Proposed Syllabus of
PG Diploma in Geoinformatics
Duration: 1 year

Course Structure

Sem- I

Code	Course Title	Hours per week			Credits
		L	T	P	
DGI-101	Principles of Remote Sensing and Photogrammetry	3	0	0	3
DGI-102	Principles of Geographic Information Systems (GIS)	3	0	0	3
DGI-103	Basics of GNSS, Cartography & Digital Mapping.	3	0	0	3
DGI-104	Mathematical Methods and Scientific Computing for Geospatial Data Analysis	3	0	0	3
DGI-105	Recent Trends in Geo-informatics:Machine Learning and Big Data.	3	0	0	3
DGI-106	Audit Course 1**	2	0	0	0
DGI -191	Remote Sensing and Photogrammetry Lab.	0	0	4	2
DGI-192	GIS Lab	0	0	4	2
DGI-193	GNSS and Cartography Lab	0	0	4	2
DGI-194	Web Technology Lab	0	0	4	2
DGI-195.	Programming in Python	0	0	4	2
Total Credits: 25					

**Audit course 1

1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga

8. Personality Development through Life Enlightenment Skills.

Sem- II

Code	Course Title	Hours per week			Credits
		L	T	P	
DGI-201	Spatial Data Modeling	3	0	0	3
DGI-202	Satellite Image Processing	3	0	0	3
DGI-203A/B	Program Elective I – Applications of Geoinformatics/ Advanced Remote Sensing Techniques	3	0	0	3
DGI-204 A/B/C/D/E/F	Program Elective II– Geoinformatics in Disaster Management / Geoinformatics in Water Resources Management/ Geoinformatics in Agriculture/ Geoinformatics in Urban planning/ Geoinformatics in Geotechnical Engineering/ Geoinformatics in Environmental Management	3	0	0	3
DGI-205	Audit Course 2**	2	0	0	0
DGI-291	Database Analysis Lab	0	0	4	2
DGI-292	Satellite Image Processing Lab	0	0	4	2
DGI-293A/B	Laboratory 4 (Based on Elective I)	0	0	4	2
DGI-294 A/B/C/D/E/F	Laboratory 4 (Based on Elective II)	0	0	4	2
DGI-295	Project Work on Applications of Geoinformatics	4	0	0	4
Total Credits: 24					

*Students to be encouraged to go to Industrial Training/Internship for at least 2-3 months during semester break.

**Audit course 2

9. English for Research Paper Writing
10. Disaster Management
11. Sanskrit for Technical Knowledge
12. Value Education
13. Constitution of India
14. Pedagogy Studies
15. Stress Management by Yoga

16. Personality Development through Life Enlightenment Skills.

Name of the Course: PG Diploma in Geoinformatics	
Subject: Principles of Remote Sensing and Photogrammetry	
Course Code: DGI– 101 & DGI - 191	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	To introduce students on concept of Remote Sensing (RS).
2.	Overview of RS image processing and its' applications.
3.	

Objective:

Sl. No.	
1.	To provide background knowledge and understanding of principles of RS, RS Sensors and systems
2.	Overview of information retrieval of earth surface features using multi-resolution, multi-scale and multi-temporal imagery;
3.	Introduction of image processing and classification techniques
4.	**Enable spatial and temporal thinking to relate remote sensing for real-world applications.**

Pre-Requisite:

Sl. No.				
1.	**Basic Knowledge of Computer System**			
Contents			**Hrs./week**	
Chapter	**Name of the Topic**		**Hours**	**Marks**
01	Remote Sensing: Definition of Remote sensing, Advantages and limitations, Remote sensing process, Electromagnetic Radiation (EMR): EMR Spectrum and its properties, EMR wavelength regions and their applications, Atmospheric windows, Interaction of EMR with matter, Spectral signatures, Resolutions: Spectral, Spatial, Temporal and Radiometric Spectral Signature and its Response: of Soil, Vegetation and Water, Basics of visual interpretation of satellite images		8	15
02	ORBITS OF SATELLITE, KEPLER'S LAWS OF MOTION, IRS SERIES OF SATELLITES, LANDSAT, SPOT, IKONOS, QUICKBIRD, MODIS, RADARSAT, NOAA, TERRA, MOS AND ERS, BRIEF INTRODUCTION TO WEATHER AND COMMUNICATION SATELLITES FUNDAMENTALS OF AERIAL PHOTOGRAPHY, VERTICAL AND OBLIQUE AERIAL PHOTOGRAPHY, AERIAL CAMERAS, PHOTOGRAMMETRY; BASIC CONCEPTS OF SCALE, OBJECT HEIGHT AND LENGTH, OBJECT AREA AND PERIMETER, GRAYSCALE TONE/COLOR OF OBJECTS, PHOTO INTERPRETATION TECHNIQUES, STEREO PHOTOGRAMMETRY AND STEREOVISION, PARALLAX BAR AND ITS APPLICATIONS.		10	15
03	Photographic System: Cameras, Sensor classification: Active and Passive, along track and across track scanners, Infrared Scanners, Thermal Sensors and Microwave Sensors		5	13
04	Introduction to Thermal Infrared Radiation Properties: Kinetic Heat, Temperature, Radiant Energy and Flux, methods of transferring heat, Thermal properties of terrain: Thermal Capacity, Thermal conductivity, Thermal Inertia, Thermal Infrared Multispectral scanners, Thermal IR Remote sensing examples		8	15
05	Passive Microwave Sensors, Active Microwave Sensors, Side looking RADAR, Scatterometer, SAR Interferometry		5	12
	Sub Total:		36	70
	Internal Assessment Examination & Preparation of Semester Examination		4	30

	Total:		40	100

Practical:

DGI- 191 Remote Sensing and Photogrammetry Lab

List of Practical:

Hands on experiments based on theory paper

Assignments:
Ground truth data collection - use of radiometers, and spectrophotometers, etc Earth Observation Satellites (LANDSAT, SPOT, IRS, IKONOS and sensors for Stereo Data {MOMS, CARTOSAT}) and their characteristics
Rainfall estimation from satellite data
Hyper-spectral remote sensing

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Kang-tsung Chang	Introduction to Geographic Information Systems		Tata McGraw Hill, New Delhi,2002
C. P. Lo and Albert K. W. Yeung	Concepts and Techniques of Geographic Information Systems		Prentice Hall of India,New Delhi,2005

Reference Books:

Burrough, Peter A. and Rachael McDonnell	Principles of Geographical Information Systems		
Magwire, D. J., Goodchild, M.F. and Rhind, D. M. Ed.	Geographical Information Systems: Principles and Applications Geographical Information Systems: Principles and Applications		

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	All	10	10				
B	ALL			5	3	5	60
C	ALL			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments		**10**

On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: PG Diploma in Geoinformatics **Subject: Principles of Geographic Information Systems (GIS)**	
Course Code: DGI – 102 & DGI - 192	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	Introducing concept, principles and applications of Geographic Information Systems (GIS).
2.	To develop the skill of using software and other tools of GIS in students.
3.	

Objective:

Sl. No.	
1.	To learn advance geoprocessing and modeling techniques
2.	To gain knowledge of geostatistical analysis and spatial data analysis to impart advance knowledge of programming
3.	To customization and automation in GIS.

Pre-Requisite:

Sl. No.			
1.	**Basic Knowledge of Computer System**		

Contents		Hrs./week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Basic Concepts about spatial information, Philosophy and definition of GIS, features, pictures, variables: points, lines, areas, Position on the earth; Basics of map.	3	5
02	Fundamentals of Data Storage, Information Organization and Data Structure Basic File Structures; Tabular Databases; Advantages of Databases, Types of Databases- hierarchical systems, network systems, relational systems and Object-oriented database systems (OODS), Data Models-Entity Relationship model, Relational Model, Data Structures; Raster Structures, Vector Structures.	7	12
03	GIS Data Requirement, sources and collection, Methods of data capture-scanning, digitization and associated errors, Conversion from Other Digital Sources, Attribute data input and management, Edge matching, creating digital data - remote sensing; generating data from existing data ; Metadata ;Different Kinds of geospatial data, Detecting and Evaluating Errors, Data Quality Measurement and Assessment, digital output options.	6	12
04	Image storage formats, Data retrieval, Data compression, NSDI,GSDI; Geographic Information in decision making; human resources and education; Interactive data exploration, Vector & Raster data query, Geographic visualization	5	5
05	**Raster data and structure, Local operations, Neighborhood operations, Zonal operations, Distance measure operations, Spatial auto correlations, DEM generation, Spatial Modeling, combining data; terrain mapping finding and quantifying relationships; spatial interpolation;**	5	12
06	Vector data base , Topological Relationships; Creation of Topology and Error Correction; Accuracy and Precision; The Importance of Error, Accuracy, and Precision, types of error, sources of error, data quality, Spatial interpolation, Overlay Operations and Buffering, Neighborhood functions Distant Measurement , Map Manipulation, Network analyses	5	12
07	GIS and Remote Sensing data Integration, Thematic Mapping, GIS and Integration of other types of data, Virtual GIS and SDSS, Project design and management, need assessment.	5	12

	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

DGI- 192 GIS Lab

List of Practical:
Concepts of customization of GIS software
Hands on experiments based on DGI- 102

Assignments:

1. Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Kang-tsung Chang 2002	Introduction to Geographic Information Systems		Tata McGraw Hill, New Delhi,2002
C. P. Lo and Albert K.W. Yeung	Concepts and Techniques of Geographic Information Systems		Prentice Hall of India, New Delhi,2005

Reference Books:

Burrough, Peter A. and Rachael McDonnell,	Principles of Geographical Information Systems		Oxford University Press, New York,1998
Magwire, D. J., Goodchild, M.F. and Rhind, D. M. Ed.	Geographical Information Systems: Principles and Applications Geographical Information Systems: Principles and Applications		Longman Group, U.K,1991

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	60
C	ALL			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**
External Examination: Examiner-			
Signed Lab Assignments		**10**	
On Spot Experiment		**40**	
Viva voce		**10**	**60**

Name of the Course: : PG Diploma in Geoinformatics	
Subject: Basics of GNSS, Cartography & Digital Mapping	
Course Code: DGI- 103 & DGI -193	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1.	To introduce the principles of the Global Navigation Satellite Systems (GNSS), Satellite Positioning, GNSS Signal Structures
2.	To demonstrate its applications to various aspects of location-based services and geospatial sciences.
3.	To provide knowledge and understandings of the RS/GIS and Computer Mapping Technology (CMT).

Objective:	
Sl. No.	

1.	To understanding the concepts of GNSS and its signals
2.	To apply GNSS in surveying and mapping
3.	To understand the concepts of different projection systems and its importance in preparing maps obeying appropriate cartographic principles

Pre-Requisite:

Sl. No.	
1.	**Basic Knowledge of Computer System**

Contents		Hrs./week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Introduction of Global Positioning System, Satellite constellation, GPS signals and data, Geo-positioning-Basic Concepts. NAVSTAR, GLONASS	3	5
02	**Basic geodesy, Geoid /datum/ Ellipsoid,- definition and basic concepts, Coordinate Systems, Special Referencing system, Map Scale, Scale factors, Indian geodetic System**	3	10
03	Control Segment, Space Segments, User Segment, GPS Positioning Types- Absolute Positioning, Differential positioning	4	10
04	Methods-Static & Rapid static, Kinematic-Real time kinematic Survey- DGPS-GPS data processing and Accuracy. Selection of Reference Station, Reference Station Equipment: GPS receiver, GPS antenna. Radio and its types, Radio Antenna. GPS Application in Surveying and Mapping, Navigation Military, Location Based Services, Vehicle tracking.	8	15
05	Visualization of geospatial data: Design aspects, Multiscale and geometric aspects scale, dissemination of (visualized) geospatial data, data products, use and users of products, Various issues in map visualization.	8	12
06	Basic Concept of cartography, Categories of maps, Interpretation of topographic maps, Cartographic databases, data measurement, cartographic design issues, colour and pattern, map lettering, map compilation, map scale, Generalization, symbolization, dot, isopleth and choropleth mapping, multivariate and dynamic mapping, map production, methods of map composing and printing	5	8
07	Basic Assumptions of projection system, Map Projections, Grouping of map projections: conic projection, cylindrical projection, Zenithal, Projection Types: Mercator, Transverse	5	10

Mercator, Polyconic, Lambert, Orthomorphic, UTM Projections and their comparison, Choosing a Map Projection, Map Projection transformation, Analysis and visualization of distortion		
Computer Cartography, the nature of Data, Database and Data structures, Data Input: Method of data capture, digitisation and scanning method, Techniques and procedure for digitising, Vector and Raster; Data output: Screen display system, file organization and formats, rectification of digital maps, software for digital mapping.		
Sub Total:	**36**	**70**
Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
Total:	**40**	**100**

Practical:

DGI- 193 GNSS and Cartography Lab

List of Practical:
Hands on experiments based on DGI- 103

Assignments:

1. Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Leicka. A	GPS Satellite Surveying		John Wiley & Sons, use. New York
Terry-Karen Steede	Integrating GIS and the Global Positioning System		ESRI Press,2002
N.K.Agrawal	Essentials of GPS		Spatial Network Pvt Ltd 2004
Sathish Gopi	**GPS and Surveying using GPS**		
Keates, J.S.	Cartographic Design and production		London, Longman ,1973
Ramesh, P. A.	Fundamentals of Cartography		**Concept Publishing Co., New Delhi,2000**
Rampal, K.K.	Mapping and Compilation		**Concept Publishing Co.,New Delhi,1993**
Anson, R.W. & Ormeling, F.J.	Basic Cartography		Vol. 1, 2nd ed., Elsevier Applied Science, Publishers,

				London,1993
Reference Books:				
Robinson A.H. & Morrison J.L	Elements of Cartography		John Wiley & Sons, 1995	
Gregory, S.	Statistical Methods for Geographers		Longman,1978	
Singh, R.L & Dutt. P.K	Elements of Practical geography		Students Friends Allahabad	
Peterson, M.P.	Interactive and Animated Cartography		Upper Sadde River, NJ: Prentice Hall.	

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	60
C	ALL			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10

B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: : PG Diploma in Geoinformatics	
Subject: Mathematical Methods and Scientific Computing for Geospatial Data Analysis	
Course Code: DGI– 104	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 0	**Continuous Assessment: 25**
Credit: 3	**Practical Sessional internal continuous evaluation: NA**
	Practical Sessional external examination: NA
Aim:	
Sl. No.	
1.	
2.	
3.	

Objective:	
Sl. No.	
1.	
2.	
3.	

Pre-Requisite:	
Sl. No.	
1.	**Basic Mathematics Knowledge**

Contents			**Hrs./week**	
Chapter	**Name of the Topic**		**Hours**	**Marks**
01	Probability mass, density, and cumulative distribution functions, Expected value, variance, Conditional expectation,Probability Distributions: Binomial, Poison and Normal.Central Limit Theorem and its Applications. Probabilistic inequalities, Markov chains.		**6**	**10**
02	Sampling theory: Random samples, Parameter, Statistic and its Sampling distribution. Standard error of statistic. Sampling distribution of sample mean and variance in random sampling from a normal distribution (statement only) and related problems. sampling distributions of estimators, Point and interval estimation of parameters.		**8**	**10**
03	Sampling theory (Continued): Testing of Hypothesis: Simple and Composite hypothesis. Critical region. Level of significance. Type I and Type II errors. One sample and two sample tests for means and proportions. Chi-Square - test for goodness of fit. Introduction to multivariate statistical models: regression and classification problems, principal components analysis. The problem of overfitting, model assessment.		**8**	**16**
04	Graph Theory: Isomorphism, Planar graphs, graph colouring, hamiltonian circuits and eulerian cycles. Permutations and Combinations with and without repetition. Specialized techniques to solve combinatorial enumeration problems		**8**	**16**
05	**Linear Algebra** **Matrices and determinants, properties of matrices and determinants, Adjoint and inverse of a matrix Eigen values**		**6**	**18**

	and Eigen vectors, Linear systems of equations and their solutions. n- dimensional Euclidean spaces, linear transformation,		
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Assignments:

1. **Based on theory lectures.**

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

Reference Books:

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	60

C	ALL			5	3	15

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Name of the Course: : PG Diploma in Geoinformatics	
Subject: Recent Trends in Geo-informatics: Machine Learning and Big Data.	
Course Code: DGI – 105 & DGI – 195	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	
2.	

3.			
Objective:			
Sl. No.			
1.			
2.			
3.			
Pre-Requisite:			
Sl. No.			
1.	**Basic Knowledge of Computer System**		

Contents		Hrs./week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	**Machine Learning** Overview of machine learning; Concept learning and the general-to-specific ordering; Decision tree learning; Neural networks; Support vector machines(SVM); Evaluating hypothesis; Bayesian learning; Computational learning theory; Instance based learning; Learning set of rules; Analytical learning; Combining inductive and Analytical learning; Reinforcement learning; Unsupervised learning.	**18**	**35**
02	**Big Data Analytics** Introduction to Big Data, Data Mining, Data Analytics, Predictive Analysis and Business Intelligence, Large Scale File System: Distributed File System, MapReduce, HDFS and Hadoop, Mining Big Data, Social Network Analysis, Issues, Challenges and Opportunities with Big Data and its Analytics.	**18**	**35**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Programming in Python -DGI--195:

List of Practical:
1. Introduction to Python
2. Python Data Types
3. Python Program Flow Control
4. Python Functions, Modules And Packages
5. Python String, List and Dictionary Manipulations
6. Python File Operation
7. Python Object Oriented Programming – Oops Concept
8. Python Regular Expression
9. Python Exception Handling
10. Python Database Interaction
11. Python Multithreading
12. Geospatial Analysis using Python
13. Application of Machine Learning and Big Data Analytics using Sci-Py, sk-learn, pandas, tensor flow

Assignments:

1. Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Mikhail Kanevski, Vadim Timonin, Alexi Pozdnukhov	Machine Learning for Spatial Environmental Data: Theory, Applications, and Software (Environmental Sciences: Environmental Engineering)		
Ian Goodfellow, Yoshua Bengio, Aaron Courville	Deep learning		MIT Press, 2016.
Neural Networks and Learning Machines	**Simon Haykin, McMaster University**	**3rd Ed**	Canada,2008
Rajaraman, A., Ullman, J. D.	Mining of Massive Datasets		Cambridge University Press, United Kingdom, 2012

Reference Books:

Berman, J.J.	Principles of Big Data: Preparing, Sharing and Analyzing Complex Information		Morgan Kaufmann, 2014

Christopher M Bishop	Pattern Recognition and Machine learning		
Tom Mitchell	Machine Learning,		McGraw Hill, 1997

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	60
C	ALL			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:			
Practical Internal Sessional Continuous Evaluation			
Internal Examination:			
Continuous evaluation			**40**
External Examination: Examiner-			
Signed Lab Assignments	**10**		
On Spot Experiment	**40**		
Viva voce	**10**	**60**	

Name of the Course: : PG Diploma in Geoinformatics

Subject: Web Technology Lab

Course Code: DGI - 194	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 0**
Teaching Scheme	**Examination Scheme**
Theory: 0	**End Semester Exam: 0**
Tutorial: 0	**Attendance : 0**
Practical: 4	**Continuous Assessment: 0**
Credit: 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Practical:

List of Practical:
1. Webpage design using HTML
2. Java Script
3. Introduction to Java Script Library for Web GIS (Open Layers, Leaflet)
4. Introduction to Spatial Database (Postgres, PostGIS)
5. Publish a Spatial Dataset using Geoserver
6. Web Services- WMS, WFS, WCS, WPS
7. Client Server Architecture of Geospatial Services
8. Creation of Applications using Web Services and Database

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

SECOND SEMESTER
Theoretical

Name of the Course: : PG Diploma in Geoinformatics	
Subject: Spatial Data Modeling	
Course Code: DGI – 201 & DGI – 291	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 4	**Continuous Assessment: 25**

Credit: 3 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	This course aims at providing students with ideas of Geospatial Modeling as well as basic practical skills to develop geospatial models for the purpose.
2.	
3.	

Objective:

Sl. No.	
1.	To provide the fundamentals of spatial data processing and analysis, including data pre-processing, exploration of data input, visualization and manipulation, Software customization and development.
2.	To give basis idea of data processing using spatial databases both in database design, implementation and management.

Pre-Requisite:

Sl. No.	
1.	**Basic Knowledge of Computer System**

Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	Introduction to Database System: Definition, purpose, data abstraction, instances, schema, DDL, DML, database manager, database administrator, and basic concepts of entity, relationship and primary key.	6	10
02	GIS and Remote Sensing data, Formats & exchange etc: Image storage formats, Data retrieval & Data compression techniques Conceptual data modeling, Concepts of UML, Database design using UML, Spatial data topological relationship	8	10
03	Concepts of spatial data storage, spatial query languages using extended SQL, spatial query processing and optimization,	8	16

	Spatial Indexing, Geospatial Modeling		
04	Data Structures: Geographical data; spatial & non spatial, geographical data in computers, Data Models: Spatial data Model – (i) Cartographic Map model – Raster structure, Quad tree Tessellation (ii) Geo-relational Model – Vector Data structure, Advantages & Disadvantages of Both	8	16
05	Data base structure: Non spatial: Hierarchical structure, Network structure, Relational Structure, Spatial Data Bases: Hybrid Data Model, Integrated Data Model	6	18
	Handling Errors in GIS, Normalization in GIS, Levels of Measurements: Nominal, Ordinal, Ratio and Interval, Advantages of RDBMS over DBMS		
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical: Database Analysis Lab

List of Practical:
1. Relational Database Management System

2. Spatial database creation (Personal Geodatabase, File Geodatabase and Enterprise Geodatabase using spatial database engine, PostgreSQL and PostGIS)

3. Spatial database design using UML, creation spatial database schema

4. Storage of Shape file, spatial data insertion and retrieval, spatial queries using extended SQL , Query optimization & index creation

Assignments:

8. Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme.　　　　**Maximum Marks-70.**　　　　**Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	60
C	ALL			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-		
Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: : PG Diploma in Geoinformatics	
Subject: Satellite Image Processing	
Course Code: DGI 202 & DGI 292	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	To develop the skill on understanding, handling and processing of remote sensing data.

Objective:

Sl. No.	
1.	Train students on using various remote sensing data types / formats, imagery products;
2.	Carryout image and data preprocessing techniques for handling radiometric and geometric corrections;
3.	Impart knowledge of principles and methods of multi-resolutions and multi-spectral data fusion, multi-temporal processing and accuracy assessment;
4.	Develop data processing automation through batch processing.

Pre-Requisite:

Sl. No.			
1.	**Basic Knowledge of Computer System**		

Contents		3Hrs./week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Concepts about digital image and its characteristics, Spectral, Spatial, Radiometric and Temporal resolution, Visual vs. Digital Methods, Image data storage and retrieval, Types of image displays and FCC	**12**	**20**
02	Pre-processing of satellite image, Radiometric and Geometric correction technique, Interpolation methods, geometric corrections, Look-up Tables (LUT),Radiometric enhancement techniques, Spatial enhancement techniques, Contrast stretching, Basics of Pattern Recognition, Spectral discrimination, Signature bank, Parametric and Non-Parametric classifiers	**12**	**25**
03	**Low Pass Filtering, High Pass Filtering, Band ratio, Types of Vegetation indices, Principal Component Analysis, Multi dated data analysis and Change detection, unsupervised classification methods, Supervised classification techniques**	**12**	**25**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:

Satellite Image Processing Lab : DGI-292

List of Practical:
1. Practicals based on Satellite Image Processing

Assignments:

1. Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Paul R Wolf, Bon A. Dewitt	Elements of Photogrammetry with		McGraw-Hill ,Fourth Edition - 2014

	Application in GIS		
Berlin: de Gruyter	**Photogrammetry**	**ISBN 978-3-11-019007-6. (EN)**	**Kraus K,2007**
Edward M.Mikhail, JananS.Bethel& ChrisMcGlone	**Introduction to Modern Photogrammetry**		Wiley & Sons Inc,2000.
Jensen, J.R	Remote Sensing of the Environment – An Earth Resources Perspective		Pearson Education, Inc. (Singapore) Pvt. Ltd., Indian edition, Delhi, 2000

Reference Books:

Sabins, F.F. Jr	**Remote Sensing – Principles and Interpretation**		**W.H. Freeman & Co., 2002 Edition**
Lillesand, Thomas M. and Kiefer, Ralph, W	**Remote Sensing and Image Interpretation**		4th Edition, John Wiley and Sons, New York, 2000

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	**Total Marks**	**No of question to be set**	**To answer**	**Marks per question**	**Total Marks**
A	ALL	10	10				
B	ALL			5	3	5	60

| C | ALL | | 5 | 3 | 15 | |

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: : PG Diploma in Geoinformatics
Subject: Applications of Geoinformatics

Course Code: DGI- 203A & DGI- 293A	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**

Tutorial: 0	Attendance : 5
Practical: 4	Continuous Assessment: 25
Credit: 3 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	
2.	
3.	

Objective:

Sl. No.	
1.	
2.	
3.	

Pre-Requisite:

Sl. No.	
1.	**Basic Knowledge of Computer System**

Contents		Hrs./week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Emergence of geoinformatics technology in application areas, understanding potentials of geoinformatics in allied sectors, geoinformatics advantage over conventional techniques. Indian satellite missions with focused applications, Recent trends in geoinformatics applications.	3	5
02	**Application in Land Resource:** Remote Sensing in Geomorphologic mapping, Remote Sensing in Landuse/Land Cover mapping. **Remote sensing in mapping soil degradation, impact of**	3	6

	surface mining on land resources, forest resources		
03	**Application in Disaster Management:** Fundamental concepts of hazards and disasters, their types, and characterization, zonationof hazards, natural and human induced disasters. Disaster and National losses, historical perspective of disasters in India.	3	6
04	**Disaster Management:** Fundamental concept of Disaster Management, government, NGOs and peoples participation disaster management. Existing organization structure for managing disasters in India. Geoinformatics in disaster mitigation	3	6
05	**Geological Hazards:** Landslide, Earthquake, Mining hazards (subsidence, flooding etc.), Volcanic hazards, Groundwater hazards, Glacial hazards	3	6
06	**Hydro meteorological Hazards:** Flash floods, River floods, Dam burst, Cloud burst, Cyclones, Coastal hazards and Drought	3	6
07	**Environmental hazards:** Forest hazards (Deforestation, Degradation and Forest fire), Land, soil degradation, desertification and Pollution (Water, air and soil)	3	5
08	**Application in Urban Planning:** Mapping urban landuse, transportation network, Utility-Facility mapping, urban sprawl, site selection for urban development, Urban Information System	3	6
09	**Application in Geo-technical Engineering:** Slope stability and drainage network analysis, Digital Terrain Modeling, Geoinformatics in Dam site selection, Highways, and Tunnel Alignment studies	3	6
10	**Application in Environmental Management: Selection of disposal sites for industrial and municipal wastes, solid waste management, Environmental Impact Assessment (EIA)** **Application in Agriculture**	3	6
11	*Application of Geoinformatics in Forestry* Concept of sustainable development &integrated resource management	3	6
12	**Concepts and Applications of Photogrammetry:** Camera calibration - representation of digital images B/W, RGB, HIS, CCD cameras, time delay integration, spectral sensitivity of CCD sensor, geometry problem of CCD image -, image measurement, coordinate system, image movement, image transformation, geometric and radiometric transformation, Tilted photos: Rectification, Mathematical photogrammetric principles, Analog vs Analytical vs Digital models - Orientation: Interior, Relative, Absolute - Collinearity and Coplanarity - Image matching - Ground control - Aerotriangulation - ortho photo generation, digital elevation model, LASER mapping - automated mapping, feature extraction, image enhancement, virtual reality modeling, non-topographic Photogrammetry, video metrology.	3	6

	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:
DGI- 293A: Applications of Geoinformatics Lab (0-2)

List of Practical:

1. Mapping flood hazards in a region using satellite images
2. Mapping landslide hazards in a region using satellite images
3. Urban sprawl mapping of a township using satellite images
4. Utility-facility mapping for regional development analysis in GIS
5. Application of Geoinformatics for identification of waste disposal sites.
6. Application in Agriculture
7. Landuse Landcover Mapping

Assignments:

1. Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	60
C	ALL			5	3	15	

End Semester Examination Scheme.   Maximum Marks-70.   Time allotted-3hrs.

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner‑

Signed Lab Assignments	**10**	

On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: : PG Diploma in Geoinformatics	
Subject: Advanced Remote Sensing Techniques	
Course Code: DGI-203B &DGI - 293B	**Semester: I**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:

Sl. No.	
1.	
2.	
3.	

Objective:

Sl. No.	
1.	
2.	
3.	

Pre-Requisite:

Sl. No.				
1.	**Basic Knowledge of Computer System**			

Contents			Hrs./week	
Chapter	**Name of the Topic**		**Hours**	**Marks**
01	**Thermal Remote Sensing**: Thermal radiation principles, processes and thermal properties of materials, thermal conductivity, thermal capacity, thermal inertia, thermal diffusivity, emissivity, sensing radiant temperatures, radiant versus kinetic temperatures, blackbody radiation, atmospheric effects, interaction of thermal radiation with terrain elements, IR detection and imaging technology, thermal sensors and scanners, airborne IR surveys, satellite thermal IR images, spatial resolution and ground coverage, thermal IR broad band scanner and multispectral scanner, geometric characteristics of across track and along track IR imageries, distortions and displacements, radiometric calibration of thermal scanners, interpretation of thermal IR imagery, temperature mapping with thermal scanner data, thermal inertia mapping, apparent thermal inertia, applications of thermal remote sensing in geology, hydrogeology, urban heat budgeting.		6	10
02	**Passive Microwave Remote Sensing**: Basics –physics of RADAR waves, spectral characteristics of RADAR waves, microwave radiometers, passive microwave scanners and sensors, applications in atmosphere, ocean and land. **Precision Remote Sensing**: Introduction, Spatial, Spectral, Temporal precision and their requirement.		8	10
03	**Active Microwave Remote Sensing**: RADAR- definition and development, Radar Systems –airborne and space borne SLRs and their components, imaging systems, typical images, radar wavelengths, scattering theory, RADAR equation, Depression angle, slant range and ground range images, spatial resolution and theoretical limits, azimuth resolution, real aperture and synthetic aperture RADAR systems, geometric characteristics of radar imagery and transmission characteristics of radar signals, SLR stereoscopy and RADARgrammetry, RADAR return and image significance, coherence, phase unwrapping, polarization, image registration, baseline determination, measurement of surface topography and deformation analysis, satellite radar systems and images, image processing, RADAR image interpretation. SAR interferometryprinciple, image processing, differential SAR interferometry, factors affecting SAR interferometry, Applications of RADAR soil response, vegetation response, water and ice response, urban area		8	16

	response.		
04	**LIDAR Remote Sensing:** Altimetric LiDAR: Physics of laser, spectral characteristics of laser, laser interaction with objects, Airborne Altimetric LiDAR: principle, Multiple return, Components of LiDAR system, INS technology, INS-GPS integration, measurement of laser range, calibration, flight planning, laser range to xyz coordinates, accuracy of various components of LiDAR, error analysis of data and error removal, raw data of DEM processing, filtering of data uses of return strength/waveform, data classification techniques, LiDAR data integration with spectral data, LiDAR Applications.	**8**	**16**
05	**Hyper-spectral Remote Sensing**: Hyper-spectral Imaging: Hyper spectral concepts, data collection systems, calibration techniques, data processing techniques; preprocessing, N-dimensional scatter-plots, Special angle mapping, Spectral mixture analysis, Spectral Matching, Mixture tuned matched filtering, Classification techniques, airborne and space-borne hyperspectral sensors, applications. High resolution hyperspectral satellite systems: Sensors, orbit characteristics, description of satellite systems, data processing aspects, applications.	**6**	**18**
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:
DGI-293B: Advanced Remote Sensing Techniques Lab (0-2)

List of Practical:
Practicals based on Advanced Remote Sensing Techniques

Assignments:

4. Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Fawaz T Ulaby, Richard K Moore	Microwave Remote Sensing active and		Vol. 1, 2 and 3 Addison – Wesly Publication company 1981,

and Adrian K Fung	passive		1982, and 1986.
Philip N Slater	**Remote Sensing**		**optics and optical systems. 1980**
Robert M Haralick and Simmonet	**Image processing for remote sensing**		

Reference Books:			
Robert N Colwell	**Manual of Remote sensing**		**Volume1, American Society of Photogrammetry 1983.**
Travett J W	**Imaging Radar for Resources surveys**		**Chapman andHall, London 1986**
Thomas M Lillesand and Ralph W. Keifer	**Remote sensing and Image Interpretation**		fourth Edition, 2002, 2003, John Wiley and Sons Inc.
Ravi P Gupta	Remote Sensing Geology		Second edition, 2003, Springer
Floyd F Sabins	Remote Sensing Principles and Interpretation		W H Freeman and Company.1997

List of equipment/apparatus for laboratory experiments:	
Sl. No.	
1.	Computer

End Semester Examination Scheme.   Maximum Marks-70.   Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	60

| C | ALL | | 5 | 3 | 15 | |

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner–

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: : PG Diploma in Geoinformatics	
Subject: Geoinformatics in Disaster Management	
Course Code: DGI -- 204A & DGI- 294A	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**

Practical: 4	Continuous Assessment: 25
Credit: 3 + 2	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1	

Objective:	
Sl. No.	
1	

Pre-Requisite:	
Sl. No.	
1.	**Basic Knowledge of Computer System**

Contents		Hrs./week	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Fundamental concepts of hazards and disasters, their types, and characterization, zonation of hazards, natural and human induced disasters. Disaster and National losses, historical perspective of disasters in India.	**6**	**10**
02	**Geological Hazards:** Landslide, Earthquake, Mining hazards (subsidence, flooding etc.), Volcanic hazards, Groundwater hazards, Glacial hazards	**8**	**10**
03	**Hydro meteorological Hazards:** Flash floods, River floods, Dam burst, Cloud burst, Cyclones, Coastal hazards and Drought	**8**	**16**
04	**Environmental hazards:** Forest hazards (Deforestation, Degradation and Forest fire), Land, soil degradation, desertification and Pollution (Water, air and soil)	**8**	**16**
05	**Disaster Management:** Fundamental concept of Disaster Management, government, NGOs and peoples participation disaster management. Existing organization structure for managing disasters in India. Geoinformatics in disaster mitigation.	**6**	**18**
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**

	Total:		40	100

Practical:

DGI- 294A: Disaster Management Lab

List of Practical:
1. Flood prone area mapping using satellite images and ancillary data.
2. Forest fire risk mapping using satellite images and GIS.
3. Landslide mapping and risk evaluation.
4. Multivariate analysis and application of geoinformatics model for landslide hazard zonation
5. Drought prone area mapping using satellite images
6. Spatial variation of climatic data using GIS techniques for drought prediction
7. Terrain mapping in coastal region for coastal hazards prediction
8. Multiple hazard mapping using satellite images and modeling risk in GIS.

Assignments:

1.Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme.   Maximum Marks-70.   Time allotted-3hrs.

Group	Unit	Objective Questions (MCQ only with the	Subjective Questions

		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
		correct answer)					
A	ALL	10	10				
B	ALL			5	3	5	60
C	ALL			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: : PG Diploma in Geoinformatics	
Subject: Geoinformatics in Water Resources Management	
Course Code: DGI--204B & DGI - 294B	**Semester: II**
Duration: 36 Hrs.	**Maximum Marks: 100+100**
Teaching Scheme	**Examination Scheme**
Theory: 3	**End Semester Exam: 70**
Tutorial: 0	**Attendance : 5**
Practical: 4	**Continuous Assessment: 25**
Credit: 3 + 2	**Practical Sessional internal continuous evaluation: 40**
	Practical Sessional external examination: 60

Aim:	
Sl. No.	
1.	

Objective:	
Sl. No.	
1.	

Pre-Requisite:	
Sl. No.	
1.	**Basic Knowledge of Computer System**

Contents		**Hrs./week**	
Chapter	**Name of the Topic**	**Hours**	**Marks**
01	Hydrologic Cycle, hydrological parameters, porosity, permeability, specific yield, Types of aquifers	6	10
02	**Watershed Delineation and Codification:** Watershed characterization, delineation and codification, watershed problems and management strategy. Geoinformatics approach	8	10

	for watershed prioritization, Principles and Techniques for Ground Water Studies		
03	*Remote Sensing in Surface - Subsurface Water Exploration: Application of remote sensing in hydro-geomorphological interpretation for ground water exploration, water quality monitoring through remote sensing*	**8**	**16**
04	*Water Conservation Projects: Geoinformatics based site selection for river valley projects, surface water harvesting structures Check dam, Nala bunds, subsurface dykes etc*	**8**	**16**
05	**Application of GIS in Groundwater Exploration** **Operational Applications in Water Resources**: Flood prediction, drought evaluation, snow cover mapping, reservoir sedimentation evaluation	**6**	**18**
	Geo-informatics Models in Water Resources: Geo-informatics based Runoff and hydrological modeling, flood Hazards modeling, snowmelt runoff modeling. **Case Studies:** Hydro-geomorphological mapping in Plateau region, Flood prone zone mapping in Indo-Gangetic Plains, Water harvesting initiatives in urban built up lands. Application of Digital Photogrammetry in Water Resources Management		
	Sub Total:	**36**	**70**
	Internal Assessment Examination & Preparation of Semester Examination	**4**	**30**
	Total:	**40**	**100**

Practical:
DGI- 294B: Water resources Management Lab – (0-2)

List of Practical:
1. Delineation of river catchments on satellite image- topographical sheets and their codification as per Watershed Atlas of India.
2. Creation of flow direction, flow length, flow accumulation in a watershed from DEM
3. Geomorphological Mapping and Drainage Mapping
4. Groundwater Modeling
5. Locating surface water harvesting structures like check dams, de-siltation tanks, andnullah bunds etc. using satellite image

6. Rainfall run-off modeling using geoinformatics approach.

Assignments:

1.Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher

Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
1.	Computer

End Semester Examination Scheme.   **Maximum Marks-70.**   **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	Total Marks	No of question to be set	To answer	Marks per question	Total Marks
A	ALL	10	10				
B	ALL			5	3	5	60
C	ALL			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Examination Scheme for Practical Sessional examination:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation			**40**

External Examination: Examiner-

Signed Lab Assignments	**10**	
On Spot Experiment	**40**	
Viva voce	**10**	**60**

Name of the Course: : PG Diploma in Geoinformatics	
Subject: DISASTER MANAGEMENT	
Course Code: DGI-205B	Semester: II
Duration: 24 Hrs.	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 2	End Semester Exam: 70
Tutorial: 0	Attendance : 5

Practical: 4	Continuous Assessment: 25
Credit: 0	Practical Sessional internal continuous evaluation: NA
	Practical Sessional external examination: NA

Aim:

Sl. No.	
1.	
2.	
3.	

Objective:

Sl. No.	
1.	learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2.	critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3.	develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
	critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in

Pre-Requisite:

Sl. No.	
1.	**Basic Knowledge of Computer System**

Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	**Introduction** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	4	**10**
02	**Repercussions Of Disasters And Hazards**: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks	4	**10**

	And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.		
03	**Disaster Prone Areas In India** Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	4	**16**
04	**Disaster Preparedness And Management** Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	4	**16**
05	**Risk Assessment** Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	4	**18**
06	**Disaster Mitigation** Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	4	
	Sub Total:	24	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	28	100

Assignments:

1. Based on theory lectures.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
R. Nishith, Singh AK	Disaster Management in India: Perspectives, issues and strategies		New Royal book Company
Sahni, PardeepEt.Al. (Eds.)	**Disaster Mitigation Experiences And Reflections**		Prentice Hall Of India, New Delhi.

Reference Books:			
Goel S. L	**Disaster Administration And Management Text And Case Studies**		Deep &Deep Publication Pvt. Ltd., New Delhi.

End Semester Examination Scheme. **Maximum Marks-70.** **Time allotted-3hrs.**

Group	Unit	Objective Questions (MCQ only with the correct answer)		Subjective Questions			
		No of question to be set	**Total Marks**	**No of question to be set**	**To answer**	**Marks per question**	**Total Marks**
A	1,2,3,4,5	10	10				
B	3, 4, 5			5	3	5	60
C	1,2,3,4,5			5	3	15	

- Only multiple choice type questions (MCQ) with one correct answer are to be set in the objective part.

- Specific instruction to the students to maintain the order in answering objective questions should be given on top of the question paper.

Examination Scheme for end semester examination:

Group	Chapter	Marks of each question	Question to be set	Question to be answered
A	All	1	10	10
B	All	5	5	3

C	All	15	5	3

Examination Scheme for Practical Sessional examination: