PANJAB UNIVERSITY, CHANDIGARH

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OUTLINES OF TESTS, SYLLABI AND COURSES OF READING FOR MASTERS IN REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS (GIS) (SEMESTER SYSTEM) FOR THE EXAMINATIONS OF 2011 -2012.

COURSE STRUCTURE

SEMESTER I

		Max. Marks
Paper I:	Fundamentals of Remote Sensing	**200**
	(a) Theory : 100	
	(b) Practicals : 60	
	(Lab. work 30 marks+ Record file 20 marks+ Viva 10 marks)	
	(c) Internal Assessment : 40	
Paper II:	Fundamentals of Geographic Information Systems (GIS)	**200**
	(a) Theory : 100	
	(b) Practicals : 60	
	(Lab. work 30 marks+ Record file 20 marks+ Viva 10 marks)	
	(c) Internal Assessment : 40	
Paper III:	Spatial Analysis	**200**
	(a) Theory : 100	
	(b) Practicals : 60	
	(Lab. work 30 marks+ Record file 20 marks+ Viva 10 marks)	
	(c) Internal Assessment : 40	

SEMESTER II

Paper IV:	Remote Sensing and GIS in Human geography (with special reference to Urban and Regional Planning)	**200**
	(a) Theory : 100	
	(b) Practicals : 60	
	(Lab. work 30 marks+ Record file 20 marks+ Viva 10 marks)	
	(c) Internal Assessment : 40	
Paper V:	Remote Sensing and GIS in Physical Geography (with special reference to environmental management)	**200**
	(a) Theory : 100	
	(b) Practicals : 60	
	(Lab. work 30 marks+ Record file 20 marks+ Viva 10 marks)	
	(c) Internal Assessment : 40	
Paper VI:	Image Processing	**100**
	(a) Theory : 50	
	(b) Practicals : 30	
	(Lab. work 15 marks+ Record file 10 marks+ Viva 5 marks)	
	(c) Internal Assessment : 20	
	Field Report	**100**
	(a) Evaluation of the Field Report : 50	
	(b) Presentation : 25	
	(c) Viva Voce : 25	

SEMESTER III

Paper VII:	Application of Remote Sensing and GIS in Disaster Management		**200**
	(a) Theory	: 100	
	(b) Practicals	: 60	
	(Lab. work 30 marks+ Record file 20 marks+ Viva 10 marks)		
	(c) Internal Assessment	: 40	
Paper VIII:	Application of Remote Sensing and GIS in Utility Management		**200**
	(a) Theory	: 100	
	(b) Practicals	: 60	
	(Lab. work 30 marks+ Record file 20 marks+ Viva 10 marks)		
	(c) Internal Assessment	: 40	
Paper IX:	Application of Remote Sensing and GIS in Resource Management		**200**
	(a) Theory	: 100	
	(b) Practicals	: 60	
	(Lab. work 30 marks+ Record file 20 marks+ Viva 10 marks)		
	(c) Internal Assessment	: 40	

SEMESTER –IV

Paper X:	Research Methodology, Project Formulation and Writing		**100**
	(a)Theory	: 80	
	(b) Internal Assessment	: 20	
	Project Report		**500**
	(a) Mid-Term Appraisal of the Project Report	: 100	
	(b) Evaluation of the Project Report	: 325	
	(c) Presentation &Viva Voce (50+25)	: 75	
	Grand Total		**2400**

NOTE:

1. The candidates, who successfully completes first two semesters of the course but scores less than 60 per cent marks in aggregate, shall be awarded Post-

SEMESTER – I

(ii)

Lillesand, T.M. & Kiefer, R.W. : *Remote Sensing and Image Interpretation*, Third Edition, John Wiley and Sons, 1994.

FURTHER READINGS:

Agarwal, C.S. and P.K. Garg : *Text Book on Remote Sensing in Natural Resources Monitoring and Management*, Wheeler Publishing Co, New Delhi, 2000.

Jain, A.K. : *Fundamentals of Digital Image Processing*, Prentice Hall, New Jersey, 1989.

Muralikrishna, I.V. : *Remote Sensing Applications and Geographic Information Systems Recent Trends*, Tata McGraw Hill, New Delhi, 1992.

Fratt, W.K. : *Digital Image Processing*, John Wiley & Sons, 1978.

Rashid, S.K. : *Remote Sensing in Geography*, Manak Publications, Delhi, 1993.

Rees, W.G. : *Physical Principles of Remote Sensing*, Cambridge University Press, Cambridge, 1990.

Richards, John, A. : *Remote Sensing*: Digital Image Analysis, Springer Verlag, 1986.

Swain, Phillip, H. : *Remote Sensing*: The quantitative Approach, McGraw Hill International Book Co., 1978.

Verbyla, David, L : *Satellite Remote Sensing of Natural Resources*, Lewis Publishers, New York, 2005

PEDAGOGY:

Students may be taken to field for verification of identifiable features on aerial photographs and satellite imageries;

Students may be taken to different institutions, such as IIRS, NRSA, State Remote Sensing Centres to acquaint with different equipments, techniques, and their products; and

Students may be asked to prepare a report using toposheets, aerial photographs and satellite imageries to trace the temporal and spatial changes.

PAPER II: FUNDAMENTALS OF GEOGRAPHIC INFORMATION SYSTEMS (GIS) **Marks: 200**

(A) THEORY **Marks: 100**
Time : 3 Hours

OBJECTIVES:
The main objective of this course is to expose the students to fundamental principles of Geographical Information Systems including basic concepts and definitions, methods and techniques, and mathematical models.

COURSE CONTENTS:

Unit-I

Concepts and Definitions:

- Geographic Information Systems (GIS): Definition and developments
- Spatial data base: Points, Lines and Polygons
- Computer components: Hardware and software

Unit-II

Functional Elements:

(iii) Boolean operations

(iv) GIS database: Network, hierarchical, and relational database, creating raster and vector GIS data; creating buffer zones; overlay and using raster and vector GIS.

(v) Using PC Arc/Info or other GIS software: Digitizing, editing, map displaying, query.

(vi) Elevation Representation: Point, line, triangular.

NOTE: The practical examination shall be conducted by a team of three examiners, including the internal, Chairperson of the Department, and one additional faculty member teaching the course.

PAPER -III: SPATIAL ANALYSIS **Marks: 200**

(A) THEORY **Marks: 100**
Time : 3 Hours

Surface Analysis

- Digital Elevation Model (DEM) and Digital Terrain Model (DTM)
- Contouring, Hill Shading and Perspective View (3D viewing)
-

Jefrey S. & John, E. : *Geographic Information Systems - An Introduction.* Prentice Hall, New Jersey, USA, 1990.

Michael F. Goodchild & Karan K. Kemp (eds.) : *Introduction to GIS*, Santa Barbara, California, NGGIA, 1990.

Wong, David W.S. & Jay Lee: Statistical Analysis of Geographic Information with ArcView GIS and ArcGIS, John Wiley and Sons, INC., New Jersey, USA, 2005.

FURTHER READINGS

Agarwal, C.S. and P.K. Garg : Text Book on Remote Sensing in Natural Resources Monitoring and Management,

SEMESTER II

PAPER IV: REMOTE SENSING & GIS IN HUMAN GEOGRAPHY **Marks: 200**
(with special reference to Urban and Regional Planning)

(A) THEORY **Marks: 100**
Time : 3 Hours

OBJECTIVES:

To provide an understanding of:

concepts and definitions of urban and regional planning so as to pin point the specific areas, where application of Remote Sensing and GIS technologies will increase efficiency and effectiveness of planning;

data base creation in terms of various attributes, types and hierarchical scales; and

planning techniques which help in the location of infrastructural facilities for decentralised urban and regional planning.

COURSE CONTENT:

Unit-I

Concepts and definitions: Planning - definition and types; role of remote sensing and GIS in

2. A total of eight questions will be set out of the whole syllabus, at least 2 from each unit and the candidates will attempt 4 questions selecting one from each unit, in addition to the compulsory question at serial number I.

(B) PRACTICAL **Marks: 60**

(i) Image/photo interpretation: recognition and detection of objects, preparation of land use maps.

(ii) Digital image processing techniques in preparation of land use and urban land use maps.

(iii) Urban growth monitoring and change detection.

(iv) Preparation of base map and its updating.

(v) Grid cell data processing.

(vi) Site planning of business activities and tourist spots.

NOTE: The practical examination shall be conducted by a team of three examiners, including the internal, Chairperson of the Department, and one additional faculty member teaching the course.

(C) INTERNAL ASSESSMENT **Marks: 40**

Internal assessment shall be as based on class test/s and assignment/s etc., as prescribed or conducted by the teacher/s concerned.

BOOKS RECOMMENDED

ESSENTIAL READINGS

Avery, T.V. : *Interpretation of Aerial Photography,* Burgess Publishing Co., Minneapolis, 1962.

Barret, E.C. & Curtis, E.F. : 'The Built Environment' in Remote Sensing of Environment, Second edition, pp. 293-306, 1982.

Gautam, N.C. : *Urban Landuse Study through Aerial Photo Interpretation Techniques*, Pink Publishing House, Mathura, 1970.3(s)-3.93056(e)-2.0301( )-4.8-vity 092008666((6(3)0.3(e7.871

(C) INTERNAL ASSESSMENT **Marks: 40**

Internal assessment shall be based on class test/s and assignment/s etc., as prescribed or conducted by the teacher/s concerned.

BOOKS RECOMMENDED

ESSENTIAL READINGS

Agarwal, C.S. and P.K. Garg :

(iv)

SEMESTER III

PAPER VII: APPLICATION OF REMOTE SENSING AND GIS IN DISASTER MANAGEMENT **Marks: 200**

(A) THEORY **Marks: 100**
Time : 3 Hours

OBJECTIVES:
Main objectives of this course are to introduce the students with the nature, causes and effects of disasters and applications of GIS and Remote Sensing in mapping, mitigation and monitoring of hazards and disasters.

Unit I

i. Fundamental concepts of hazards and disasters
ii.

FURTHER READINGS

Agarwal, C.S. and P.K. Garg : *Text Book on Remote Sensing in Natural Resources Monitoring and Management*, Wheeler Publishing Co, New Delhi, 2000.

Burrough, P.A. & Macdoneli, R.A.: *Principles of Geographic Information Systems,* Oxford University Press, 2000.

Demers, M.N. : *Fundamentals of geographic Information Systems*, 2nd Edition, John Wiley and sons, 2000.

Giarratano, J. & Rieley, G. : *Expert Systems: Principles and Programming*, PRS Kent Publishing Company, 1985.

Muralikrishna, I.V. : *Remote Sensing Applications and Geographic Information Systems Recent Trends*, Tata McGraw Hill, New Delhi, 1992.

Rashid, S.K. : *Remote Sensing in Geography*, Manak Publications, Delhi, 1993.

Rees, W.G. : *Physical Principles of Remote Sensing*, Cambridge University Press, Cambridge, 1990.

Swain, Phillip, H. : *Remote Sensing*: The quantitative Approach, McG2.0301TJ(a)-12.649955.745

(C) INTERNAL ASSESSMENT **Marks: 40**

Internal assessment shall be based on class test/s and assignment/s etc., as prescribed or conducted by the teacher/s concerned.

PEDAGOGY:

Students may be asked to prepare a report on zonation of hazards and disasters using topographical sheets, aerial photographs and satellite images.
Students may acquaint with the satellite imageries of various kinds of disasters.

PAPER VIII: APPLICATION OF REMOTE SENSING AND GIS IN UTILITY MANAGEMENT **Marks: 200**

(A) THEORY **Marks: 100**
Time : 3 Hours

OBJECTIVES:

The major objective of this paper is to expose the students the application of remote sensing and GIS in managing utility services. It further aims at training them to take quick, correct and reliable locational decisions.

Unit I

Utility, Description of all essential services and utilities, Database development and Data Acquisition, Acquiring and integrating geo-spatial d-0.144544(A)-0.14454

Unit II

Land Resources: Introduction to agriculture and soil resources, Crop inventory, land evaluation, land degradation and soil conservation; Mineral resources and impacts of mining. Bio-Resources: Remote sensing application in agriculture, forest resources and wildlife habitat assessment. Mapping of forest density and type, issues in forest management.

Unit III

Water Resources: Remote sensing application in surface and sub surface water resources evaluation, watershed characterization, water resources management and development, water quality and pollution issues.
Energy Resources: Coal, oil and nuclear energy, non-conventional energy resources, future potential and requirement of energy resources. Geo-information in energy resources management.

Unit IV

Geo-information Models in Resource Management: Land resources development, prioritization and mol

(B) PRACTICAL **Marks: 60**

1. LU-LC mapping at level I and Level II using 1:50,000 scale satellite image.
2. Forest Types Mapping using satellite images.
3. Delineating on satellite image various surface water resources and identify potential sites for WR conservation.
4. Delineation of surface mining zones and impact on land resources of the area using satellite image
5.

Unit II

Preparation of research projects and writing of reports: Preparation of field reports, spatial data, classification and sampling problems. Need for sampling, types of sampling, sample size, sampling area.
Project Definition, Importance of Projects and Proj

PROJECT REPORT **Marks**: **500**

(a) Mid-Term Appraisal of the Project Report	:	100
(b) Evaluation of the Project Report	:	325
(c) Presentation &Viva Voce (50+25)	:	75

NOTE:

(i) Mid-term appraisal of the project report of each student shall be done by the board of the four examiners consisting of the supervisor, chairman, and the two senior faculty members of the department.

(ii) Mid-term appraisal of the project report shall have two-components: (i) presentation on project proposal including the research objectives, methodology and the chapter scheme, after the three weeks of assigning the project title, (ii) presentation of data analysis and tentative findings, after the six weeks of assigning the project title.

(iii) In case of project report, the Board of Control shall assign a candidate to a faculty member/s for supervision of his/her report on an approved topic. The student shall prepare three copies of his/her project report and