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, 2016-17

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 Academic Session 2014-2015)

1. The Syndicate has approved the following guidelines,3165( )-35.1644(i)022.662(11.3771

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. Remote Sensing Types; Platforms and Scanning Systems
iii. Visible & IR, Thermal Infrared and Microwave Remote Sensing

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 containingP (e)-2.8073 .6383(n)8.4677(P)25((e)-2.80762(r)-28

4. Visual Interpretation of Features from Satellite Image
5. Digital Satellite Imageries: Data Import & Data Structures
6. Digital Image Interpretation: Band Combination Analysis
7. Digital Image Interpretation: Histogram and Pixel Value Analysis
8. Unsupervised Classification of Satellite Data
9. Supervised Classification of Satellite Data

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. Jensen, J.R., *Introductory Digital Image Processing: A Remote Sensing Perspective*, Pearson Prentice Hall, 2005.
3. Joseph, G. *Fundamentals of Remote Sensing*, Universities Press, 2005.
4. Lillesand, T.M., R.W. Kiefer and J.W. Chipman, *Remote Sensing and Image Interpretation*, 5th Edition, John Wiley and Sons, 2004.
5. Mather, P.M. and M.G. Koch, *Computer Processing of Remotely-Sensed Images: An Introduction*, John Wiley & Sons, 2011.
6. Prost, Gary L., *Remote Sensing for Geoscientists: Image Analysis and Interpretation*, 3rd Edition, CRC Press, Taylor & Francis, 2013.

Further Readings:

1. Gomarasca, Mario A, *Basics of Geomatics*, Springer: Heidelberg, 2009.
2. Nag, P. and M. Kudrat, *Digital Remote Sensing*, Concept Publishing Company, New Delhi, 1998.
3. Richards, John A. *Remote Sensing Digital Image Analysis: An Introduction*, 5th Edition, Springer-Verlag Berlin Heidelberg, 2013.
4. Gupta, R.P., *Remote Sensing Geology*, Springer, Heidelberg, Germany, 2003.
5. Roy, P.S.; Van Westen, C.J.; Jha, V.K.; Lakhera, R.C. and Champati Ray, P.K., *Natural Disaster and their(a)18.4(n-5.31915(o)-2.604(hM)-101279t)1.40511(a)-10.883()-10.883(i)10.883(*

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, t o0381(i)22.680.42551( )-61915(f)13.85g f915(f)a

PAPER III: FUNDAMENTALS OF GEOGRAPHIC INFORMATION SYSTEMS (GIS)

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

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.

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

UNIT – I

Concepts and Definitions:

i. Geographic Information Systems (GIS): Definition and Developments
ii. Spatial data base: Points, Lines and Polygons
iii. GIS Components: Hardware and Software

UNIT – II

6. Spatial Representation: Mapping Techniques

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 communication of results and documentation of work performed; to impart skills for data management, charting, and visualization; to expose students to the effective techniques of using search engines & the services of Internet and to impart programming skill for developing programs in 'C' language.

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.

SEMESTER-II

PAPER V: CARTOGRAPHY

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

OBJECTIVES: The course is designed to emphasize the relevance and scope of cartography in GIS. It shall highlight the value of this vital field in the current and highly versatile field of Remote Sensing and GIS.

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

UNIT – I

Basic Concepts of Cartography

i. Cartography: Definition, Scope and Significance
ii. Historical Perspective of Cartographic Development
iii. Traditional and Digital Cartography
iv. Cartography and GIS

UNIT – II

Data Types and Map Basics

v. Levels of Measurements
vi. Data: Types (Spatial and Attribute data), Sources and Analysis
vii. Map Types and Classifications; Topographic Maps
viii. Map Projections, Datum and Coordinate System

UNIT – III

Map Designs and Production

ix. Principles of Symbolization
x. Basics of Colour Schemes and Representation
xi. Map Lettering and Legend Presentation
xii. Map Layout and Product Generation

UNIT – IV

Interpretation of Topographical Maps

xiii. Relief Representation: Contours, Hachures, Hill Shading
xiv.

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, Proportionate Circles, Isopleth Map

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. Cromley, R.G., *Digital Cartography*, Prentice-Hall of India, New Delhi, 1992.
2. Crampton, W.C., *Mapping: A Critical Introduction to Cartography and GIS,* John Willy & Sons, New York, 2010.
3. Dent, B.D., *Cartography-Thematic Map Design*, WBC McGraw–Hill, Boston, 1999.
4. John Krygier and Denis Wood, *Making Maps: A visual guide to map design for GIS*, Guilford Publications, New York, 2005.
5. Keates, J.S., *Cartographic Design and Production*, Longman, London, 1998.
6. Misra, R.P. and Ramesh, A., *Fundamental of Cartography*, Concept Publishing Company, New Delhi, 1989.
7. Monkhouse, F.J., *Maps and Diagrams*, Methuen and Co., London, 1994.
8. Nag, P., *Thematic Cartography and Remote Sensing*, Concept Publishing Co., New Delhi ,1992.
9. Nelson Petrie, *Analysis and Interpretation of Topographical Maps (Rev),* Orient Blackswan Pvt. Ltd. 1997.
10. Rampal, K.K., *Mapping and Compilation*, Concept Publishing Co., New Delhi, 1993.
11. Raisz, Erwin, *Principles of Cartography,* McGraw Hill, New York, 1962.
12. Robinson, A.H. and others, *Elements of Cartography*, John Willy & Sons, New York, 6th edition, 2009.
13. Singh, R.L. and Singh R.P.B., *Elements of Practical Geography,* Kalyani Publishers , New Delhi, Reprint 2002.

Further Readings:

1. Birch, T., *Maps- Topographical and Statistical*, Clarendon Press, Oxford, 1949.
2. Brown, L.A., *The Story of Maps,* Cressit Press, London, 1951.
3. Harley J.B. and David Woodward, *The History of Cartography* Volume 2, Book 2, The University of Chicago Press, 1995.
4. Raisz, Erwin, *Principles of Cartography,* McGraw Hill, New York, 1962.
5. Ramamurthy, K., *Maps Interpretation: India Landscapes Through Survey of India*, Topographic Maps, R.K. Mutt Road, Madras, 1982.
6. Tyner, J.A., *Principles of Map Design*, Guilford Publications, New York, 2010.
7. Wood Clifford H. and Keller C., *Cartographic Design- Theoretical and Practical Perspectives,* John Wiley & Sons, 1996.

PEDAGOGY: Students will be encouraged to ask questions and participate in classroom discussions. Assignments, term papers and group discussions will be the additional methods to make teaching more focused and interesting.

PAPER-VI: SPATIAL ANALYSIS

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

OBJECTIVES: The course is designed to help the students to understand the techniques, which assist in providing focused and precise analysis of emerged pattern of geographical phenomena.

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

UNIT- I

Fundamentals of Spatial analysis

i. Significance of Spatial analysis
ii. Nature of Spatial Data
iii. Using GIS for Spatial Analysis.

UNIT- II

Point Pattern Analysis

iv. Point Features Over Space: Meaning and Nature
v.

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 applied to image information for human viewing. Then apply these tools in the laboratory in image restoration, enhancement and compression.

(A) THEORY **Marks: 50**

Time: 3 Hours

UNIT – I

i.

NOTE:

PAPER VIII: FUNDAMENTALS OF GLOBAL POSITIONING SYSTEM (GPS)

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

Objectives: The objectives of this paper are to give a comprehensive introduction to GPS and DGPS technology, system concepts, design, operation, implementation and applications, to provide detailed information on the GPS signal, the processing by the receiver, and the techniques by which GPS obtains position, velocity and time.

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

UNIT I

i. Concept and Characteristics of Global Navigational Satellite System (GNSS)
ii. Historical Background, GPS Segments, Features of GPS Satellites, Principles of Operation, Fundamentals on Satellite Geodesy, Referential Systems related to GNSS, Survey and Characteristics of Observed Values.

UNIT II

iii. Surveying with GPS: Absolute, Relative and Differential Positioning, Kinematic GPS.
iv. I
and Data Transformation

UNIT III

v. Survey on GNSS Application: Basic Principles in Working with DGNSS-Practical PropleHsr

Cporninese Application in:GeodeTg.

(B) PRACTICAL **Marks: 30**

1. Mapping and Analysis of Absolute and Relative Relief

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

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

OBJECTIVES: To demonstrate the application of Remote Sensing and GIS technologies in

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.

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

Data in Research

iv. Types and Sources of Data
v. Data collection: Methods and Techniques
vi. Data Processing and Analysis

UNIT-III

Sampling:

vii. Sampling: Concept, Need and Significance
viii. Probability and Non-Probability Sampling
ix. Sampling Techniques

UNIT-IV

Research Proposal and Report Writing

x. Formulation of Research Proposal
xi. Types and Elements of Report;
xii. Steps involved in Report Writing ; Presentation of Findings

NOTE:

1. A Compulsory Question at serial number I containing 15 short answer type questions shall be set covering the whole syllabus. Student will attempt any 10 parts in about 25-30 words each. Each part shall carry 2 marks (total 20 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 15 marks each (total 60 marks). These will be in addition to the Compulsory Question at serial number I.

(B) 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. Creswell, John W., *Research Design; Qual17(0)31:9183(e)nes . acsnl*

4. Kumar Ranjit, *Research Methodology: A step-by-step Guide for Beginners*

SEMESTER IV

PAPER- XIII: PROJECT REPORT

Marks: 400

1.