left side, declination is said to be western or negative. Variations in declination Diurnal variation Annual variation Secular variation Irregular variation The angle which the line of force of earth's magnetic field makes with the surface of earth is called the magnetic dip. In elevation these line of forces are inclined downward towards the north in thenorthern hemisphere and downward towards south in southern hemisphere. At a place near 70° north latitude and 96 ° west longitudes, it will be dip 90°. This area is	3.5 3.5	7

	called north magnetic pole. A similar area in southern hemisphere is called the south pole. At any other place the magnetic needle will not towards the north magnetic pole. The dip of needle will be zero at equator and the needle will remain horizontal.		
b	Plot traverse by using given bearings – 2(sketch) Included angle < B = 45° 10′ + 60° 40′ = 105° 50′ Included angle < C = 180° - (60° 40′ + 9° 50′) =104° 00′ Included angle < D = 9°50′ + 80°40′ = 90°30′ Included angle < A = 180° - (80°40′ + 45° 10′) = 54° 10′ Sum = 360° 00′ computation of included angles – 5 marks Check (2n-4) x90 = 360° 00′ - 1 marks	2x4	8
VII a	A leveling staff is a straight rectangular rod having graduations, the foot of the staff representing zero reading. The purpose of a leveling staff is to determine the amount by which the station is above or below the line of sight. Leveling staffs are divided into to classes. 1) Self reading staff a) Solid staff b) Folding staff c) Telescopic staff 2) Target staff Relative merits of self reading and Target staffs		7

<table>
<tr>
<td>b</td>
<td>
<table>
<tr><th>Station</th><th>B S</th><th>I S</th><th>F S</th><th>H I</th><th>R L</th><th>Remarks</th></tr>
<tr><td>1</td><td>1.820</td><td></td><td></td><td>51.820</td><td>50.000</td><td>B.M.</td></tr>
<tr><td>2</td><td></td><td>2.150</td><td></td><td>51.820</td><td>49.67</td><td></td></tr>
<tr><td>3</td><td></td><td>-1.230</td><td></td><td>51.820</td><td>53.050</td><td></td></tr>
<tr><td>4</td><td></td><td>-1.460</td><td></td><td>51.820</td><td>53.280</td><td></td></tr>
<tr><td>5</td><td>2.345</td><td></td><td>0.905</td><td>48.570</td><td>50.915</td><td></td></tr>
<tr><td>6</td><td></td><td>1.995</td><td></td><td>48.570</td><td>46.575</td><td></td></tr>
<tr><td>7</td><td></td><td></td><td>1.86</td><td>48.570</td><td>46.710</td><td></td></tr>
</table>
For tabulating the staff readings – 2.5 marks
Computation of H.I – 2.5 marks
Computation of Reduced level – 2 marks
Σ B. S. – Σ F. S. = Last R. L. – First R. L. – 1 mark
</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>VIII
a</td>
<td>
List of important axes of dumpy level
Vertical axis
Axis of level tube
Axis of telescope
Line of collimation or line of sight
Relations between these axes
a) Axis of bubble tube plate level perpendicular to vertical axis
b) Horizontal axis perpendicular to vertical axis
c) Line of collimation coincide to axis of telescope
d) Axis of altitude bubble parallel to line of collimation
e) Line of collimation horizontal vertical circle reads zero
</td>
<td>3
4</td>
<td>7</td>
</tr>
</table>

b

b) Problem can be solved either by H. I. method or by Rise & Fall method

Station	BS	IS	FS	Rise	Fall	R. L.	Rer
1	1.820					101.08	
2		2.150			0.330	100.75	
3		1.230		0.920		101.67	
4	0.905		1.460		0.230	101.440	(
5		2.345			1.440	100.000	
6		1.995		0.350		100.35	
7			1.860	0.135		100.485	

For tabulating the staff readings – 2.5 marks

Computation of Rise & Fall or computation of H.I. in case of H.I. method – 2.5 marks

Computation of Reduced level – 2 marks

Σ B. S. – Σ F. S. = Σ Rise – Σ Fall = Last R. L. – First R. L. – 1 mark

8

IX

a

An instrument is said to be in perfect if its various parts maintain their true positions relative to each other.

Required permanent adjustments in dumpy level.

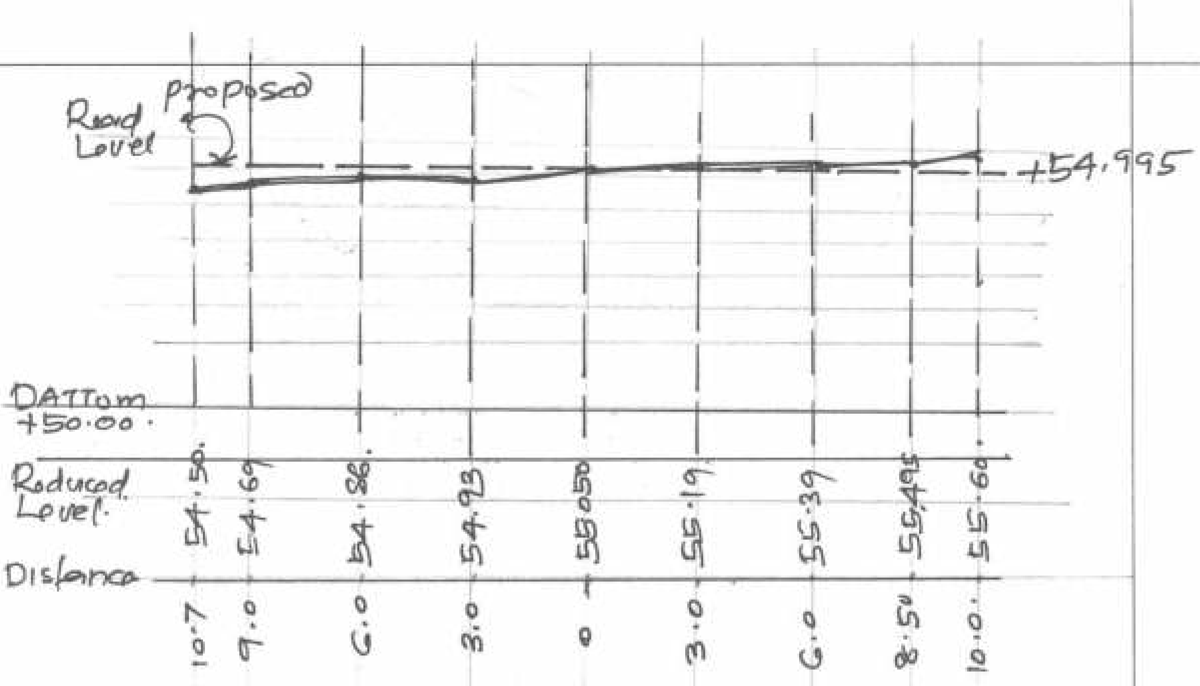
a) The bubble axis should be perpendicular to the vertical axis
b) The line of collimation and the optical axis of the telescope should coincide with one another.
c) The line of collimation should be parallel to the bubble axis.

Adjustment of level tube

Adjustment of cross hair ring

Adjustment of line of sight/collimation

8

b	The points on contour lines are interpolated linearly between the two neighbouring points. For this purpose three methods are used. a) Estimation. b) Arithmetic calculation. c) Mechanical or graphical method.		7
X a	1. Indirect method of contouring a) Method of squares b) Cross-section method c) Radial line method		7
Xb	 C.S. @ Chainage - 110.00.		8