

Exam.	New Back (2066 & Later Batch)		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

Subject: - GIS Application and Remote Sensing (Elective III) (CE78501)

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ Attempt All questions.
- ✓ The figures in the margin indicate Full Marks.
- ✓ Assume suitable data if necessary.

1. What is GIS and its importance in civil engineering. [2+4]
2. a) Why is map projection necessary? State two main differences between a Geographic Coordinate System and Projected Coordinate System. [4]
 b) Why Nepal uses a different coordinate system than the UTM? [2]
3. How is the following raster encoded using full raster encoding, run length encoding, quad tree encoding and value point encoding? [6]

F	F	F	F	W	W	F	F
F	F	F	F	W	W	F	F
F	F	F	F	O	O	F	F
F	F	F	F	O	O	F	F
F	F	F	F	S	S	S	S
F	F	F	F	S	S	S	S
F	F	F	F	S	S	W	W
F	F	F	F	S	S	W	W

*F= Forest
 *W= Water Body
 *O= Open Space
 *S= Settlement

4. What are the main sources of data feed to GIS? What is positional and attribute accuracy? [4+2]
5. What is a spatial DBMS? Explain different types of DBMS structures. [2+3]
6. Explain following vector function in vector GIS with suitable example. [10]
 - a) Union
 - b) Clip
 - c) Merge
 - d) Intersect
7. Calculate the flow direction and flow accumulation raster from the following DEM. Also, delineate the watershed area if the pour-point reference cell is (4, 4) and cell size is 30×30 meters. [10]

0, 0

118	112	109	111	115
114	107	96	89	92
109	40	84	77	79
104	99	95	62	65
68	68	67	61	64
62	60	58	56	50

8. Illustratively explain how position is determined using GPS. What types of error can occur during a GPS measurement? [6]
9. a) How objects are differentiated in remote sensing by their spectral signatures, explain with illustration? Explain the different types of resolution in remote sensing. [5]
- b) What band combination used in Landsat 8 imagery to represent the natural colour and colour infrared (for vegetation)? [2]
10. Briefly explain the map elements. [6]
11. Explain the following with at least 1 relevant application example in each. [4x3]
- a) Raster algebra
 - b) Zonal statistics
 - c) IDW interpolation
 - d) Reclassification

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Exam.	Regular		
Level	BE	Full Marks	80
Programme	BCE	Pass Marks	32
Year / Part	IV / II	Time	3 hrs.

Subject: - GIS Application and Remote Sensing (*Elective III*) (CE78501)

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- ✓ Attempt **All** questions.
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- ✓ Assume suitable data if necessary.

- a) Differentiate GIS from cartography, CAD and information system. [3]
- b) Explain data feeds of GIS. [3]
2. a) What do you understand by Map projection system? [2]
- b) Write about the parameters of coordinate system used in Nepal. [2]
- c) Why Nepal's Coordinate system (MUTM) use 3° zone instead of 6° compared to UTM? [2]
3. a) Explain different types of data models. [4]
- b) What is topology in TIN data model? [2]
- c) Show the encoding of following raster using run length and Quadtree encoding. [6]

12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12
12	12	12	12	12	12	12	12
5	5	6	6	9	9	9	9
5	5	61	62	9	6	9	9
7	7	7	7	9	9	9	9
7	7	7	7	9	9	9	9

4. a) Explain the guiding principles of GPS measurement with descriptive figures. [3]
- b) Explain the possible errors that might occur while using GPS. How can accuracy of GPS increased? [3]
5. a) Explain about relational database management system. [3]
- b) How the relationship is maintained? [3]
6. How will you perform following analyses using GIS? Describe the analysis tools along with relevant figures.

 - a) Locate all the settlements that lies within 1 km distance (both side) from rivers.
 - b) Flood plain zoning of the selected river according to types of river.
 - c) Show the area of agricultural land that lies in that flood plain.

Provided data:

Shapefile of river, land use data, point data of the settlements, Shapefile of flood plain (Polygon)

[10]

7. Explain the following Raster function with relevant example. [10]

- a) View shade
- b) Euclidean Distance
- c) Reclassify
- d) Slope and aspect
- e) Hillshade

8. The following grid represents a DEM data of certain area whose cell size is 100m. Using this data answer the following questions. [12]

- a) Show the sink cell.
- b) What will be the value of that cell when the sink is filled?
- c) Calculate flow direction and flow accumulation value for each cell.
- d) What is the area of the largest possible watershed?
- e) Show the river in the raster when stream definition is limited to minimum catchment area of 40000 m²?

78	72	69	71	58	49
74	67	56	49	46	50
69	40	44	37	37	48
64	58	55	22	22	24
78	61	47	21	21	19
74	53	34	12	11	12

9. Explain spectral signature of different land use with example and application of Remote sensing in civil engineering. [3+3]

10. a) How different symbologies differ according to scaling of data (Nominal, ordinal, interval and ratio) [3]

b) Explain about visual variables in map designing. [3]
