SARDAR PATEL UNIVERSITY
VALLABH VIDYANAGAR
Programme – MSc Geoinformatics
(Under Choice Based Credit Scheme)
Semester – I
Syllabus with effect from : 2017-18

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(2 years Full-Time Course)

First Semester (6 months)

Subject Code	**Subject Title**
PS01CGIN21	Principles of Remote Sensing
PS01CGIN22	Principles of Geographical Information System
PS01CGIN23	Principles and Applications of GPS
PS01CGIN24	Advanced Programming Concepts & Data Structures
PS01CGIN25	RDBMS & Client Server Computing
PS01CGIN26	Practical based on PS01CGIN22, PS01CGIN24 & PS01CGIN25

Second Semester (6 months)

Subject Code	**Subject Title**
PS02CGIN21	Digital Image Processing
PS02CGIN22	Spatial Analysis and Modeling
PS02GCIN23	Java Programming
PS02CGIN24	Web Programming
PS02CGIN25	Practical based on PS02CGIN21, PS02GCIN23 & PS02GCIN24
Elective:	
PS02EGIN21	Natural Resources Management
PS02EGIN22	Disaster Management

Third Semester (6 months)

Subject Code	Subject Title
PS03CGIN21	Spatial Data Infrastructure & Web GIS Services
PS03CGIN22	QGIS Tools and Applications Development
PS03CGIN23	Visual Programming
PS03CGIN24	Android & iPhone Applications Development
PS03CGIN25	Practical based on PS03CGIN22 and PS03CGIN24

Elective:

PS03EGIN21	Geoinformatics Application in Governance
PS03EGIN22	Geoinformatics Application in Utility Management

Fourth Semester (6 month)

Subject Code	Subject Title
PS04CGIN21	Project Work

Eligibility: B.Sc., BCA, BE, B.Voc(SD), PGDCA, PGDCAA, BBA(ITM/ISM), MCA, M.Sc.

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Teaching and Evaluation Scheme for M. Sc. (Geoinformatics) 1st Semester
[Total: 600 Marks]

Paper No.	Paper Title	Teaching Schedule				University Examination		Internal Evaluation
		Lect.	Tut.	Prac.	Credit	Duration	Marks	Marks
PS01CGIN21	Principles of Remote Sensing	3	1	-	4	3	70	30
PS01CGIN22	Principles of Geographical Information System	3	1	-	4	3	70	30
PS01CGIN23	Principles and Applications of GPS	3	1	-	4	3	70	30
PS01CGIN24	Advanced Programming Concepts & Data Structures	3	1	-	4	3	70	30
PS01CGIN25	RDBMS & Client Server Computing	3	1	-	4	3	70	30
PS01CGIN26	Practical based on PS01CGIN22, PS01CGIN24 & PS01CGIN25	-	-	10	5	5	70	30

Teaching and Evaluation Scheme for M. Sc. (Geoinformatics) 2nd Semester
[Total: 600 Marks]

Paper No.	Paper Title	Teaching Schedule				University Examination		Internal Evaluation
		Lect.	Tut.	Prac.	Credit	Duration	Marks	Marks
PS02CGIN21	Digital Image Processing	3	1	-	4	3	70	30

PS02CGIN22	Spatial Analysis and Modeling	3	1	-	4	3	70	30
PS02GCIN23	Java Programming	3	1	-	4	3	70	30
PS02CGIN24	Web Programming	3	1	-	4	3	70	30
PS02CGIN25	Practical based on PS02CGIN21, PS02GCIN23 & PS02GCIN24	-	-	10	5	5	70	30
PS02EGIN21 Or PS02EGIN21	Elective Subjects	-	-	-	4	3	70	30

Elective Subject:

PS02EGIN21 - Natural Resources Management
PS02EGIN22 - Disaster Management

Teaching and Evaluation Scheme for M. Sc. (Geoinformatics) 3rd Semester
[Total: 600 Marks]

Paper No.	Paper Title	Teaching Schedule				Evaluation Scheme		
						University Examination		Internal Evaluation
		Lect.	Tut.	Prac.	Credit	Duration	Marks	Marks
PS03CGIN21	Spatial Data Infrastructure & Web GIS Services	3	1	-	4	3	70	30
PS03CGIN22	QGIS Tools and Applications Development	3	1	-	4	3	70	30
PS03CGIN23	Visual Programming	3	1	-	4	3	70	30
PS03CGIN24	Android & iPhone Applications Development	3	1	-	4	3	70	30
PS03CGIN25	Practical based on PS03CGIN22 and PS03CGIN24	3	1	10	5	5	70	30
PS03EGIN21 Or PS03EGIN22	Elective Subjects	-	-	-	4	3	70	30

Elective Subject:

PS03EGIN21 – Geoinformatics Application in Governance
PS03EGIN22 – Geoinformatics Application in Utility Management

Teaching and Evaluation Scheme for M. Sc. (Geoinformatics) 4ᵗʰ Semester
[Total: 600 Marks]

Paper No.	Paper Title	Credit	External Marks	Internal Marks
PS04CGIN21	Project Work	25	420	180

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COURCE OF STUDY
RULES FOR DEGREE OF THE MASTER OF SCIENCE
(M.Sc.) GEOINFORMATICS

R.P.G. GIN. 1	A Candidates for admission to the Two year Master of Geoinformatics course must have passed a Bachelor's degree examination (10+2+3) pattern) either in science with Computer Science or Information Science or Computer Application B.C.A/ B.E / B.Sc. / B.Voc (SD)/ PGDCA/ PGDCAA/ BBA (ITM / ISM)/ MCA/M.Sc.
R.P.G. GIN. 2	The examination for the various theory courses and laboratory work will be conducted under semester system. For this purpose each academic year will be divided into two semesters.
R.P.G. GIN. 3	The ratio between the external and internal assessments will be 70:30.
R.P.G. GIN. 4	Candidate shall be required to attend at least 75% of the total theory, lectures, practical's and project work organized under each of the courses by them during the semester.
R.P.G. GIN. 5	(I) The Head of the department in consultation with other teachers of the department will prepare in the beginning of the semester a detailed scheme of the periodic test(s), seminars, quizzes etc., and the programme for the test examinations and the same will be announced to the candidates. (II) The record of the test examinations as well as seminars, and quizzes will be maintained by the department (III) Every candidate shall maintain a regular record of his practical and project work shall be duly certified by his teacher(s) from time to time.

	Distribution of Internal Examination Marks Each theory paper Average Marks
	
	 (1) One Tutorial Test per semester of 3 hours duration and having 15
	      6 questions of 10 marks each. The total marks to be reduced
	      to………………………..
	 (2) There will be 6 quiz tests of 10 marks each. The total of 60 10
	      marks to be reduced to …………………….
	 (3) Seminar……………….. 05
	                                  Total 30 Marks
	 Practical:
	 (1) One/Two practical test per semester: 25
	 (2) Each Practical of 20 marks (Journal). The total marks of all 05
	      the practicals to be reduced to …………………..
	                                  Total 30 Marks

R.P.G. GIN. 6	Candidate will be required to obtain at least 33% marks in the internal evaluation

	separately in each head of passing. A candidate who fails to obtain 33% marks in not more than two heads of passing may be allowed to appear at the university examination by the Head of the department concerned on the recommendation of the committee appointed by him to assess the candidate's overall performance. (Note: Head of passing will mean a course in theory or practical or project work)
R.P.G. GIN. 7	The final results for the award of the degree will be declared on the basis of the grand total of all the semesters examinations prescribed for the degree examination.
R.P.G. GIN. 8	No candidate will be allowed to reappear in course in which he/she has already passed.
R.P.G. GIN. 9	Standard of Passing: The standard of passing the M.Sc. (Geoinformatics) degree examination will be as under:- (1) To pass any semester examination for the M.Sc. degree a candidate must obtain at least 40% marks in the university Examination and 40% marks in the aggregate of University and Internal Examination in each course of Theory, Practical and Project work. (2) Those of the successful candidates who obtain 50% or more marks in the aggregate of all the semesters taken together will be placed in the Second Class and those who obtain 60% or more marks in the aggregate will be placed in the First Class. The successful candidates who obtain 70% or more marks in the aggregate of all the semesters taken together will be declared to have passed the examination in the First Class with distinction.
R.P.G. GIN. 10	(i) A candidate who fails in more than two courses (any two out of total heads of passing in the particular semester) in particular semester will not be admitted for further study at a subsequent semester and will be required to repeat the courses in which he/she has failed by joining the department as a regular student in the semester in which these courses are again offered. A Candidate failing in not more than two courses at any semester examination will be promoted to the subsequent semester according to the following scheme: (II) A Candidate failing in the First Semester will be permitted to prosecute his/her study upto the Third Semester but will not be permitted to go to the Fourth Semester until he/she has cleared all the courses of the First Semester eventhough he/she may have passed in the Second Semester and/or Third Semester. A Candidate failing in the Second Semester will be permitted to prosecute his studies upto the Fourth Semester.
R.P.G. GIN. 11	The Following are the courses for the Master of Science in Geoinformatics degree examinations

M. Sc. (Geoinformatics) - 1st Semester Syllabus

Effective From: 2017 - 2018

Paper No.	Paper Title
PS01CGIN21	Principles of Remote Sensing
PS01CGIN22	Principles of Geographical Information System
PS01CGIN23	Principles and Applications of GPS
PS01CGIN24	Advanced Programming Concepts & Data Structures
PS01CGIN25	RDBMS & Client Server Computing
PS01CGIN26	Practical based on PS01CGIN22, PS01CGIN24 & PS01CGIN25

M. Sc. (Geoinformatics) - 1st Semester Syllabus

Paper No.:   **PS01CGIN21**
Paper Title: **Principles Of Remote Sensing**

Unit 1   Physical Principles
The Electromagnetic spectrum, Energy sources and radiation, Laws of blackbody radiation, Radiometric quantities, Gaseous absorption and scattering of solar radiation, Atmospheric windows & Atmospheric absorption, Emission in IR region, Thermal remote sensing. Spectral Signatures of vegetation, soil, minerals, land, ocean, water, snow.

Unit 2   Multi spectral and Hyperspectral Sensing
Resolution types, Across track scanning, Along track scanning, Geometric characteristics of both scanners, Thermal scanning, Interpreting Thermal Scanner Imagery, Hyper-spectral Sensing,   Satellite Program and Image Examples: Landsat, SPOT, IRS, INSAT.

Unit 3   Microwave and Lidar Sensing
Radar development, Side looking Radar System operation, Synthetic Aperture Radar, Radar Characteristics, Radar image Interpretation, Interferometric Radar, Radar Remote sensing from space, Seasat-1, Almaz-1, ERS-1, ERS-2, Envisat, JERS-1, ALOS, Radarsat, Passive microwave sensing, Lidar.

Unit 4   Visual Image interpretation and Applications
Visual image analysis, elements of image interpretation, interpretation keys, incorporation of ancillary and contextual data, band selection, feature space, training signature extraction, Land use / land Cover mapping, Agriculture, Forestry, Hydrology, Urban and Regional Planning.

Reference Books:

1. Fundamentals of Remote Sensing, George Joseph, University Press
2. Remote sensing and image interpretation, Lillesand T.M. and Kiefer R.W, John Wiley & Sons, 2002 (4th edition)
3. Remote sensing: Principles and interpretation, Sabins F.F, Freeman and Co., 1996
4. Remote Sensing – principles and applications, B.C. Panda, Viva Books, N. Delhi, 2005
5. Satellite meteorology – an introduction, Kidder S.Q. and Vonder Harr T.H., Academic press, 1995

Paper No.: PS01CGIN22
Paper Title: **Principles Of Geographical Information Systems**

Unit 1 **Introduction**
The Concept of Spatial Information System, Definitions & Terminology, Map and GIS, Components of GIS, The Four Ms of GIS
Data Types and Spatial Relationship
Point, Line, Polygon / Area, Surface, Non-spatial Attribute Data, Topology
Data Sources
Maps, Satellite Imageries, GPS and Survey Measurements, Tabular, Repositories (Global Spatial Data Infrastructure, National Spatial Data Infrastructure (NDSI) , Natural Resources Repository (NRR)
Geo-referencing
Datum, Coordinate System, Projection, Datum / Projection Transformations

Unit 2 **Data Quality and Basic Spatial Analysis**
Raster Models, Vector Models, Accuracy, Precision and Resolution, Consistency and Completeness, Error Sources, Queries ,   Measurement, Classification, Symbolization , Union, Intersection, Data Merging
Database Creation and Organization
Database Design, Spatial Database Creation, Database Editing and Error Removal, EdgeMatching and Rubber Sheeting, Linking of Attribute Data, Database Partitioning and Indexing

Unit 3 **Map Generation**
Template Selection, Title and Content, Page Size and Scale, Label, Legend and Symbology, GIS Packages

Unit 4 **GIS Project Design & Management**
Applications
Location Based Services, Disaster Management, Utility Management,   E-governance
Technology Trends
Mobile GIS, Internet / WEB GIS,   OGC Standards

Reference Books:

1. Geographic Information Systems, Michael DeMers, Wiley India, 3rd Edition -2011
2. Geographical Information Systems Principles, Techniques, Management & Applications,   Paul A. Longley, Michael F. Goodchild, David J. Maguire, David w. Rhind by John Wiley & Sons Inc.

Paper No.:   **PS01CGIN23**
Paper Title: **Principles And Applications Of GPS**

Unit	Introduction
1	The Concept of Satellite Navigation, GPS , GLONASS and Indian Regional Navigation Satellite System (IRNSS - ISRO)

Unit   **Introduction**
1   The Concept of Satellite Navigation, GPS , GLONASS and Indian Regional Navigation Satellite System (IRNSS - ISRO)
GPS Segments
Space Segment, Control Segment, Ground Segment
GPS Signal and Information Contents
C/A code, P Code, Navigation Message, Almanac, Time and Ionosphere Correction Parameters, Health Information, GPS Observables Code, Carrier Phase and Pseudo Range Measurements

Unit   **GPS Data Processing and Error Sources**
2   Types of GPS Receiver , Static, Dynamic and Differential data processing, Velocity and Time Data, Position and Height Transformation, Selective Availability, Ephemeris, Multipath, Ionospheric & Tropospheric Delay, Dilution of Position, Satellite & Receiver Clock Error

Unit   **GPS Technology Trends**
3   Mobile GPS, Software Defined GPS and GPS –GIS Unification

Unit   **GPS Applications**
4   Control Points Survey, Mobile Mapping, Navigation, Time Transfer, Fleet Monitoring, Crustal Deformation Study

Reference Books:

1. GPS for land surveys, Jan Van Sickle, CRC Press
2. Global Positioning System: Signals, measurements & Performance, Pratap Misra and per Enge

Paper No.: **PS01CGIN24**
Paper Title: **Advanced Programming Concepts & Data Structures**

Unit 1 **Advanced Programming**
      Pointers and Indirection
      Command line arguments
      Macros
      File Management
      Graphics

Unit 2 **Object Oriented Concepts and OO Programming**
      Difference between conventional and object oriented languages
      Abstraction and Encapsulation
      Classes, objects and instantiation, data members, methods
      Inheritance
      Polymorphism, function and operator overloading
      Implementing polymorphism and overloading
      Implementing inheritance, access control, virtual methods
      Creating and destroying objects, runtime memory management

Unit 3 **Data Structures and File Management**
      Arrays
      Linked Lists
      Stacks
      Queues
      Trees
      Concepts of fields, records and files
      Variable length records
      Sequential file organization
      Random file organization

Unit 4 **Indexing Methodology**
      Indexing structures like B trees and B+ trees
      ISAM
      Hashing techniques for direct files
      Inverted lists, multi-lists
      Heaps

Reference Books:

1. Tremblay J. & Sorenson P.G: An Introduction to Data Structures with Applications 2nd Edition – TMH
2. Singh Bhagat& Naps Thomas: Introduction to Data Structures – TMH
3. Liberty Jesses & Keogh Jim: C++ An Introduction to Programming – PHI
4. LangranYedidyah, Augeustem Moshe J, TenenbaumAron M: Data Structures Using C and C++ - PHI
5. Stroustrup, Bjarne: The C++ Programming Language 3rdEditioin – Addison Wesley

Paper No.:   **PS01CGIN25**
Paper Title: **RDBMS & Client Server Computing**

Unit 1   **Introduction**
                Fundamentals of RDBMS
                Data models
                Operations on RDBMS
                Database design and Normalization, ERD.
                Case Study

Unit 2   **Structured query language (SQL)**
                Introduction to SQL syntax
                Data definition language commands
                Data manipulation language commands
                Data control language commands
                Database objects like views, indexes, sequence, synonyms, and snapshot.
                Introduction to PL/SQL: control structures and subprograms
                Stored Procedures and Functions
                Transaction control, concurrency control
                Database triggers, packages and error handling.

Unit 3   **Fundamentals of Client Server Systems**
                Introduction to distributed system
                Structure of distributed database
                Commit protocols
                Reverse Engineering
                Study of front-end tool

Unit 4   **Client server Systems Tools**
                Introduction to Client-Server systems
                Two-tier and Three-Tier client-server architecture
                Introduction to various types of tools
                Strategies for building automated systems
                Event-driven programming

Reference Books:

1. Elmasri R and Navathe S.B: Fundamentals of Database Systems - The Benjamin/Cummings Pub
2. Joe Salemi: Guide to Client/Server Database – ZD Press
3. User Manuals of Selected RDBMS Packages.

Paper No.:   **PS01CGIN26**
Paper Title: **Practical based on PS01CGIN22, PS01CGIN24 & PS01CGIN25**