PANJAB UNIVERSITY, CHANDIGARH

(Estted. under the Panjab University Act VII of 1947- enacted by the Govt. of India)

FACULTY OF ARTS

SYLLABI

FOR

MASTERS IN REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS (RS & GIS) (SEMESTER SYSTEM) EXAMINATIONS, 2015-16

GUIDELINES FOR CONTINUOUS INTERNAL ASSESSMENT (20%) FOR REGULAR STUDENTS OF MASTERS IN REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS (RS & GIS)

(Semester System)

(Effective from the First Year Admissions for the A

SEMESTER-III			
Paper	**Title**	**Max. Marks**	**Credits**
IX	Remote Sensing and Geographic Information Systems in Geosciences (a) Theory : 50 (b) Practical (Lab work 10 marks+ Record file 10 marks+ Viva 10 marks): 30 (c) Internal Assessment : 20	100	4
X	Remote Sensing and Geographic Information Systems in Urban and Regional Planning (a) Theory : 50 (b) Practical (Lab work 10 marks+ Record file 10 marks+ Viva 10 marks): 30 (c) Internal Assessment : 20	100	4
XI	Research Methodology (a) Theory : 80 (b) Internal Assessment : 20	100	4
XII	Internship and Field Report (a) Evaluation of the Internship and Field Report : 50 (b) Presentation of Data Analysis and Main Findings : 30 (c) Viva-voce : 20	100	4
	Total	**400**	**16**
SEMESTER-IV			
Paper	**Title**	**Max. Marks**	**Credits**
XIII	Project Report 1. Formulation of Project Proposal 2. Mid Term appraisal 3. Pre-submission Presentation 4. Evaluation 5. Presentation 6. Viva-voce	 50 50 50 150 50 50	
	Total	**400**	**16**
	GRAND TOTAL (Semester-I, II, III, IV)	**1600**	**64**

NOTE:

1.

SEMESTER - I

PAPER-I: FUNDAMENTALS OF REMOTE SENSING

Max. Marks	**: 100**
Theory	: 50
Practical	: 30
Internal Assessment	: 20

OBJECTIVES: To introduce the basic principles of remote sensing, satellite systems and their functioning, and applications of remote sensing technology.

(A) THEORY **Marks: 50**
Time: 3 Hours

UNIT – I

Fundamental Concepts of Remote Sensing:

i. Remote Sensing: Definition, Concept, History and Applications
ii. Types of Remote Sensing
iii. Remote Sensing Platforms and Scanning Systems

UNIT – II

EMR Principles and Interaction Mechanisms:

iv. Radiation Principles; Electromagnetic Spectrum
v. Energy-Atmosphere Interaction; Atmospheric Windows
vi. Energy-Earth Interaction; Spectral Signatures of Surface Features

UNIT – III

Image Processing and Interpretation:

vii. Image: Meaning and Types (Analogue and Digital) and Characteristics
viii. Resolution: Spatial, Spectral, Radiometric and Temporal
ix. Basics of Image Processing; Elements of Image Interpretation.

UNIT – IV

Satellite Systems and Sensors:

x. LANDSAT, SPOT and IRS
xi. IKONOS, Quickbird, World-View and GeoEye
xii. SRTM, ASTER, MODIS

NOTE:

1. A Compulsory Question at serial number I containing 10 short answer type questions shall be set covering the whole syllabus. Student will attempt any 7 parts in about 25-30 words each. Each part shall carry 2 marks (total 14 marks).
2. A total of eight questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selec

3. Understanding the simple geometry of aerial photographs
4. Interpretation of information given on the margins of photograph and satellite imageries.
5. Locating principal point, conjugate principal point, flight line
6. Stereoscopic vision Test, selection of stereo pair and its orientation and placing under the stereoscope for stereovision.
7. Identification and mapping of features from single photograph.
8. Identification and mapping of features from a stereo pair and their verification in the field.
9. Measurement of scale, relief displacement , parallax , height and slope from vertical aerial photographs
10. Identification of planimetric positions

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: 20**

Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.

LIST OF READINGS

Essential Readings

1. McGlone, J. Chris, *Manual of Photogrammetry (Sixth Edition),* American Society of Photogrammetry and Remote Sensing, 2013.
2. Mikhail, Edward M. et al, *Introduction to Modern Photogrammetry*, John Wiley & Sons Inc. 2001.
3. Moffitt, F. H., *Photogrammetry*, 3rd Edition, Harper & Row, NY, 1980.
4. Paul Wolf et al., *Elements of Photogrammetry with Application in GIS*, Fourth Edition, McGraw-Hill Professional, 2013.
5. Wolf, P. R., *Elements of Photogrammetry*. McGraw-Hill, NY, 1983.
6. Zorn, H. C., *Introductory Course in Photogrammetry*. 6th Ed. ITC, Netherlands, 1980.

Further Readings

1. Burnside, C. D., *Mapping from Aerial Photography*. 2nd Ed, Collins, 1985.
2. Campbell, J.B., *Introduction to Remote Sensing*, 3rd ed., The Guilford Press, 2002.
3. Curran Paul, J., *Principles of Remote Sensing*, UK: ELBS, 1984.
4. Joseph, George, *Fundamentals of Remote Sensing*, Universities Press India, 2007.
5. Lillesand, T. M.; R.W. Kiefer, and J.W. Chipman, *Remote Sensing and Image Interpretation*, 5th Edition, Wiley, 2007.
6. Sabins, Floyd F., *Remote Sensing: Principles and Interpretation,* New York: WH Freeman and Company, 2007.

PEDAGOGY: Students will be demonstrated the difference between qualitative and quantitative understanding of various aspects of Photogrammetry. Demo exercise on measurements on the map and photo will make students aware the importance of Photogrammetry in objective and precise mapping using aerial photographs.

6. Spatial Representation: Mapping Techniques
7. Spatial Representation: Symbolizing and Map Layouts
8. Basic Analysis in GIS: Buffering, Overlay and Query Building

NOTE:

PAPER-IV: FUNDAMENTALS OF COMPUTERS AND COMPUTER PROGRAMMING

Max. Marks	**: 100**
Theory	: 50
Practical	: 30
Internal Assessment	: 20

OBJECTIVES: To develop basic skills and understanding of computer operations; to develop skills of Word Processing for written commu

NOTE:

1. A Compulsory Question at serial number I containing

SEMESTER-II

PAPER V: CARTOGRAPHY

Max. Marks	**: 100**
Theory	: 50
Practical	: 30
Internal Assessment	: 20

OBJECTIVES: The course is designed to emphasize the relevance and83(a)-24.08

3. Generation of Hill Shading Map
4. Profiles: Longitudinal and Transverse Profiles
5. Interpretation of Physical and Cultural features from Topographical Sheet
6. Thematic Maps: Dot Map, Choropleth Map, Proportiona

PAPER VII: IMAGE PROCESSING

Max. Marks	**: 100**
Theory	: 50
Practical	: 30
Internal Assessment	: 20

OBJECTIVES:

The course is designed to introduce the student to analytical tools and methods which are currently used in digital image processing as appli

(B) PRACTICAL **30 Marks**

1. Components and Operation of GPS Instrument
2. Understanding the Different Pages of GPS
3. Collecting Readings using Primary Pages
4. Surveying a Small Area
5. Mapping of the Surveyed Area
6. Tabulation of Information of the Surveyed Area
7. Analysis of the Map and Data Collected
8. Application Exercises

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: 20**

Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.

LIST OF READINGS

Essential Readings:

1. Anderle, R., *The Global Positioning System*, Royal Society of London, UK, 1988.
2. Blewitt, G., *Advances in GPS Technology for Geodynamics Investigations: 1978-1992*, Crustal Dynamics Project AGU Monograph, NASA. 1993.
3. Colombo O. L. & M. M. Watkins, *Satellite Positioning*, in US National report to IUGC on Geodesy, 1991.
4. C. Jones, *Geographical Information Systems and Computer Cartography*, Pearson Education Inc, 1997.
5. C. Rizos, *Introduction to GPS*, University of New South Wales, 1999.
6. El-Rabbani, Ahmed, *Introduction to GPS: The Global Positioning System*, Artech House, 2002.
7. Kaplan, Elliott D., *Understanding GPS: Principles and Applications*, Artech House, 2005.
8. Letham, Lawrence, *GPS Made Easy: Using Global Positioning Systems in the Outdoors*, Rocky Mountain Books, 2008.

Further Readings:

SEMESTER III

PAPER IX: REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS IN GEOSCIENCES

Max. Marks	**: 100**
Theory	: 50
Practical	: 30
Internal Assessment	: 20

OBJECTIVES: To train the students to detect, identify and analyze the various facets of geomorphic and geological features; analyze various hydrological and geo-environmental parameters and manage disasters with the help of remote sensing and GIS.

(A) THEORY **Marks: 50**
Time: 3 Hours

UNIT - I

Remote Sensing and GIS in Geological and Geomorphological Studies

i. Terrain Elements; Spectral Signatures of Rocks
ii. Lithological; Structural and Geomorphological mapping
iii. Thermal and Microwave Remote Sensing for Geological Mapping
iv. RS and GIS for Mineral and Oil Exploration

UNIT - II

Remote Sensing and GIS for Hydrological and Geo-environmental Studies

v. Surface Water and Ground Water Management
vi. Morphometric Analysis of a Drainage Basin
vii. Soil and Land Degradation
viii. Land Use/Land Cover Analysis

UNIT – III

Remote Sensing and GIS in Disaster Management

ix. Hazard, Vulnerability, Risk, Disaster
x. Types of Hazards/Disasters
xi. Disaster Management
xii. Role of Geoinformatics in Disaster Management

UNIT – IV

Remote Sensing and GIS in Hazard and Risk Analysis

xiii. Remote Sensing Data for Disaster Studies
xiv. Hazard Mapping and Analysis
xv. Risk and Vulnerability Assessment

NOTE:

1. A Compulsory Question at serial number I containing 10 short answer type questions shall be set covering the whole syllabus. Student will attempt any 7 parts in about 25-30 words each. Each part shall carry 2 marks (total 14 marks).
2. A total of eight questions will be set out of the whole syllabus, at least 2 from each unit. The candidates will attempt 4 questions selecting one from each unit carrying 9 marks each (total 36 marks). These will be in addition to the Compulsory Question at serial number I.

(B) PRACTICAL **Marks: 30**

1. Mapping and Analysis of Absolute and Relative Relief
2. Measurement of Slopes: Degree, Aspect and Curvature
3. Generation of Spatial Profile and Surface Profile
4. Generation of 3-Dimensional Model of Terrain
5. Morphometric Analysis of Drainage Basins
6. Land Use/Land Cover Analysis
7. Geomorphological Mapping
8. Lineaments/Fault Mapping and Analysis
9. Landslide Hazard Zonation
10. Flood Hazard and Risk Analysis

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: 20**

Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.

LIST OF READINGS

Essential Readings:

1. Campbell, J. B. and R.H. Wynne, *Introduction to Remote Sensing* (Fifth Edition), Guilford Press, 2012.
2. Gupta, R.P., *Remote Sensing Geology*, Springer, Heidelberg, Germany, 2003.
3. Hyndman, D. and D. Hyndman, *Natural Hazards and Disasters*, 2nd edition. USA, Belmont: Brooks/Cole, 2009
4. Roy, P.S.; Van Westen, C.J.; Jha, V.K.; Lakhera, R.C. and Champati Ray, P.K., *Natural Disaster and their Mitigation: Remote Sensing and Geographical Information System Perspectives*, IIRS, Dehra Dun, Govt. of India, 2000.
5. Verbyla, David, L., *Satellite Remote Sensing of Natural Resources*, Lewis Publishers, New York, 2005

Further Readings:

1. Agarwal, C.S. and P.K. Garg, *Text Book on Remote Sensing in Natural Resources Monitoring and Management*, Wheeler Publishing Co, New Delhi, 2000.
2. Greedry, Alan, F., *Application of Remote Sensing with Special Reference to Geosciences*, Gregory Geo-science, 1974.
3. Papova, T.A. and Pandey, S.N., *Principles and Applications of Photogeology*, Wiley Eastern Publishers, 1987
4. Smith, Willam, L., *Remote Sensing Applications for Mineral Exploration*, Dawden Hutchintons and Ross Inc., 1977.
5. Verstappen, H., *Remote Sensing in Geomorphology*, Elsevier Scientific Publications, Netherlands, 1977.

PEDAGOGY: Students may be taken to institutions such as IIRS, NRSC and State Remote Sensing Centers to acquaint them with equipments, techniques and their products. Students may be asked to prepare a report on landform using topographical sheets, aerial photographs and satellite images. Students may acquaint with the satellite imageries of various kinds of environmental problems.

PAPER X: REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS IN URBAN AND REGIONAL PLANNING

Max. Marks	**: 100**
Theory	: 50
Practical	: 30
Internal Assessment	: 20

OBJECTIVES:

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: 20**

Internal assessment shall be based on Written Test, Snap Test, Participation in Class discussion, Term Paper and Attendance as prescribed by the University.

LIST OF READINGS

Essential Readings:

1. Bhatta, B., *Analysis of Urban Growth and Sprawl from Remote Sensing Data*, Springer-Verlag Berlin Heidelberg, 2010.
2. Campbell, J. B. and R.H. Wynne, *Introduction to Remote Sensing* (Fifth Edition),

PAPER XI: RESEARCH METHODOLOGY

Max. Marks	**: 100**
Theory	: 80
Internal Assessment	: 20

OBJECTIVES: The aim of this paper is to train the students about the various aspects of research writing so that they are in a position to write research reports independently.

(A) THEORY **Marks : 80**

Time: 3 Hours

UNIT-I

Basic Concepts

i. Meaning, Objectives and Significance of Research
ii. Types of Research and Research Approaches.
iii. The Research Process

UNIT-II

4.

SEMESTER IV

PAPER- XIII: PROJECT REPORT

Marks: 400

1. Formulation of Project Proposal : 50 marks
2. Mid Term appraisal : 50 marks
3. Pre-submission Presentation : 50 marks

Examination Board:
Chairperson
Supervisor
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