

**DEPARTMENT OF GEOGRAPHY M.D. UNIVERSITY, ROHTAK**

**M. Sc Geo-informatics Semester-IV w.e.f. 2013-14**

**Scheme of Examination**

<b>SEMESTER-IV</b>						
<b>16</b>	XVI	Research Methodology	<b>100</b>	<b>20</b>	<b>80</b>	<b>3 Hours</b>
<b>17</b>	XVII	Application of Geo-informatics with reference to any one of following: I. Geomorphology II. Resource Planning and Management III. Urban and Regional Planning	<b>100</b>	<b>20</b>	<b>80</b>	<b>3 Hours</b>
<b>18</b>	XVIII	Lab Work on Paper XVII	<b>100</b>	Distribution of marks Lab work test : 60 Record on Lab work : 20 Viva Voce : 20		<b>4 Hours</b>
<b>19</b>	XIX	Dissertation	<b>200</b>			
<b>Total</b>			<b>2000</b>			

## **M.Sc. Geo-Informatics Semester - IV**

### **Paper-XVI: Research Methodology**

**Max Marks: 80**

**Time: 3 hrs.**

#### **UNIT-I**

Meaning and purpose of Research; Scientific Method in Research; Deductive and Inductive routes of scientific explanation

#### **UNIT-II**

Histogram; Measures of central tendency (Mean, Median and Mode); Standard Deviation and Coefficient of Variation, Simple Correlation Coefficient (Rank Correlation and Product Moment) and Simple Linear Regression analysis, Matrices.

#### **UNIT-III**

Introduction to Computer Programming; Development of algorithms and flow chart; C++ language - Introduction, Objects, Decisions , Loops, Functions, Structs, References, Classes, Pointers.

#### **UNIT-IV**

Identification of Research Question and Literature Surveying; Process of Research Report Writing: Mechanics, Style, Notes and Bibliography; Ethics in Research.

#### **Notes:**

1. A compulsory question containing 8 short answer type questions shall be set covering the whole syllabus. Each question shall carry 2 marks (total 16 marks).
2. A total of eight questions in addition to question no. 1(compulsory) will be set out of the whole syllabus, at least 2 from each unit. The candidate will attempt 4 questions in all selecting one from each unit. Each question shall carry 16 marks.

***Recommended Readings:***

Harvey, David (1969), *Explanation in Geography*, London: Edward Arnold.

Hubbard, Phil et.al.(2002), *Thinking Geographically*, London: Continuum.

Hoggart, Keith et.al. (2002), *Researching Human Geography*, London: Arnold.

Johnston, R.J. and J.D. Sidaway (2004), *Geography and Geographers*, London: Arnold.

Kitchin, Rob and Nicholas J. Tate (2000), *Conducting Research in Human Geography*, London: Prentice Hall.

Lafore, Robert (2002), *Object-Oriented Programming in C++*, New Delhi: Dorling Kindersley(India) Pvt. Ltd..

Robinson, Guy M. (1998), *Methods and Techniques in Human Geography*, New York: John Wiley.

## **M.Sc. Geo-Informatics Semester - IV**

### **Paper-XVII (I): Application of Geo-informatics in Geomorphology**

**Max Marks: 80**

**Time: 3 hrs.**

#### **Unit-I**

##### **Conceptual Framework**

Interface of Geoinformatics with Geosciences; Basic Geomorphic processes and features.

#### **Unit-II**

##### **Geomorphic Applications**

Principles and recognition elements for terrain evaluation, mapping of terrain, classification of land forms; Interpretation of erosional and depositional land forms; Interpretation of drainage system; Study of land slide and floods - case studies.

#### **Unit-III**

##### **Lithologic and Stratigraphic Applications**

Spectral characteristics of lithologic/ stratigraphic features; factors affecting tonal appearance of rocks; Identification and mapping of rock types; Study of faults, folds, lineaments and lithologic boundaries - case studies.

#### **Unit-IV**

##### **Hydrogeomorphological Applications**

Hydrologic features and its elements; Surface water and ground water studies; Interpretation techniques for targeting ground water potential zones; Delineation of watershed, watershed prioritization and management - case studies.

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2. A total of eight questions in addition to question no. 1 (compulsory) will be set out of the whole syllabus, at least 2 from each unit. The candidate will attempt 4 questions in all selecting one from each unit. Each question shall carry 16 marks.

***Recommended Readings:***

1. Agarwal, C. S. and P.K. Garg, 2000, A Text Book on remote Sensing in Natural Resources Monitoring and Management, Wheeler, Publishing Co., New Delhi.
2. American Society of Photogrammetry, 1993, Manual of Remote Sensing, Falls Church, Virginia.
3. Arthur L. Bloom, Geomorphology, Prentice Hall, New Delhi.
4. Burrough. P.A., 1986, Geographical Information Systems for Land Resources Systems, Oxford University Press, New York.
5. Druary, S.A., 1987, An Image Interpretation in Geology, Allen and Unwin Ltd. London.
6. Greedry, Alan, F., 1974, Application of Remote Sensing with Special References ton Geosciences, Gregory Geo-Science.
7. P. Dayal, Text Book of Geomorphology Shukla book depot, Patna.
8. Siegal, B. S. & Gillespie, A. R., 1986, remote Sensing in geology, John Wiley Publications.
9. Smith, William, L., 1977, Remote Sensing Applications for Mineral Exploration Dawden Hutchingers and Ross Inc.
10. Townsend, J.T.G., 1981, Terrain Analysis and Remote Sensing, George Allen and Unwin.

## **M.Sc. Geo-Informatics Semester - IV**

### **Paper-XVII (II): Application of Geo-informatics in Resource Planning and Management**

**Max Marks: 80**

**Time: 3 hrs.**

#### **Unit-I**

Fundamental concepts of soil; Spectral characteristics of soils; Remote sensing application in soil survey and mapping; Soil moisture estimation using geoinformatics; Concept and approaches of land evaluation; Soil erosion types and their processes; Remote sensing in characterization of land degradation types and their processes; Soil erosion modeling using geoinformatics.

#### **Unit-II**

Principles of remote sensing in water resource assessment; Hydrologic cycle elements and quantification through Remote Sensing; Ground and surface water inventory; Spectral characteristics of water and water quality; Principles of aerial photo/satellite image interpretation in lithological identification and structural analysis; Applications of digital elevation models (DEM) in water resources; Watershed characterization, delineation and codification; Erosion, erodibility and sediment yield modeling.

#### **Unit III**

Remote Sensing in Agriculture - an introduction and background; Spectral characteristics of crops; Principles of crop identification and crop acreage estimation using geoinformatics; Crop yield modeling using geoinformatics; Applications in crop inventory; Vegetation index; Role of satellite remote sensing in drought monitoring.

#### **Unit-IV**

Introduction and distribution of forests; Types of forests in India; Role of geoinformatics in forest studies; Interaction of EMR with vegetation; Spectral and temporal characteristics of vegetation; Forest cover mapping through geoinformatics; Forest density mapping; Remote Sensing application in forest cover change detection; Biomass estimation using geoinformatics; Bio-diversity study using geoinformatics.

#### **Notes:**

3. A compulsory question containing 8 short answer type questions shall be set covering the whole syllabus. Each question shall carry 2 marks (total 16 marks).
4. A total of eight questions in addition to question no. 1(compulsory) will be set out of the whole syllabus, at least 2 from each unit. The candidate will attempt 4 questions in all selecting one from each unit. Each question shall carry 16 marks.

***Recommended Readings:***

1. Anji Reddy, M. 2004. Geoinformatics for environmental management. B.S. Publications.
2. Avery, T, E. 1977. Interpretation of Aerial Photographs. Burgess Publishing Co., Minnesota (3rd Ed.).
3. Chow, V.T ed. (1964). Handbook of Applied Hydrology. Mc-Graw Hill book Company. New York.
4. Engman, E.T. and Gurney, R.J. 1991. Remote Sensing in Hydrology. Chapman and Hall, London.
5. Franklin S.E. 2001. Remote Sensing for sustainable forest management. Lewis Publication.
6. Jensen, J.R. 2000. Remote Sensing of the Environment: An Earth resource Perspective. Prentice Hall.
7. Lecture Note (Module II), Agriculture and Soil Division. IIRS Dehradun.
8. Lecture Note (Module II), Forest Division. IIRS Dehradun.
9. Lecture Note (Module II), Water Resource Division. IIRS Dehradun.
10. Lillesand, T.M., and Kieffer, R.M., 1987. Remote Sensing and Image Interpretation, John Wiley.
11. Lillesand, T. M. and Kiefer, R. W. 1994. Remote Sensing and Image Interpretation. John Wiley & Sons, New York, Third edition.
12. Meijerink, A.J., Hans A.M. de Blouwer, Chris M. Mannaerts, Colrol R. Valenzuela, 1994. Introduction to the use of Geographic Information System for Practical Hydrology. ITC Publication No. 23.
13. Nefedov, K.E. and Popova, T.A., 1972 – Deciphering of Ground water from aerial photographs. Amerind Publishing Co., New Delhi.
14. O' Callaghan, J .F. and D.M. Mark, 1984. The extraction of drainage networks from digital elevation data. Comp Vis, Graphics and Image Proc. 28, pp 323-344.
15. Sharma, P.D. Ecology and Environment, Rastogi Publications
16. Skidmore A. 2002: Environmental modeling with GIS and Remote Sensing. Taylor and Francis.

## **M.Sc. Geo-Informatics Semester – IV**

### **Paper-XVII (III): Application of Geo-informatics in Urban and Regional Planning**

**Max Marks: 80**

**Time: 3 hrs.**

#### **Unit-I**

Introduction to basic urban processes and concept of regional planning. Study of morphology and internal structure of Indian cities emphasizing the use of Geoinformatics. Problems of urban and regional planning in India. Application of Geoinformatics in urban and regional planning.

#### **Unit-II**

Urban Information System and its use in urban planning. Requirement and availability of remote sensing data for urban planning; Urban physical infrastructure planning; Planning urban utilities and services; Urban land use planning – problems and methods of planning.

#### **Unit-III**

Land use/ Land cover mapping. Urban land use classification with specific reference to Anderson's and NRSA/NUIS classification system. Creation and up-dating of urban land use maps. (A Case study from Indian Cities).

Urban sprawl – Meaning ,types and factors affecting urban sprawl. Issues associated with urban sprawl in India. Mapping of urban sprawl with aerial photos and satellite imageries. A Case study of Rohtak city in Haryana.

#### **Unit-IV**

Rural-urban fringe: characteristics, demarcation, mapping and analysis with fine resolution satellite data and GIS tools.

Urban hazards : meaning, types, mapping and management: a case study from Indian cities (Application of aerial photographs/ satellite images and GIS tools)

#### **Notes:**

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2. A total of eight questions in addition to question no. 1(compulsory) will be set out of the whole syllabus, at least 2 from each unit. The candidate will attempt 4 questions in all selecting one from each unit. Each question shall carry 16 marks.



## Recommended Readings:

1. Avery, T.E., and G.L. Berlin, 1985, *Interpretation of Aerial Photographs*, Burgess Minneapolis.
2. Branch, m. C., 1971, *City Planning and Aerial Information*, Harvard University Press., Cambridge
3. Lauder, D.T., 1959, *Aerial Photo Interpretation*, Mc Graw Hill, New York.
4. Lindgren, D.T. 1985 *Land use Planning and Remote Sensing*, Nijhoff, Dordrecht.
5. Rhind, David and Hudson ray, 1980, *Landuse*, Methuen Pub., New York.
6. Sokhi, B. S. and SM Rashid, 1999, *Remote Sensing of Urban Environment*, Manak Publishers, New Delhi
7. Way, D., 1978, *terrain Analysis : A Guide to site selection using Aerial Photo Interpretation*, Dowden, Hutchinson & Ross, stroudsburg.
8. Buruside, C.D., 1979, *Mapping from Aerial Photographs*, Grands, London
9. Gautam, N. C. 1970, *Urban Landuse Study through Aerial Photo Interpretation Techniques*, Pink Publishing House, Mathura.
10. Nag, Prithvish, 1992, *Thematic Cartography and Remote Sensing*, Concept, New Delhi.
11. Sunderam, K. V., 1977, *Urban and Regional Planning in India*, Concept, New Delhi.
12. Taylor, John, L. Williams, David C., 1981, *Urban Planning Practice in Developing Countries*, Pergamon Press.

**M.Sc. Geo-Informatics Semester – IV**

**Paper: XVIII (I)**

**Lab Work on the Application of Geo-informatics in Geomorphology**

**Max Marks: 100**

**Time: 4 hrs**

**Exercises will be taken on the following topics:**

1. Identification and mapping of geomorphological features from topographical maps, aerial photographs and satellite imageries.(One exercise each ) Total = 3
2. Measurement and mapping of slope from topographical maps, aerial photographs. (One exercise each) Total = 2
3. Identification and mapping of different types of rocks from aerial photographs and satellite Imageries. (One exercise each) Total = 2
4. Surface water mapping from satellite imagery. Total = 1
5. Delineation of watersheds from topographical maps, aerial photographs and satellite imageries. Total = 1
6. Delineation of flood plains and flood inundation mapping through satellite imageries.

**Distribution of Marks:**

- |      |                                  |   |             |
|------|----------------------------------|---|-------------|
| (i)  | Lab Work Test                    | : | 60 Marks    |
| (ii) | Record on lab work and Viva-Voce | : | 20+20 Marks |

Note: (a) The Lab Work test shall consist of six questions. Candidates are required to attempt any three questions. All questions carry equal marks.

- (b) Candidates shall produce their lab work record before the Board of Examiners for evaluation at the time of their viva-voce examination.

**M.Sc. Geo-Informatics Semester - IV**

**Paper: XVIII (II)**

**Lab Work on the Application of Geo-informatics in Resource Planning and Management**

**Max Marks: 100**

**Time: 4 hrs**

**Exercises will be taken on the following topics:**

1. Familiarization with soil basics (Field/Laboratory work); Spectral characteristics of soils.
2. Visual and Digital analysis of multispectral satellite data in degraded land mapping.
3. Watershed delineation using toposheets.
4. Water pixel extraction using Normalized Difference water Index (NDWI) technique.
5. Derive the basic Morphological parameters of river basin using digital elevation model.
6. RS and GIS application in Erosion modeling and Land Evaluation.
7. Visual / Digital Interpretation of multispectral satellite data for crop inventory, crop identification and acreage estimation.
8. Stereoscopic interpretation of trees and forest by using Ariel photographs.
9. Spectral /Temporal characteristics of vegetation by using multispectral satellite data.  
by using multispectral satellite data.
10. Forest cover mapping; Bio-mass/Bio-diversity estimation by using multispectral satellite data.

**Distribution of Marks:**

- |      |                                  |   |             |
|------|----------------------------------|---|-------------|
| (i)  | Lab Work Test                    | : | 60 Marks    |
| (ii) | Record on lab work and Viva-Voce | : | 20+20 Marks |

Note: (a) The Lab Work test shall consist of six questions. Candidates are required to attempt any three questions. All questions carry equal marks.

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**M.Sc. Geo-Informatics Semester – IV**

**Paper: XVIII ( III)**

**Lab Work on the Application of Geo-informatics in Urban and Regional Planning**

**Max Marks: 100**

**Time: 4 hrs**

**Exercises will be taken on the following topics:**

1. Identification and description of objects (point features) in urban area on aerial photographs & satellite images.
2. Identification and description of objects (linear features) in urban area on aerial photographs/ satellite images.
3. Thematic mapping of urban land uses on aerial photographs & satellite images (at least five exercises).
4. Mapping of urban sprawl with GIS Software and analysis of sprawl.
5. Demarcation and mapping of rural-urban fringe on aerial photographs and satellite images.
6. Preparing interpretation keys for urban area (pan, true color and FCC images)
7. Mapping and interpretation of LULC transformation in an urban area.
8. Supervised classification of urban land use/land cover categories on satellite images.

**Distribution of Marks:**

- |      |                                  |   |             |
|------|----------------------------------|---|-------------|
| (i)  | Lab Work Test                    | : | 60 Marks    |
| (ii) | Record on lab work and Viva-Voce | : | 20+20 Marks |

Note: (a) The Lab Work test shall consist of six questions. Candidates are required to attempt any three questions. All questions carry equal marks.

- (b) Candidates shall produce their lab work record before the Board of Examiners for evaluation at the time of their viva-voce examination.