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

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.
   b) Explain the possible errors that might occur while using GPS. How can accuracy of GPS increased?
5. a) Explain about relational database management system.
   b) How the relationship is maintained?
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)
7. Explain the following Raster function with relevant example a) View shade

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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 questons. 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.
10. a) How different symbologies does differs according to scaling of data (Nominal, ordinal, interval and ratio)

    b) Explain about visual variables in map designing

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

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?
5. What is a spatial DBMS? Explain different types of DBMS strtrctures
6. Explain following vector function in vector GIS with suitable example.
   a) Union
   b) Clip
   c) Merge
   d) Intersect
7. Calculate the flow direction and flow accumulation raster from the following DEM. Also, delineate thewatershed areaif the pour-point reference cell is (4, 4) and cell size is 30x30 meters.

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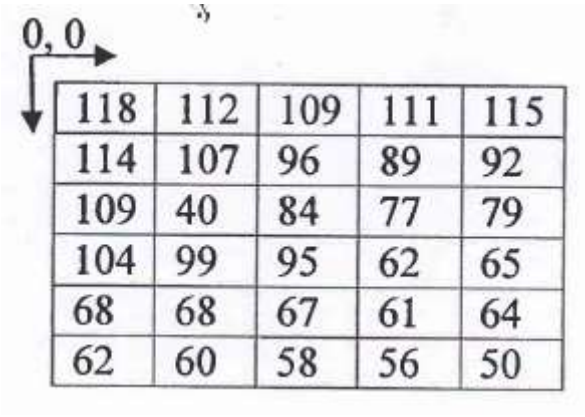

118	112	109	111	115
114	107	96	89	92
109	40	84	77	79
104	99	95	62	65
68	68	67	61	64
62	60	58	56	50

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

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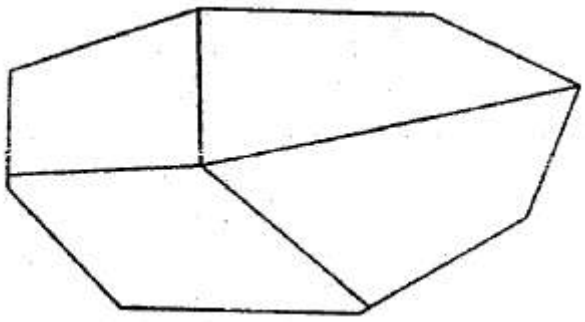
1. a. Prepare a standard layout of a map with all map elements.

   b. Write down the three raster encoding methods and % decrease in size for following figure

25	25	25	25	25	25
25	25	25	25	25	25
25	25	25	25	25	25
5	5	5	10	10	10
5	5	5	12	12	12
5	5	5	15	12	12

   c. Label vertex, node, arc and polygon for following figure



2. a. Explain how sink is develcped in DEM and how it can be removed.

   b. Derive flow direction, flow accumulation and river network from figure below. Consider threshold value as 10 cells. If the cell size is 100m then calculate the catchment area at the lower right cell having value 445.

480	500	490	480	485
505	495	490	475	480
500	485	455	470	475
495	490	480	465	470
490	485	475	455	450
500	490	480	460	445

3. a. Explain different types of interporation methods in raster GIS and their application in different engineering fields.

   b. Interpolate a value using any one methbd if the distance from four known values 160, 170,180 and 90 are 1000, 500, 600 and 120 respectiveiy.

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4. Explain clip, merge, union, dissolve and intersection functions in vector GIS with suitable figures and tables for each function. \
5. Explain following raster spatial functions
   a. Surface
   b. Slope
   c. Aspect
   d. Viewshade
   e. Map Algebra
   f. Summarize Zone
   g. Proximity
   h. Distance
6. Write short notes
   i. Different types of database management system
   ii. How the time is maintained in GPS
   iii. Different t5zpes of attribute variables used in GIS
   iv. UTM and MUTM coordinate system
   v. Active and passive Remote sensing
   vi. Supervised and unsupervised classification

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1. a) How GIS can be applied in infrastructure planning and design?
   b) Describe about four Ms.
   c) Which basic function of GIS is the more important? Why?
2. a) Describe briefly the projection system which has been used in Nepal?
   b) Calculate allowable RMS error for a map of scale at 1:2500 and is in UTM projection.
   c) Describe briefly on errors in GIS data made through actual changes.
3. a) Compress lhe given raster data using quadtree method.

12	12	12	12	10	10	10	10
12	12	12	12	10	10	10	10
12	12	12	12	10	10	10	10
12	12	12	12	10	10	10	10
9	9	7	2	6	6	4	4
9	9	1	3	6	6	4	4
3	3	8	8	2	2	5	5
3	3	8	8	2	2	2	5

   b) Why is topology important in GIS?
4. Describe briefly about the macro level components of data quality.
5. What is Network data model? Describe with examples.
6. Differentiate between following geoprocessing functions by suitable examples with features attribute tables.
   a) Clip and intersect
   b) Merge and dissolve
7. a) Generate an output raster of the suitable area for landfill site from the given raster below- The values in the both raster given below denote the distanccs in kilometer from settlement buildings and river network. The area located farther from the buildings and closer from the river network is the suitable for it. First of all set the conditions for both raster.

Skip to main content

4	8	3	3
3	1	5	5
6	4	11	12
9	5	14	15
4	8	16	17

Distance from buildings

11	10	9	9
10	9	8	7
6	5	2	1
5	4	3	2
5	4	3	2

Distance from river

b) Describe briefly about cell statistics anrl zcnal statisties.

8. What are the data sources of DEM? Describe about the applications of DEM.
9. a) Derive flow direction from the following raster.

58	52	55	53	56	58
55	40	42	45	51	55
48	34	20	33	48	52
33	23	28	27	25	38
17	20	21	22	23	24
12	10	15	18	16	17

b) Describe about the Shreve method for stream order.

10. a) Explain the functions of GPS segments.
    b) Describe briefly on how GPS works?
11. a) What do you meqn by multi-spectral, multi-temporal and multi-sensor?
    b) How do you create false color composite image? What is its importance?
12. What are the elements to be included in a map layout? Explain with a sample layouL

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1. Answer followings:

   a) Write down the definition of GIS, its cornponeuts and basic types of spatial data

   b) What is the difference between spatial and none spatial data?

   c) Explain Nepal and UTM coordinate system.

   d) Prepare a standard layout for map printing

2. a) Write down the union, intersection and clip functions (Figure and Table) from two polygons given below.

   b) Disolve the Lu table according to Lu_ id and Name.

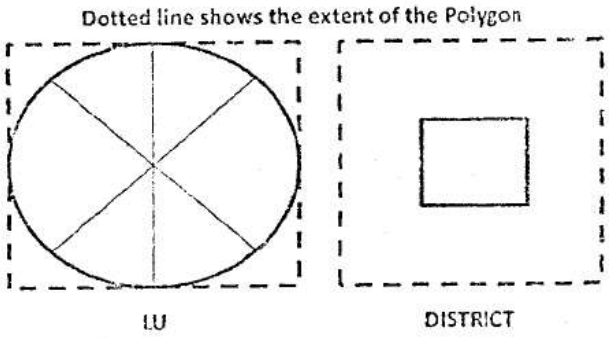
   c) Explain buffer function with table

Table of Lu polygon theme

Record_no	LU_id	name
1	100	Cultivation
2	200	Forest
3	200	Forest
4	100	Cultivation
5	100	Cultivation
6	300	Urban

Table of district polygon theme

Record_no	dis_id	D_name
1	20	Jumla



3. a) Explain how sink is developed in DEM and how it can be removed.

   b) Derive flowdirection, flowaccumulation and river network from the figure below. Consider threshold as 6 cells. If the cell size is 100m then calculate the catchment area at the lower right cell having the value 445.

Skip to main content

510	500	490	480	470
505	495	490	475	480
500	485	455	470	475
495	490	480	465	470
490	485	475	455	450
500	490	480	460	445

4. a) Explain different types of database Management Systems
   b) How relationship maintains in relational database management system?
   c) Explain basic principles of GNSS and basic equation of GNSS.
   d) How time is maintained in GNSS?
   e) Write down the applications cf GNSS.
5.
   a) Explain different types of interpolation in Raster GIS.
   b) Explain proximity map calculation and summarize zone functions of Raster GIS.
   c) Write down the different image processing steps in remote sensing.
   d) Illustrate BBQ, BIL and BIP raster format.
   e) Explain the spectral signature of an object.