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B. Sc. Engg. (CEE)/ 1st Sem.

05 December, 2023 (Group-A: Morning)

ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)
 ORGANISATION OF ISLAMIC COOPERATION (OIC)
 DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Semester Final Examination
 Course No.: CEE 4103
 Course Title: Surveying

Winter Semester: 2022-2023
 Full Marks: 200
 Time: 3 Hours

There are 5 (Five) questions. Question no. 1, 2, 3 are compulsory. Answer any one from question no. 4 and 5. Programmable calculators are not allowed. Do not write on this question paper. The figures in the right margin indicate full marks. The Symbols have their usual meaning. Assume missing value, if any.

1. Answer any four questions shown below from (a) to (f) :

- (a) Explain, with the help of a neat sketch, an idealized remote sensing system. (10)
(CO1-PO1)
 - (b) Explain various types of data structures used in GIS. (10)
(CO1-PO1)
 - (c) Define (i) Ecliptic (ii) Equinoctial Points (iii) Solstices (iv) Celestial Sphere. Draw necessary sketches. (10)
(CO1- PO1)
 - (d) Explain how the procedure of reciprocal leveling eliminates the effect of atmospheric refraction and earth's curvature as well as the effect of inadjustment of the line of collimation. (10)
(CO1- PO1)
 - (e) List five methods of direct distance measurements and describe them in brief. (10)
(CO- PO1)
 - (f) Discuss the uses of following instruments in chain and plane table surveying (i) Peg (ii) Ranging Rod (iii) Optical square (iv) Alidade (v) Trough Compass (10)
(CO1- PO1)
- 2(a) The following consecutive readings were taken with a dumpy level: 3.864, 3.346, 2.932, 1.952, 0.854, 3.796, 2.639, 1.542, 1.934, 0.864, 0.665. The level was shifted after the fifth and eight readings. The first reading was taken on a benchmark of RL 150.250. Calculate the reduced levels of the change points, and the difference of level between the first and last points. (20)
(CO2- PO2)

Backsight	Inter.sight	Foresight	Ht. of coll.	Reduced level	Remarks
3.864				150.25	Benchmark
	3.346				
	2.932				
	1.952				
3.796		0.854			Change point (T.P)
	2.639				
1.934		1.542			Change point (T.P)
	0.864				

- (b) Observations taken by means of a theodolite fitted with stadia hairs gave intercepts of 0.650 m and 1.630 m with the telescope horizontal, at distances of 60 m and 150 m, respectively. The instrument was then set over a station having an RL of 264.30 m, the height of the instrument being 1.2 m. The readings on a vertical staff were 1.000, 2.070m, and 3.140, the telescope being inclined at 8° below the horizontal. Calculate the RL of the point where the staff was held and its distance from the instrument. (20)
(CO2- PO2)

- (c) A road is to be made at a constant RL of 45 m runs from north to south. The ground is level east to west. The ground levels at the centre-line of the proposed road are as follows. (15)
(CO2- PO2)

Chainage(m)	0	15	30	45	60	75	90
RL (m)	45.8	46.5	46.8	45.5	47	47.4	46.9

The road is 8m wide at formation and the side slopes are 1:1. Determine the volume of excavation by trapezoidal and prismoidal formula.

- (d) Find the elevation of the top of the chimney from the following data: (10)
(CO2- PO2)

Inst. station	Reading on B.M.(m)	Angle of elevation	Remarks
A	0.862	$18^\circ 36'$	R. L. of B. M.=421.380 m
B	1.222	$10^\circ 12'$	Distance AB=50 m

Stations A and B and the top of chimney are in the same vertical plane.

- (e) The survey data of a close traverse is given in the following Table. (15)
(CO2- PO2)

Line	Length(m)	Bearing
AB	201.8	N $45^\circ 00'$ W
BC	288.4	N $60^\circ 30'$ E
CD	192.6	S $34^\circ 45'$ E
DA	252.13	S $59^\circ 53' 09''$ W

Find the area of this closed traverse by latitudes and meridian distances.

- 3(a) The apex distance/External distance of a 3° degree circular curve is 82.45 m. Determine the deflection angle, tangent length and length of the long chord. (10)
(CO3- PO2)

- (b) A simple circular curve has a radius of 800 m and a deflection angle of 36° . Tabulate the ordinates from the chord to set out the curve. (10)
(CO3- PO2)

- (c) A -1% grade meets a +2% grade at station 470 m of elevation 328.605 m. A vertical curve of length 120 m is to be used. The pegs are to be fixed at 10 m interval. Calculate the elevations of the points on half of the curve. (20)
(CO3- PO2)

- (d) Two straights on the centre-line of a proposed railway curve intersect at 2610 m, the deflection angle being 46° . A circular curve with 400 m radius and transitions of 90 m length are to be inserted. Calculate the necessary data to set out the curve by tangential angles. Calculate these values for the first transition and circular curve only. (20)
(CO3- PO2)
- 4(a) The scale of an aerial photography is 1 cm = 100m. The photograph size is 20 cm X 20 cm. Determine the number of photographs required to cover an area 10 km X 10 km, if the longitudinal lap is 60% and the side lap is 30%. (10)
(CO4- PO2)
- (b) Draw typical contour map and cross-section of the following: (10)
(i) Pond (ii) Overhanging Cliff (iii) River (CO4- PO2)
5. From the records available from survey notes, it is observed that the lengths of two lines were not readable of the following closed traverse. From the available data given below, find the lengths of the two sides. (20)
(CO4- PO2)

Line	PQ	QR	RS	ST	TP
Length(m)	178.6	228.4	Missing	Missing	238.8
Bearing	S $52^\circ 30'$ E	N $48^\circ 45'$ E	N $18^\circ 15'$ W	S $78^\circ 30'$ W	S $32^\circ 30'$ W