

**Proposed Syllabus of
M.Tech Geoinformatics**

Course Structure

Sem- I

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

Sem- II

Code	Course Title	Hours per week			Credits
		L	T	P	
PGGI-201	Spatial Data Modeling	3	0	0	3

PGGI-202	Satellite Image Processing	3	0	0	3
PGGI-203A/B	Program Elective I – Applications of Geoinformatics/ Advanced Remote Sensing Techniques	3	0	0	3
PGGI-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
PGGI-205	Audit Course	2	0	0	0
PGGI-206	Research Methodology and IPR	2	0	0	2
PGGI-291	Database Analysis Lab	0	0	4	2
PGGI-292	Satellite Image Processing Lab	0	0	4	2
PGGI-293A/B	Laboratory 4 (Based on Elective I)	0	0	4	2
PGGI-294 A/B/C/D/E/F	Laboratory 4 (Based on Elective II)	0	0	4	2
PGGI-295	Project Work on Applications of Geoinformatics	4	0	0	2
Total Credits: 24					

Sem- III

Code	Course Title	Hours per week			Credits
		L	T	P	
PGGI-301A/B	Program Elective III: Recent Trends in Geoinformatics Big Data, Data Mining/ Geospatial Cloud Computing	3	0	0	3
PGGI-302 A/B/C	2.Open Elective Business Analytics/Operations Research	3	0	0	3

PGGI-391A/B/C	Recent Trends in Geoinformatics (Big Data, Data Mining Lab/ Geospatial Cloud Computing Lab)	0	0	4	02
PGGI-392	Dissertation-I /Industrial Project	0	0	20	10
Total Credits: 18					

Sem-IV

	Course Title	Hours per week			Credits
		L	T	P	
PGGI-491	Dissertation II	0	0	32	16
Total Credits: 16					

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

Audit course 1 & 2

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.

Name of the Course: M.Tech Geoinformatics	
Subject: Principles of Remote Sensing and Photogrammetry	
Course Code: PGGI- 101 & PGGI- 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,	8	15

	Temporal and Radiometric Spectral Signature and its Response: of Soil, Vegetation and Water, Basics of visual interpretation of satellite images		
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:

PGGI- 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

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

Group	Unit	Objective Questions		Subjective Questions			
		No of	Total	No of	To	Marks	Total Marks
		(MCQ only with the correct answer)					

		question to be set	Marks	question to be set	answer	per question	
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
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External Examination: Examiner-

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

Name of the Course: M.Tech Geoinformatics

Subject: Principles of Geographic Information Systems (GIS)

Course Code: PGGI- 102 & PGGI- 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.

4. Introducing concept, principles and applications of Geographic Information Systems (GIS).

5. To develop the skill of using software and other tools of GIS in students.

6.

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.

2.	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,	5	12

	GIS and Integration of other types of data, Virtual GIS and SDSS, Project design and management, need assessment.		
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

PGGI- 192 GIS Lab

List of Practical:

Concepts of customization of GIS software
Hands on experiments based on PGGI- 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:		Longman Group, U.K,1991

	Principles and Applications		

List of equipment/apparatus for laboratory experiments:

Sl. No.	
2.	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: : M.Tech Geoinformatics	
Subject: Basics of GNSS, Cartography & Digital Mapping.	
Course Code: PGGI- 103	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.	

Pre-Requisite:

Sl. No.	
3.	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 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.	5	10
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

PGGI- 193 GNSS and Cartography Lab

List of Practical:

Hands on experiments based on PGGI- 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, 2 nd 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.	
3.	Computer

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

Group	Unit	Objective Questions (MCQ only with the	Subjective Questions
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		correct answer)					
		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
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External Examination: Examiner-

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

Name of the Course: : M.Tech Geoinformatics

Subject: Mathematical Methods and Scientific Computing for Geospatial Data Analysis

Course Code: PGGI- 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.	

Objective:

Sl. No.	

Pre-Requisite:

Sl. No.	
4.	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	6	10

	expectation,Probability Distributions: Binomial, Poison and Normal.Central Limit Theorem and its Applications. Probabilistic inequalities, Markov chains.		
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 and Eigen vectors, Linear systems of equations and their solutions. n- dimensional Euclidean spaces, linear transformation,	6	18
	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 to be	Question to be answered

		question	set	
A	All	1	10	10
B	All	5	5	3
C	All	15	5	3

Name of the Course: : M.Tech Geoinformatics	
Subject: Recent Trends in Geo-informatics:Machine Learning and Big Data.	
Course Code: PGGI-105 & PGGI-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.			
2.	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:			
<u>Programming in Python -PGGI--195:</u>			
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	3 rd 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 Bishop	M Pattern Recognition and Machine learning		
Tom Mitchell	Machine Learning,		McGraw Hill, 1997

List of equipment/apparatus for laboratory experiments:

Sl. No.	
4.	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 to be	Question to be answered
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		question	set	
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
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External Examination: Examiner-

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

Name of the Course: : M.Tech Geoinformatics	
Subject: Web Technology Lab	
Course Code:	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.	
5.	Computer

Examination Scheme for Practical Sessional examination:**Practical Internal Sessional Continuous Evaluation****Internal Examination:**

Continuous evaluation			40
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External Examination: Examiner-

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

SECOND SEMESTER
Theoretical

Name of the Course: : M.Tech Geoinformatics	
Subject: Spatial Data Modeling	
Course Code: PGGI- 201 & PGGI- 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.

3.			
Pre-Requisite:			
Sl. No.			
3.	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, Spatial Indexing Geospatial Modeling	8	16
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:

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:

4. 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:

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List of equipment/apparatus for laboratory experiments:

Sl. No.	
6.	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
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External Examination: Examiner-

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

Name of the Course: : M.Tech Geoinformatics	
Subject: Satellite Image Processing	
Course Code: PGGI202 & PGGI292	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.			
5.	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:			
<u>Satellite Image Processing Lab : PGGI-292</u>			

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 Application in GIS		McGraw-Hill ,Fourth Edition - 2014
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		4 th Edition, John Wiley and Sons, New York, 2000

List of equipment/apparatus for laboratory experiments:

Sl. No.	
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7.		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	
<ul style="list-style-type: none"> 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: : M.Tech Geoinformatics	
Subject: Applications of Geoinformatics	
Course Code: PGGI- 203A & PGGI- 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.	
Objective:	
Sl. No.	
4.	
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 surface mining on land resources, forest resources	3	6
03	Application in Disaster Management: 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.	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:

PGGI- 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:

6. 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.	
8.	Computer

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

Group	Unit	Objective Questions	Subjective Questions
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		(MCQ only with the correct answer)					
		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
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External Examination: Examiner-

Signed Lab Assignments		10	
On Spot Experiment		40	

Viva voce	10	60
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Name of the Course: : M.Tech Geoinformatics				
Subject: Advanced Remote Sensing Techniques				
Course Code: PGGI-203B		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.				
Objective:				
Sl. No.				
Pre-Requisite:				
Sl. No.				
7.	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		6	10

	<p>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.</p>		
02	<p>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.</p> <p>Precision Remote Sensing: Introduction, Spatial, Spectral, Temporal precision and their requirement.</p>	8	10
03	<p>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 response.</p>	8	16
04	<p>LIDAR Remote Sensing: Altimetric LiDAR: Physics of laser, spectral characteristics of laser, laser interaction with objects, Airborne Altimetric LiDAR: principle, Multiple return,</p>	8	16

	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.		
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:

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

List of Practical:

Practicals based on Advanced Remote Sensing Techniques

Assignments:

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 and Adrian K Fung	Microwave Remote Sensing active and passive		Vol. 1, 2 and 3 Addison – Wesley Publication company 1981, 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.	
9.	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	
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- 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
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External Examination: Examiner-

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

Name of the Course: : M.Tech Geoinformatics

Subject: Geoinformatics in Disaster Management

Course Code: PGGI--204A & PGGI- 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.			
	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:

PGGI- 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:

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List of equipment/apparatus for laboratory experiments:

Sl. No.	
10.	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: : M.Tech Geoinformatics	
Subject: Geoinformatics in Water Resources Management	
Course Code: PGGI--203B & PGGI- 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 for watershed prioritization, Principles and Techniques for Ground Water Studies	8	10
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

	<p>Geo-informatics Models in Water Resources: Geo-informatics based Runoff and hydrological modeling, flood Hazards modeling, snowmelt runoff modeling.</p> <p>Case Studies: Hydro-geomorphological mapping in Plateau region, Flood prone zone mapping in Indo-Gangetic Plains, Water harvesting initiatives in urban built up lands.</p> <p>Appliaction of Digital Photogrammetry in Water Resources Management</p>		
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

PGGI- 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

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Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
11.	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
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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
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External Examination: Examiner-

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

Name of the Course: : M.Tech Geoinformatics
Subject: ENGLISH FOR RESEARCH PAPER WRITING

Course Code: PGGI -205A

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.			
Objective:			
Sl. No.			
1.	Understand that how to improve your writing skills and level of readability		
2.	Learn about what to write in each section		
3.	Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission		
Pre-Requisite:			
Sl. No.			
8.	Basic Knowledge of Computer System		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	4	10
02	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	4	10
03	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	4	16

04	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,	4	16
05	skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	4	18
06	useful phrases, how to ensure paper is as good as it could possibly be the first- time submission	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
Goldbort R	Writing for Science		Yale University Press
Day R	How to Write and Publish a Scientific Paper		Cambridge University Press

Reference Books:

Highman N	English for Writing Research Papers		Springer New York Dordrecht Heidelberg London, 2011

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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: : M.Tech Geoinformatics

Subject: DISASTER MANAGEMENT

Course Code: PGGI-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.			
Objective:			
Sl. No.			
5.	Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.		
6.	Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.		
7.	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.			
9.	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 And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	4	10
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 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:

Name of the Course: : M.Tech Geoinformatics	
Subject: SANSKRIT FOR TECHNICAL KNOWLEDGE	
Course Code: PGGI-205C	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.	
Objective:	
Sl. No.	
1.	To get a working knowledge in illustrious Sanskrit, the scientific language in the world

2.	Learning of Sanskrit to improve brain functioning
3.	Learning of Sanskrit to develop the logic in mathematics, science & other subjects
4.	enhancing the memory power
5.	The engineering scholars equipped with Sanskrit will be able to explore the
6.	huge knowledge from ancient literature

Pre-Requisite:

Sl. No.	
1.	

Contents		2 Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	<ul style="list-style-type: none"> Alphabets in Sanskrit, Past/Present/Future Tense, Simple Sentences 	8	10
02	<ul style="list-style-type: none"> Order Introduction of roots Technical information about Sanskrit Literature 	8	10
03	<ul style="list-style-type: none"> Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics 	8	16
	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

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

Examination Scheme for Practical Sessional examination:

Name of the Course: : M.Tech Geoinformatics	
Subject: VALUE EDUCATION	
Course Code: PGGI-205D	Semester: I
Duration: 36 Hrs.	Maximum Marks: 100
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
Aim:	
Sl. No.	
7.	Knowledge of self-development
8.	Learn the importance of Human values
9.	Developing the overall personality
Objective:	

Sl. No.			
8.	Understand value of education and self- development		
9.	Imbibe good values in students		
10.	Let the should know about the importance of character		
Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	<ul style="list-style-type: none"> ● Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. 	4	10
02	<ul style="list-style-type: none"> ● Moral and non- moral valuation. Standards and principles. ● Value judgements 	5	10
03	<ul style="list-style-type: none"> ● Importance of cultivation of values. ● Sense of duty. Devotion, Self-reliance. ● Honesty, Humanity. Power of faith, National Unity. ● Patriotism.Love for nature,Discipline 	5	16
04	<ul style="list-style-type: none"> ● Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. ● Punctuality, Love and Kindness. ● Avoid fault Thinking. ● Free from anger, Dignity of labour. ● Universal brotherhood and religious tolerance. ● True friendship. ● Happiness Vs suffering, love for truth. ● Aware of self-destructive habits. ● Association and Cooperation. ● Doing best for saving nature 	5	16
05	<ul style="list-style-type: none"> ● Character and Competence –Holy books vs Blind faith. ● Self-management and Good health. ● Science of reincarnation. ● Equality, Nonviolence,Humility, Role of Women. ● All religions and same message. ● Mind your Mind, Self-control. ● Honesty, Studying effectively 	5	18

	Sub Total:	24	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
Chakroborty, S.K.	Values and Ethics for organizations Theory and practice		Oxford University Press, New Delhi

Reference Books:

List of equipment/apparatus for laboratory experiments:

Sl. No.	
12.	Computer

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

Group	Unit	Objective Questions		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:

Name of the Course: : M.Tech Geoinformatics	
Subject: CONSTITUTION OF INDIA	
Course Code: PGGI-205E	Semester: I
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.	Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
2.	To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
3.	To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.
Objective:	
Sl. No.	
1.	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
2.	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
3.	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
	Discuss the passage of the Hindu Code Bill of 1956.
Pre-Requisite:	
Sl. No.	
10.	

Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	<ul style="list-style-type: none"> ● History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working) 	4	10
02	<ul style="list-style-type: none"> ● Philosophy of the Indian Constitution: Preamble Salient Features 	4	10
03	<ul style="list-style-type: none"> ● Contours of Constitutional Rights & Duties: ● Fundamental Rights ● Right to Equality ● Right to Freedom ● Right against Exploitation ● Right to Freedom of Religion ● Cultural and Educational Rights ● Right to Constitutional Remedies ● Directive Principles of State Policy ● Fundamental Duties. 	4	16
04	<ul style="list-style-type: none"> ● Organs of Governance: ● Parliament ● Composition ● Qualifications and Disqualifications ● Powers and Functions ● Executive ● President ● Governor ● Council of Ministers ● Judiciary, Appointment and Transfer of Judges, Qualifications ● Powers and Functions 	4	16
05	<ul style="list-style-type: none"> ● Local Administration: ● District's Administration head: Role and Importance, ● Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation. ● Pachayati raj: Introduction, PRI: ZilaPachayat. ● Elected officials and their roles, CEO ZilaPachayat: Position and role. ● Block level: Organizational Hierarchy (Different departments), ● Village level: Role of Elected and Appointed officials, ● Importance of grass root democracy 	4	18

	<ul style="list-style-type: none"> ● Election Commission: ● Election Commission: Role and Functioning. ● Chief Election Commissioner and Election Commissioners. ● State Election Commission: Role and Functioning. ● Institute and Bodies for the welfare of SC/ST/OBC and women. 	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
	The Constitution of India		1950 (Bare Act), Government Publication.
framing of Indian Constitution	Dr. S. N. Busi, Dr. B. R. Ambedkar		1st Edition, 2015
M. P. Jain	Indian Constitution Law		7th Edn., Lexis Nexis, 2014

Reference Books:

D.D. Basu	Introduction to the Constitution of India		Lexis Nexis, 2015

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

Group	Unit	Objective Questions (MCQ only with the	Subjective Questions
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		correct answer)		No of question to be set	To answer	Marks per question	Total Marks
		No of question to be set	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:

Name of the Course: : M.Tech Geoinformatics	
Subject: PEDAGOGY STUDIES	
Course Code: PGGI-205F	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.	What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2.	What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3.	How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Objective:

Sl. No.	
1.	Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2.	Identify critical evidence gaps to guide the development.

Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	<ul style="list-style-type: none"> ● Introduction and Methodology: ● Aims and rationale, Policy background, Conceptual framework and terminology ● Theories of learning, Curriculum, Teacher education. ● Conceptual framework, Research questions. 	5	10

	● Overview of methodology and Searching.		
02	<ul style="list-style-type: none"> ● Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. ● Curriculum, Teacher education. 	5	10
03	<ul style="list-style-type: none"> ● Evidence on the effectiveness of pedagogical practices ● Methodology for the in depth stage: quality assessment of included studies. ● How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? ● Theory of change. ● Strength and nature of the body of evidence for effective pedagogical practices. ● Pedagogic theory and pedagogical approaches. ● Teachers' attitudes and beliefs and Pedagogic strategies. 	5	16
04	<ul style="list-style-type: none"> ● Professional development: alignment with classroom practices and follow-up support ● Peer support ● Support from the head teacher and the community. ● Curriculum and assessment ● Barriers to learning: limited resources and large class sizes 	5	16
05	<ul style="list-style-type: none"> ● Research gaps and future directions ● Research design ● Contexts ● Pedagogy ● Teacher education ● Curriculum and assessment ● Dissemination and research impact. 	4	18
	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
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Ackers J, Hardman F	Classroom interaction in Kenyan primary schools		Compare, 31 (2): 245-261.
Agrawal M	Curricular reform in schools: The importance of evaluation		Journal of Curriculum Studies, 36 (3): 361-379.
Akyeampong K	Teacher training in Ghana - does it count?		Multi-site teacher education research project (MUSTER) country report 1. London: DFID.

Reference Books:

Akyeampong K, Lussier K, Pryor J, Westbrook J	Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count?		International Journal Educational Development, 33 (3): 272–282.
Alexander RJ	Culture and pedagogy: International comparisons in primary education.		Oxford and Boston: Blackwell.
Chavan M	Read India: A mass scale, rapid, ‘learning to read’ campaign.		
www.pratham.org/images/resource%20working%20paper%202.pdf			

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

Group	Unit	Objective Questions (MCQ only with the correct answer)	Subjective Questions
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		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:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation				40
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External Examination: Examiner-

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

Name of the Course: M.Tech Geoinformatics			
Subject: Stress management by Yoga			
Course Code: PGGI-205G		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.	Develop healthy mind in a healthy body thus improving social health		
2.	Improve efficiency		
Objective:			
Sl. No.			
1.	To achieve overall health of body and mind		
2.	To overcome stress		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Definitions of Eight parts of yog. (Ashtanga)	8	20
02	Yam and Niyam. Do`s and Don`t`s in life. i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	8	30
03	Asan and Pranayam i) Various yog poses and their benefits for mind & body ii) Regularization of breathing techniques and its effects- Types of pranayam	8	20
	Sub Total:	24	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	28	100
Assignments: Based on theory			
List of Books			

Text Books:							
Name of Author		Title of the Book		Edition/ISSN/ISBN		Name of the Publisher	
1. Janardan Swami Yogabhyasi Mandal, Nagpur		‘Yogic Asanas for Group Tarining-Part- I’					
Reference Books:							
Swami Vivekananda, AdvaitaAshrama		“Rajayoga or conquering the Internal Nature”				(Publication Department), Kolkata	
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	70
C	ALL			5	3	15	
<ul style="list-style-type: none"> • Only multiple choice type question (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: M.Tech Geoinformatics	
Subject: Personality development through life enlightenment skills	
Course Code: PGGI-205H	Semester: II
Duration: 24 Hours	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory:02	End Semester Exam: 70
Tutorial:0	Attendance : 5

Practical:0	Continuous Assessment: 25		
Credit:0			
Aim:			
Sl. No.			
1.	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life		
2.	The person who has studied Geeta will lead the nation and mankind to peace and prosperity		
3.	Study of Neetishatakam will help in developing versatile personality of students.		
Objective:			
Sl. No.			
1.	To learn to achieve the highest goal happily		
2.	To become a person with stable mind, pleasing personality and determination		
3.	To awaken wisdom in students		
Pre-Requisite:			
Sl. No.			
1.			
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Neetisatakam-Holistic development of personality <ul style="list-style-type: none"> • Verses- 19,20,21,22 (wisdom) • Verses- 29,31,32 (pride & heroism) • Verses- 26,28,63,65 (virtue) • Verses- 52,53,59 (dont's) 	8	20
02	<ul style="list-style-type: none"> • Verses- 71,73,75,78 (do's) • Approach to day to day work and duties. • Shrimad BhagwadGeeta : Chapter 2-Verses 41, 47,48, • Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,Chapter 18-Verses 45, 46, 48. 	8	20
03	<ul style="list-style-type: none"> • Statements of basic knowledge. • Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68 • Chapter 12 -Verses 13, 14, 15, 16,17, 18 • Personality of Role model. Shrimad BhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, • Chapter 4-Verses 18, 38,39 • Chapter18 – Verses 37,38,63 	8	30
	Sub Total:	24	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	28	100
Assignments:			

List of Books									
Text Books:									
Name of Author		Title of the Book		Edition/ISSN/ISBN		Name of the Publisher			
1.Swami SwarupanandaAdvaita Ashram		“Srimad Bhagavad Gita”				(Publication Department), Kolkata			
Reference Books:									
2.P.Gopinath,		Bhartrihari’s Three Satakam (Niti-sringar- vairagya)				Rashtriya Sanskrit Sansthanam, 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	ALL	10	10						
B	ALL			5	3	5	70		
C	ALL			5	3	15			
<ul style="list-style-type: none"> Only multiple choice type question (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: M.Tech Geoinformatics	
Subject: Research Methodology and IPR	
Course Code: PGGI-206	Semester: II
Duration: 36 Hours	Maximum Marks:100
Teaching Scheme	Examination Scheme
Theory:2	End Semester Exam:70
Tutorial:0	Attendance: 5
Practical:	Continuous Assessment:25

Credit:2	Practical Sessional internal continuous evaluation:NA		
	Practical Sessional external examination:NA		
Aim:			
Sl. No.			
1.	Understand research problem formulation.		
2.	Analyze research related information		
3.	Follow research ethics		
Objective:			
Sl. No.			
1	Understand research problem formulation.		
2	Analyze research related information		
3	Follow research ethics		
4.	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.		
5.	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.		
6.	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.		
Pre-Requisite:			
Sl. No.	Basic English		
Contents			Hrs./week
Chapter	Name of the Topic	Hours	Marks
01	Introduction: Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.	6	14
02	Effective literature studies approaches: analysis Plagiarism, Research ethics	6	10
03	Effective technical writing: how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.	6	14

04	Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	6	14
05	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.	6	14
06	New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.	6	4
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30

Assignments: Based on Theory Lecture.

List of Books

Text Books:

Name of Author	Title of the Book	Edition/ISSN/ISBN	Name of the Publisher
Stuart Melville and Wayne Goddard	Research methodology: an introduction for science & engineering students		
Ranjit Kumar	Research Methodology: A Step by Step Guide for beginners	2 nd Edition	

Reference Books:

T. Ramappa, S. Chand,	“Intellectual Property Rights Under WTO”,	2008	
Robert P. Merges, Peter S. Menell, Mark A. Lemley,	“ Intellectual Property in New Technological Age”,	2016.	
Asimov,	“Introduction to Design”, Prentice Hall,	1962.	
Mayall,	“Industrial Design”,		McGraw Hill, 1992.
Halbert,	“Resisting Intellectual Property”,		Taylor & Francis Ltd ,2007.
Niebel,	“Product Design”,		McGraw Hill, 1974.

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

Group	Unit	Objective Questions (MCQ only with the	Subjective Questions
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		correct answer)		No of question to be set	To answer	Marks per question	Total Marks
		No of question to be set	Total Marks				
A	1,2,3,4,5,6	10	10				60
B	1,2,3,4,5,6			5	3	5	
C	1,2,3,4,5,6			5	3	15	
<ul style="list-style-type: none"> • Only multiple choice type question (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			

THIRD SEMESTER

Name of the Course: : M.Tech Geoinformatics	
Subject: Recent Trends in Geo-informatics (Big Data, Data Mining)	
Course Code: PGGI 301A & PGGI 391A	Semester: III
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.

11. **Basic Knowledge of Computer System**

Contents

Hrs./week

Chapter

Name of the Topic

Hours

Marks

01

Understanding Spatial Data Science

6

10

Introduction to spatial data science, Spatial data science in comparison with science, data science and spatial data science. Unique aspects of spatial data science from three perspectives of business, technology and data. Issues of dealing with spatial data: including DBMS problems, topology, spatial indexing and spatial big data problems. Spatial autocorrelation, map projection, uncertainty, and modifiable areal unit problem.


02

Solution Structures to Spatial Data Science problems

8

10

Four Disciplines for Spatial Data Science and Applications:

	<p>Geographic Information System (GIS), Database Management System (DBMS), Data Analytics and Big Data Systems. Open source software's in the four related disciplines: QGIS for GIS, PostgreSQL and PostGIS for DBMS, R for Data Analytics, Hadoop and Hadoop-based solutions for Big Data System.</p> <p>Spatial Data vs. Spatial Big Data</p>		
03	<p>Spatial DBMS and Big Data Systems</p> <p>DBMS and related features, and limitations of conventional Relational DBMS for spatial data. Difference of spatial DBMS from conventional DBMS, New features to manage spatial data; Brief overview of Big Data Systems and the current paradigm – MapReduce, Hadoop MapReduce, Hadoop Distributed File System (HDFS), Hadoop YARN, as an implementation of MapReduce paradigm; Hadoop ecosystem and show how to utilize Hadoop tools such as Hive, Pig, Sqoop, and HBase for spatial big data processing;</p>	8	16
04	<p>Hadoop tools for spatial big data - Spatial Hadoop and GIS Tools for Hadoop, review their pros and cons for spatial big data management and processing</p>	8	16
05	<p>Spatial Data Analytics</p> <p>Introduction, Proximity and Accessibility, Spatial data science for business applications, while trade area analysis, supply to demand ratio, Floating Catchment Analysis (FCA), and Gravity-based index of accessibility, Spatial Autocorrelation: Spatial Interpolation; Spatial Categorization; Hotspot Analysis; Network Analysis</p>	6	18
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
 PG Diploma(Geoin)	Total:	40	100

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:

Practical Internal Sessional Continuous Evaluation

Internal Examination:

Continuous evaluation				40
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External Examination: Examiner-

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

Name of the Course : M.Tech Geoinformatics

Subject: Geospatial Cloud Computing			
Course Code: PGGI-301B & PGGI-391B		Semester: III	
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	<ul style="list-style-type: none"> • Introduction to Cloud and Server GIS • GIS Server up and running on Cloud • Cloud-based databases and web editing with GIS Server • 	8	15
02	<ul style="list-style-type: none"> • GIS Server performance and rasterized map tiles • Map design and vector tile services using Mapbox 	10	15

03	<ul style="list-style-type: none"> • Thematic mapping services • Web maps and data as services 	10	15
04	<ul style="list-style-type: none"> • GIS as a service • GIS on your own cloud 	8	15
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30
	Total:	40	100

Practical:

List of Practical:

Hands on experiments based on theory paper.

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	1,2,3,4	10	10				
B	3, 4			5	3	5	60
C	1,2,3,4			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: : M.Tech Geoinformatics	
Subject: Business Analytics	
Course Code: PGGI-302A	Semester: III
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.			
12.	Basic Knowledge of Computer System		
Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	<p>Unit1: Business analytics: Overview of Business analytics, Scope of Business analytics, Business Analytics Process, Relationship of Business Analytics Process and organisation, competitive advantages of Business Analytics.</p> <p>Statistical Tools: Statistical Notation, Descriptive Statistical methods, Review of probability distribution and data modelling, sampling and estimation methods overview.</p>	6	10
02	<p>Unit2: Trendiness and Regression Analysis: Modelling Relationships and Trends in Data, simple Linear Regression.</p> <p>Important Resources, Business Analytics Personnel, Data and models for Business analytics, problem solving, Visualizing and Exploring Data, Business Analytics Technology.</p>	6	10
03	<p>Unit3: Organization Structures of Business analytics, Team management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predictive analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.</p>	6	16
04	<p>Unit4: Forecasting Techniques: Qualitative and Judgmental Forecasting, Statistical Forecasting Models, Forecasting</p>	6	16

	Models for Stationary Time Series, Forecasting Models for Time Series with a Linear Trend, Forecasting Time Series with Seasonality, Regression Forecasting with Casual Variables, Selecting Appropriate Forecasting Models. Monte Carlo Simulation and Risk Analysis: Monte Carle Simulation Using Analytic Solver Platform, New-Product Development Model, Newsvendor Model, Overbooking Model, Cash Budget Model.		
05	Unit5: Decision Analysis: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.	6	10
06	Unit6: Recent Trends in : Embedded and collaborative business intelligence, Visual data recovery, Data Storytelling and Data journalism.	6	8
	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
Marc J. Schniederjans, Dara G. Schniederjans, Christopher M. Starkey	Business analytics Principles Concepts, and Applications		Pearson FT Press
Business Analytics	James Evans		persons Education

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	1,2,3,4,5,6	10	10				
B	1,2,3,4,5,6			5	3	5	60
C	1,2,3,4,5,6			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:

Name of the Course: : M.Tech Geoinformatics	
Subject: Operations Research	
Course Code: PGGI-302 B	Semester: III
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.	

13.	Basic Knowledge of Computer System		
Contents		Hrs./week	
Chapter	Name of the Topic	Hours	Marks
01	Unit 1: Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models	6	10
02	Unit 2 Formulation of a LPP - Graphical solution revised simplex method - duality theory - dual simplex method - sensitivity analysis - parametric programming	8	12
03	Unit 3: Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem - max flow problem - CPM/PERT	8	16
04	Unit 4 Scheduling and sequencing - single server and multiple server models - deterministic inventory models - Probabilistic inventory control models - Geometric Programming.	8	16
05	Unit 5 Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation	6	16
	Sub Total:	36	70
	Internal Assessment Examination & Preparation of Semester Examination	4	30

	Total:	40	100
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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
H.A. Taha	Operations Research, An Introduction		PHI, 2008
H.M. Wagner	Principles of Operations Research		PHI, Delhi, 1982.
Pannerselvam	, Operations Research		Prentice Hall of India 2010

Reference Books:

J.C. Pant	Introduction to Optimisation: Operations Research		Jain Brothers, Delhi, 2008
Hitler Libermann	Operations Research		McGraw Hill Pub. 2009
Harvey M Wagner	Principles of Operations Research		Prentice Hall of India 2010

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	
<ul style="list-style-type: none"> 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		
Viva voce			10	60		

Name of the Course: M.Tech Geoinformatics	
Subject: Dissertation-I /Industrial Project	
Course Code:	Semester: III
Duration:	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory: 0	End Semester Exam: NA
Tutorial: 0	Attendance: NA
Practical: 20	Continuous Assessment: NA
Credit: 10	Practical Sessional internal continuous evaluation: 40
	Practical Sessional external examination: 60
Aim:	
Sl. No.	
1.	To Present the work in International/ National conference or reputed journals.
Objective:	
Sl. No.	
1.	Build ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
2.	To select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
3.	To present the findings of their technical solution in a written report. .

4.	To synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
Contents	20 Hrs./week
<p>The dissertation / project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study. The dissertation should have the following</p> <ul style="list-style-type: none"> · Relevance to social needs of society · Relevance to value addition to existing facilities in the institute · Relevance to industry need · Problems of national importance · Research and development in various domain The student should complete the following: · Literature survey Problem Definition · Motivation for study and Objectives · Preliminary design / feasibility / modular approaches · Implementation and Verification · Report and presentation <p>The dissertation stage II is based on a report prepared by the students on dissertation allotted to them. It may be based on:</p> <ul style="list-style-type: none"> · Experimental verification / Proof of concept. · Design, fabrication, testing of Communication System. · The viva-voce examination will be based on the above report and work. 	

Sem-IV

Name of the Course: M.Tech Geoinformatics	
Subject: Dissertation II	
Course Code:	Semester: IV
Duration:	Maximum Marks: 100
Teaching Scheme	Examination Scheme
Theory:0	End Semester Exam:NA
Tutorial:0	Attendance: NA
Practical:32	Continuous Assessment:NA
Credit: 16	Practical Sessional internal continuous evaluation:40
	Practical Sessional external examination:60
Aim:	
Sl. No.	
1.	To Present the work in International/ National conference or reputed journals.
Objective:	
Sl. No.	
2.	Build ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.
3.	To select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.

4.	To present the findings of their technical solution in a written report. ·
5.	To synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem.

Contents	32 Hrs./week
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Guidelines for Dissertation Phase II

- As per the AICTE directives, the dissertation is a yearlong activity, to be carried out and evaluated in two phases i.e. Phase – I: July to December and Phase – II: January to June.
- The dissertation may be carried out preferably in-house i.e. department’s laboratories and centers OR in industry allotted through department’s T & P coordinator.
- After multiple interactions with guide and based on comprehensive literature survey, the student shall identify the domain and define dissertation objectives. The referred literature should preferably include IEEE/IET/IETE/Springer/Science Direct/ACM journals in the areas of Computing and Processing (Hardware and Software), Circuits-Devices and Systems, Communication-Networking and Security, Robotics and Control Systems, Signal Processing and Analysis and any other related domain. In case of Industry sponsored projects, the relevant application notes, white papers, product catalogues should be referred and reported.
- Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation and phase wise work distribution, and submit the proposal within a month from the date of registration.
- Phase – I deliverables: A document report comprising of summary of literature survey, detailed objectives, project specifications, paper and/or computer aided design, proof of concept/functionality, part results, A record of continuous progress.
- Phase – I evaluation: A committee comprising of guides of respective specialization shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend repeating the Phase-I work.
- During phase – II, student is expected to exert on design, development and testing of the proposed work as per the schedule. Accomplished results/contributions/innovations should be published in terms of research papers in reputed journals and reviewed focused conferences OR IP/Patents.
- Phase – II deliverables: A dissertation report as per the specified format, developed system in the form of hardware and/or software, A record of continuous progress.
- Phase – II evaluation: Guide along with appointed external examiner shall assess the progress/performance of the student based on report, presentation and Q & A. In case of unsatisfactory performance, committee may recommend for extension or repeating the work