SHIVAJI UNIVERSITY, KOLHAPUR

Established: 1962

A^{++} Accredited by NAAC (2021) with CGPA 3.52

Structure and Syllabus in Accordance with

National Education Policy - 2020

with Multiple Entry and Multiple Exit

Post Graduate Diploma in Geoinformatics

under
Faculty of Science and Technology

(To Be Implemented From Academic Year 2023-24)

INDEX

1. Preamble

Geospatial technology has been widely used in various sectors, such as agriculture, infrastructure development, finance, mining, disaster management, and more. Recognizing the growing importance and potential of the geospatial sector for national development and the information economy, the Indian government took the initiative to introduce the National Geospatial Policy in 2022 with a citizen-centric approach.

To meet the increasing demand for skilled human resources with knowledge of geospatial technology, Shivaji University launched the P. G. Diploma in Geoinformatics program in 2008. However, in line with the National Education Policy (NEP) of 2020, the university has undertaken a major restructuring of the course. The P. G. Diploma in Geoinformatics has been transitioned from an annual course structure to a semester pattern, ensuring that it aligns with the latest guidelines and educational reforms set forth by the NEP-2020.

The revised curriculum has been meticulously designed to equip students with a comprehensive understanding of recent trends in Geoinformatics, interdisciplinary studies, theoretical and applied perspectives. Additionally, the introduction of the semester and credit systems enables students to develop essential skills and expertise in geospatial technology, catering to the current industry demands and several employment opportunities in this field

2. Duration

- The course shall be a full time course.
- The duration of course shall be of one year/two semesters.

3. Eligibility for Admission

Graduate in Geography/ Geology / Physics / Botany / Environmental Sciences / Agriculture / Forestry / Computer Science or B.E / B.Tech in Civil Engineering / Agricultural Engineering / Computer Science / Information Technology.

4. Medium of Instruction

The medium of instruction will be English.

5. Programme Structure

Structure in Accordance with National Education Policy - 2020
With Multiple Entry and Multiple Exit Options
P.G. Diploma in Geoinformatics (Level-8)

Course Type	Course Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
		Lectures (Hours/ week)	Practical (Hours/ week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours:Min	Maximum Marks	Minimum Marks	Exam. Hours
SEMESTER-I (Duration- Six Months)										
Major Mandatory	MMT-101	4	--	4	80	32	3	20	8	1
	MMT-102	4	--	4	80	32	3	20	8	1
	MMPR-103	--	8	4	100	40	5	--	--	--
	MMPR-104	--	4	2	50	20	2:30	--	--	--
Major Elective	MET-105/106	4	--	4	80	32	3	20	8	1
Research Methodology	RM-107	4	--	4	80	32	3	20	8	1
Total (A)		**16**	**12**	**22**	**470**	--	--	**80**	--	--
SEMESTER-II (Duration- Six Months)										
Major Mandatory	MMT-201	4	--	4	80	32	3	20	8	1
	MMT-202	4	--	4	80	32	3	20	8	1
	MMPR-203	--	4	2	50	20	2:30	--	--	--
	MMPR-204	--	8	4	100	40	5	--	--	--
Elective Theory	MET-205/206	4	--	4	80	32	3	20	8	1
OJT	OJT-207	--	8**	4	60	24	3	40	16	*
Total (B)		**12**	**20**	**22**	**450**	--	--	**100**	--	--
Total (A+B)				**44**	**920**	--	--	**180**	--	--

Note(s):

•Student contact hours per week : **28/32** Hours	•Total Marks for P. G. Diploma in Geoinformatics. : **1100**
•Theory Lectures **60** Minutes Each and Practical Lectures **120** Minutes Each	• Total Credits for P. G. Diploma in Geoinformatics.: **44** **Level 8:** Semester I & II
•MMT- Major Mandatory Theory •MET- Major Elective Theory •MMPR- Major Mandatory Practical •RM- Research Methodology •FP/OJT- Field Project / On Job Training(**during vacation)	• Theory and Practical examination will be conducted at the end of respective semester. •Practical courses may be divided into sub-sections. •*Duration of practical examination as per respective BOS guidelines. •***Separate passing is mandatory for Theory and Practical examination as well as University and Internal assessment.***
• **Requirement for Entry at Level 8: Completed all requirements of the Bachelor's Degree (Level 7) with above mentioned eligibility criteria (section 3).**	
• **Requirement for Exit after Level 8:** **Students can exit after completion of Level 8 with Post Graduate Diploma in Geoinformatics.**	
• **Entry Option for Level 9: Upon successful completion of the P. G. Diploma in Geoinformatics (Level 8) with a minimum of 44 credits, students are eligible for direct admission to the second year (third semester) of the P. G. Diploma in Geoinformatics. (Level 9).**	

6. Programme Outcomes (POs)

1. The P. G. Diploma in Geoinformatics students will be professionally competent in geospatial professions, with a strong knowledge base, skill set, mindset, and pragmatic wisdom.
2. P. G. Diploma students will have ability of making comprehensive geospatial analysis, interpret spatial problems, and suggest proper solutions by using theoretical, methodological, and instrumental knowledge of geospatial technology.
3. They will have good understanding about proper utilization of natural resources through geospatial knowledge.
4. The graduates will be encouraged in their understanding of moral and social values in daily life in order to develop a culturally and civilized personality.
5. They will be interested in conducting research to address important and emerging societal problems relating to geospatial technology and the environment.

7. Course Codes

Semester	Course Type	Sr. No.	Course Number	Course Title	Course Code
Semester- 1	Major Mandatory	1	MMT-101	Fundamentals and Applications of Remote Sensing	MSU0325MML920G1
		2	MMT-102	Geographical Information System (GIS)	MSU0325MML920G2
		3	MMPR-103	Geographical Information System Lab	MSU0325MMP920G1
		4	MMPR-104	Modern Surveying Lab	MSU0325MMP920G2
	Major Elective	5	MET-105	Fundamentals and Principles of Modern Surveying	MSU0325MEL920G1
		6	MET-106	Statistics for Geospatial Studies	MSU0325MEL920G2
	Research Methodology	7	RM-107	Research Methodology	MSU0325RML920G
Semester- 2	Major Mandatory	1	MMT-201	Photogrammetry and Digital Image Processing	MSU0325MML920H1
		2	MMT-202	Database Management System and Web GIS	MSU0325MML920H2
		3	MMPR-203	Photogrammetry and Digital Image Processing Lab	MSU0325MMP920H1
		4	MMPR-204	DBMS, Web-GIS and Mini Project	MSU0325MMP920H2
	Major Elective	5	MET-205	Geodesy and Digital Cartography	MSU0325MEL920H1
		6	MET-206	Coastal Zone Studies	MSU0325MEL920H2
	OJT	7	OJT-207	Field Project / On Job Training	MSU0325OJP920H

8. Syllabus

M. Sc. Geoinformatics (Part I) (Level-8) (Semester I)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Fundamentals and Applications of Remote Sensing
Course Code: MMT-101 (MSU0325MML920G1)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Understand the basic concept and principles of remote sensing.
2. Understand the role of remote sensing and DIP in data collection and analysis.
3. Know the different types of sensor and remote sensing techniques.
4. Understand the use and importance of satellite images and aerial photographs to assess the geographical phenomena.
5. Apply the knowledge of remote sensing in various thematic studies.

Unit I: Introduction and Principles of Remote Sensing **15 Lectures**
Definition and scope of remote sensing; History and development of remote sensing technology; Electromagnetic radiation (EMR) and electromagnetic spectrum; EMR interaction with atmosphere and earth surface; Atmospheric window and spectral reflectance curve; Resolutions in remote sensing; Types of remote sensing; Principles and applications of optical, thermal & microwave remote sensing.

Unit II: Aerial Photography **15 Lectures**
Aerial photographs: types, scale, and resolution; Types of aerial cameras and photographic films; Geometry of aerial photographs; Flight planning; Impact of season, time and topography on aerial photographs; Elements of visual image interpretation; Aerial photos vs. satellite imagery.

Unit III: Satellite Remote Sensing **15 Lectures**
Satellite: types and their characteristics; Types of Sensors; Orbital and sensor characteristics of major earth resource satellites: LANDSAT, Sentinel and IRS; Recent developments of Indian remote sensing satellite programme; Environmental, meteorological and communicational satellites.

Unit IV: Applications of Remote Sensing **15 Lectures**
Geospatial Technology in Urban and Regional planning, Water resource management, Soil resource Management, Agriculture and Crop Monitoring, Forestry and Environment, Land use/ land cover mapping and change detection, Natural hazards assessment.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. Wolf. P.R., (2014). Elements of Photogrammetry with Application in GIS, McGraw Hill books Co., London.
2. Curran P.J (1985). Principles of Remote Sensing, Longman, London.
3. Lillisand T.M and R.W. Kiefer (1994). Remote Sensing and Image Interpretation (3rd edition). John Wiley & Sons, New York.
4. Sabins F.F Jr. (1987). Remote Sensing: Principles and Interpretation, W.H.Freeman & Co., New York.
5. James B. Campbell, Randolph H. Wynne, Valerie A. Thomas (2022). Introduction to Remote Sensing, Guilford Press, New York
6. Alexey Bunkin and Konstantin Voliak (2001). Laser Remote Sensing of the Ocean, John Wiley and Sons., New York.
7. Gibso, P., and Clare H. Power, (2000). Introductory Remote Sensing: Principles and Concepts, Routledge, London.
8. Hayesm L., (1991). Introduction to Remote Sensing, Taylor and Francis Publication, London.

9. Kumaraswamy, K. (2003). Remote Sensing for Environmental Studies, Department of Geography, Bharathidasan University, Tiruchirappalli. 10. Karl Kraus (2007). Photogrammetry – Geometry from Images and Laser Scans, Walter de Gruyter, Berlin.

Web References:

1. Indian Space Research Organisation (ISRO), India: http://www.isro.org
2. National Remote Sensing Centre (NRSC), India: http://www.nrsc.gov.in
3. National Aeronautics and Space Administration (NASA), USA: http://www.nasa.gov
4. National Oceanic and Atmospheric Administration (NOAA), USA: http://www.noaa.gov
5. United States Geological Survey (USGS), USA: http://www.usgs.gov
6. International Society for Photogrammetry and Remote Sensing (ISPRS): http://www.isprs.org
7. Wikimapia: http://www.wikimapia.org
8. Bhuvan: http://www.bhuvan.nrsc.gov.in

M. Sc. Geoinformatics (Part I) (Level-8) (Semester I)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Geographical Information System (GIS)
Course Code: MMT-102 (MSU0325MML920G2)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Understand the Fundamentals of GIS and distinguish various types of GIS data models
2. Familiarization with various data types, editing and storage of spatial and non-spatial data.
3. Create maps to communicate spatial data in a meaningful way to others
4. Visualize multivariate spatial data.

Unit I: Introduction to GIS **10 Lectures**
Definition of Geographical Information System (GIS), History and development of GIS, Components of GIS, GIS operations, Future of GIS.

Unit II: Basics of GIS **20 Lectures**
Types of geographic data; Raster and vector data model: Advantages and disadvantages; Fundamental of data storage: block code, run length code, chain code, quad tree; Spatial data input: Digitization and Conversion; Point, line and polygon; Concept of arc, node and vertices; Digitization errors; Topology: Error and editing.

Unit III: GIS Analysis **20 Lectures**
Vector data analysis: Buffering, Overlay analysis, Network analysis; Raster data analysis; Interpolation techniques in GIS; Terrain analysis: DEM, DSM, DTM and TIN, Viewshed and Watershed Analysis; Types of Queries in GIS.

Unit IV: Data Visualization and Recent Trends **10 Lectures**
GIS and maps; Visualization process; Visualization strategies; Maps dissemination; Process modeling and simulation; Current issues and trends in GIS.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. Bernhardensen, Tor. 1999. Geographic Information Systems: An Introduction. Toronto: John Wiley & Sons, Inc.
2. Burrough, Peter A. and McDonnell, Rachael A. 1998. Principles of Geographical Information Systems – Spatial Information Systems and Geostatistics. Oxford University Press.
3. Chang, Kang-tsung. 2002. Introduction to Geographic Information Systems. New Delhi: Tata McGraw-Hill Publishing Company Limited.
4. Clarke, Keith C. 2001. Getting Started with Geographic Information Systems (3r d Ed.) (Prent ice Hall Series in Geographic Information Science). Upper Saddle River, New Jersey: Prentice Hall.
5. DeMers, Michael N. 2000. Fundamentals of Geographic Information Systems (2n d Ed.) (Wiley Student Edit ion). New York: John Wiley & Sons, Inc.
6. Foresman, T. (Ed.) 1998. The History of Geographic Information Systems – Perspectives from the Pioneers. Upper Saddle River, NJ: Prentice Hall.

Web References:

1. www.esri.com
2. www.natmo.gov.in
3. www.surveyofindia.gov.in
4. https://gisgeography.com/

M. Sc. Geoinformatics (Part I) (Level-8) (Semester I)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Geographical Information System Lab
Course Code: MMPR-103 (MSU0325MMP920G1)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Learn the graphical user Interface and tools of GIS software.
2. Apply the knowledge of GIS software in various application fields.
3. Apply Comprehensive knowledge of GIS software for analysis of geographical data and to solve real world problems.
4. Understand the role of GIS as decision support system.
5. Understand and develop the different types of models for GIS spatial analysis.

Exercise of QGIS Software:

1. Interface of QGIS.
2. Working with Projections.
3. Georeferensing: Toposheet and Image Registration.
4. Digitization of Map Data.
5. Satellite Image Browsing Systems
6. Working with WMS Data
7. Making a Map Layout.
8. Data query: Spatial and Attribute.
9. Animating Time Series Data
10. Interpolating Point Data
11. Travel Time Analysis with Uber Movement
12. Service Area Analysis using Open route service
13. Working with Google Earth.

Exercise of ArcGIS and ArcGIS Pro Software:

1. Overview of ArcGIS: Introduction Arc Map, Arc Catalogue And Arc Toolbox.
2. Data Formats in ArcGIS: Import Of Data, Shapefile, Feature Class, Geodatabase, Data Frames, Labeling Features.
3. Georeferencing in ArcGIS: Coordinating System, Datum Conversion, Map Projection, Storing and Viewing Projection Information.
4. Vector Data: Creating New Features, Editing Functions, Digitization, Errors and Creation of Topology.
5. Aspatial Data: Understanding Tables, Field Types, Table Manipulation, Table Relation, Creation of Graphs and Reports.
6. Map Design: Layout and Map Composition.
7. Spatial Analysis-I: Query By Location/Attribute, Buffer and Overlay Analysis.
8. Spatial Analysis-II: Interpolation Methods, Viewshed and Watershed Analysis.
9. Applications: Calculation of Vegetation and Water Indices, Slope and Contour, Network Analysis.
10. Import and Create 3D Model in ArcGIS Pro

References:

1. Adriaans, P., and D. Zantinge. 1996. Data Mining. New York: Addison-Wesley.
2. Bernhardensen, Tor. 1999. Geographic Information Systems: An Introduction. Toronto: John Wiley & Sons, Inc.
3. Bishop, Michael P. and Shroder, John F. (Eds.) 2004. Geographic Information Science and Mountain Geomorphology. Chichester, U.K.: Praxis Publishing (Springer).11
4. Bracken, Ian and Webster, Christopher. 1990. Information Technology in Geography and Planning (Including Principles of GIS). London & New York: Routledge.

5. Burrough, Peter A. and McDonnell, Rachael A. 1998. Principles of Geographical Information Systems – Spatial Information Systems and Geostatistics. Oxford University Press.
6. Buttenfie ld, B.P. and R.P. McMaster 1991. Map Generalization: Making Rules for Knowledge Presentation. New York: Wiley.
7. Chang, Kang-tsung. 2002. Introduction to Geographic Information Systems. New Delhi: Tata McGraw-Hill Publishing Company Limited.
8. Chrisman, N. 1998. "Academic Origins of GIS," In T. Foresman (Ed): The History of Geographic Information Systems. Upper Saddle River, NJ: Prent ice Hall, pp. 33-43.
9. Clarke, Keith C. 2001. Getting Started with Geographic Information Systems (3r d Ed.) (Prent ice Hall Series in Geographic Information Science). Upper Saddle River, New Jersey: Prentice Hall.

Web References:

1. https://docs.qgis.org/2.18/pdf/en/QGIS-2.18-UserGuide-en.pdf
2. https://qgis.org/en/site/
3. https://www.esri.com/en-us/arcgis/about-arcgis/overview
4. http://downloads.esri.com/support/documentation/ao_/698What_is_ArcGis.p

M. Sc. Geoinformatics (Part I) (Level-8) (Semester I)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Modern Surveying Lab
Course Code: MMPR-104 (MSU0325MMP920G2)
Total Credits: 02
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Quantify the Digital Surface Model (DSM), Digital Terrain Model (DTM) and its applications.
2. Prepare topographical map and contour map on an area.
3. Familiar with the GPS and DGPS components, types and applications.
4. Describe the applications of UAV in archaeology, urban mapping and disaster studies.

Theodolite and Total Station:

1. Field survey with theodolite
2. Field survey with total station

GPS and DGPS:

1. GPS: Basic functions, Waypoint demarcation and Area Calculation through GPS
2. GPS: Transfer data in GIS software
3. DGPS: Basic functions, Selection of reference station for calibration and Point data collection (GCPs)
4. DGPS: DGPS and GIS data integration and output preparation

Drone/UAV:

1. Flight planning
2. Assemble and calibration
3. Flying for data collection
4. Data processing for generation of DEM, point cloud and Orthophoto

References:

1. R.Subramanian "Surveying and leveling" 2nd edition, 2013, Oxford university press, New Delhi.
2. Dr. A.M. Chandra, "Plane Surveying", 2007, New Age International (P) Ltd., New Delhi.
3. Dr. A.M. Chandra, "Higher Surveying", 2006, New Age International (P) Ltd., New Delhi.
4. Dr. B.C. Punamia, "Surveying Vol. I and II", 2016, Laxmi Publishers, New Delhi
5. S.K. Duggal, "Surveying, Vol. I, II and III", 2009, Tata Mcgraw Hill, New Delhi.
6. B. Bhatta, "Remote Sensing and GIS", Oxford University Press, New Delhi.
7. Dr. A.M. Chandra, "Remote Sensing and GIS", Narosa Publishers, New Delhi.
8. Sateesh Gopi, R. Sathikumar, and N. Madhu, "Advanced Surveying", Pearson Education India, 2007.
9. "GPS Satellite Surveying", Alfred Leick 3rd Edition, John Wiley and Sons 2004.
10. Global Navigation Satellite Systems by G. S. Rao 2010 Tata McGraw Hill Education Pvt Ltd.
11. "GPS Theory, Algorithms and Applications Guocheng Xu," Springer-Verlag, 2003.
12. Unmanned Aerial Remote Sensing: UAS for Environmental Applications 1st Edition, David R. Green (Editor) 2020

Web References:

1. https://cpe.leica-geosystems.com/si/blog/post/what-is-a-total-station-how-it-works.html
2. https://ellipsis-drive.com/blog/drones-and-their-impact-on-gis-mapping/
3. https://en.wikipedia.org/wiki/Differential_GPS
4. https://opendronemap.org/
5. https://www.mapmyindia.com/solutions/drones/

M. Sc. Geoinformatics (Part I) (Level-8) (Semester I)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Fundamentals and Principles of Modern Surveying
Course Code: MET-105 (MSU0325MEL920G1)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Understand principles and methods of surveying, including traditional and advanced techniques.
2. Use Total Station for data processing and analysis in surveys.
3. Apply GPS and DGPS for mapping, navigation, and accurate surveys.
4. Utilize drone/UAV technology for data capturing and post-processing.
5. Minimize errors and ensure precision in survey measurements using appropriate units.

Unit I: Introduction to Surveying **15 Lectures**
Introduction and principles of surveying; Classification of surveying, Survey methods: traditional and advanced, Nature of surveying work: field work and office work, Sources and types of errors, Units of measurements.

Unit II: Surveying with Total Station **15 Lectures**
Introduction to total station: Principle and function, REM, RDM, Use of total station for data processing and analysis; Electronic distance measurement survey; Area measurement survey; Height measurement survey; Survey data post processing; Survey data applications.

Unit III: Surveying with GPS and DGPS **15 Lectures**
Introduction to GPS; GPS satellite system; GPS segments; Sources of GPS errors; Differential GPS: Principle, concepts and function, Duel and single frequency DGPS, RTK and Static Surveys; Application of GPS and DGPS in surveying, mapping and navigation.

Unit IV: Surveying with Drone/UAV Technology **15 Lectures**
Introduction to drones; History of UAVs; Types of Drones; Working principle; Components; Photogrammetry and data capturing process; Post processing of UAV data; Data products; Applications.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. R.Subramanian "Surveying and leveling" 2 ndedition, 2013, Oxford university press, New Delhi.
2. Dr. A.M. Chandra, "Plane Surveying", 2007, New Age International (P) Ltd., New Delhi.
3. Dr. B.C. Punamia, "Surveying Vol. I and II", 2016, Laxmi Publishers, New Delhi
4. Dr. A.M. Chandra, "Remote Sensing and GIS", Narosa Publishers, New Delhi.
5. Sateesh Gopi, R. Sathikumar, and N. Madhu, "Advanced Surveying", Pearson Education India, 2007.
6. Global Navigation Satellite Systems by G. S. Rao 2010 Tata McGraw Hill Education Pvt Ltd.
7. "GPS Theory, Algorithms and Applications Guocheng Xu," Springer-Verlag, 2003.
8. Unmanned Aerial Remote Sensing: UAS for Environmental Applications 1st Edition, David R. Green (Editor) 2020
9. Barry Kavanagh & Tom Mastin, "Surveying Principles and Applications", Pearson, 2018.

Web References:

1. https://cpe.leica-geosystems.com/si/blog/post/what-is-a-total-station-how-it-works.html
2. https://ellipsis-drive.com/blog/drones-and-their-impact-on-gis-mapping/
3. https://en.wikipedia.org/wiki/Differential_GPS
4. https://opendronemap.org/

M. Sc. Geoinformatics (Part I) (Level-8) (Semester I)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Statistics for Geospatial Studies
Course Code: MET-106 (MSU0325MEL920G2)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Students will frame problems using multiple mathematical and statistical representations of relevant structures and relationships and solve using standard techniques.
2. Demonstrate knowledge of the properties of parametric, semi-parametric and nonparametric testing procedures
3. Interpreting and communicating the results of a statistical analysis
4. Recognize the importance and value of mathematical and statistical thinking, training, and approach to problem solving, on a diverse variety of disciplines

Unit I: Introduction **20 Lectures**
Statistical Methods for Geography; Scientific method and mathematical notation; Descriptive Statistics; Measures of central tendency: Mean, Median, and Mode; Measures of Dispersion: Range, Variance, Standard Deviation, z-score, Skewness, Kurtosis and Histograms.

Unit II: Probability **20 Lectures**
Probability Concepts; Discrete Probability Distributions: Uniform, Binomial and Poisson Distributions; Continuous Probability Distributions; Probability Models; Central Limit Theorem and Confidence Intervals.

Unit III: Hypothesis Testing and Sampling **10 Lectures**
Sources of Data; Sampling; Hypothesis Testing: z-test and t-test; Analysis of Variance (ANOVA).

Unit IV: Correlation and Regression **10 Lectures**
Covariance; Pearson's Correlation Coefficient; Spearman's Rank Correlation Coefficient; Correlation and Geographic Problems; Regression Analysis.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. Rogerson, P. A. (2001) Statistical Methods for Geography, Sage Publications, New Delhi.
2. Pal, S. K. (1998) Statistics for Geoscientists, Tata McGraw Hill, New Delhi.
3. Hammond, P. and McCullagh, P. S., (1978) Quantitative Techniques in Geography: An Introduction, Oxford University Press, New York.
4. Gareth James (2013). An Introduction to Statistical Learning: with Applications in R, Springer Science & Business Media.
5. George A. Morgan (2011). IBM SPSS for Introductory Statistics, Taylor & Francis.
6. Ajai, S. G. and Sanjaya, S.G. (2009) Statistical Methods for Practice and Research, Sage Publications, New Delhi.
7. Lyman Ott (2015). An Introduction to Statistical Methods and Data Analysis, Cengage Learning.
8. Ding-Geng (Din) Chen, Karl E. Peace (2021) Applied Meta-Analysis with R and Stata.

Web References:

1. https://machinelearningmastery.com/
2. https://www.hackerrank.com/domains/ai/machine-learning
3. https://newonlinecourses.science.psu.edu/stat857/node
4. http://www.unc.edu/courses/2006spring/geog/090/001

M. Sc. Geoinformatics (Part I) (Level-8) (Semester I)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Research Methodology
Course Code: RM-107 (MSU0325RML920G)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Understand the meaning, significance, and types of research.
2. Develop understanding of the basic framework of research process.
3. Demonstrate knowledge of various data collection techniques.
4. Develop skills in thesis writing and effective presentation of research findings.

Unit I: Introduction **15 Lectures**
Basics of Research; Research problem; Research design; Hypothesis; Qualitative and Doctrinal Methods in Research; Quantitative Methods in Research.

Unit II: Sampling and Research Types **15 Lectures**
Quantitative Research; Qualitative Research; Sampling; Measurement; Scaling; Reliability and Validity.

Unit III: Method of Data Collection **15 Lectures**
Methods of Data Collection; Primary and Secondary Data; Tools and Techniques of Data Collection; Data Analysis; Survey Method; Data Processing.

Unit IV: Thesis Writing **15 Lectures**
Report Writing; Research Ethics; Research Proposal; Review of Literature; Presentation of Research; Citation Patterns; Plagiarism.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. Basil Gomez, John Paul Jones., (2010). Research Methods in Geography: A Critical Introduction, John Wiley & Sons, New York.
2. Daniel Montello, Paul Sutton, (2006). An Introduction to Scientific Research Methods in Geography, SAGE.
3. Ron Iphofen (2018). The SAGE Handbook of Qualitative Research Ethics, SAGE.
4. Paige Baltzan (2016). Business Driven Information Systems, McGraw Hill Education, New York.
6. David L. Olson (2015). Information Systems Project Management, Business Expert Press, New York.

Web References:

1. https://foss4g.org/
2. http://sdeuoc.ac.in/sites/default/files/sde_videos/190459.pdf
3. https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf
4. http://www.wbnsou.ac.in/online_services/SLM/PG/MLIS-07.pdf
5. https://onlinecourses.swayam2.ac.in/cec23_ge07/preview

M. Sc. Geoinformatics (Part I) (Level-8) (Semester II)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Photogrammetry and Digital Image Processing
Course Code: MMT-201 (MSU0325MML920H1)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Acquire knowledge on the Development of Digital Photogrammetry, DIP and its Software and Hardware components.
2. Understand the concepts of Stereo image analysis include interior orientation, exterior orientation and aerial triangulation.
3. Understand planning and processing of photogrammetric and Image processing data.
4. Classify satellite images using classification techniques and carry out accuracy assessment.

Unit I: Fundamentals of Photogrammetry **15 Lectures**
Definition; Photogrammetry System; Source of photogrammetry information; Projection in Photogrammetry; Scale and coverage; Image coordinate system; Relief displacement; Parallax and stereo; Image overlap; Image Geometry; platforms.

Unit II: Digital Photogrammetry **15 Lectures**
Sensor model (Interior Orientation); platform model (Exterior Orientation); Resection and Intersection; Relative and Absolute orientation; Orthophotography; Feature extraction and object recognition; Close range photogrammetry: camera instrument, software and Applications.

Unit III: Introduction to Digital Image Processing **15 Lectures**
Digital image: Introduction and data formats; Introduction to image processing; Image processing system characteristics; Initial statistical extraction: histograms, univariate and multivariate statistics; Image Pre-processing: Introduction; Radiometric correction; Atmospheric correction; Geometric correction.

Unit IV: Image Enhancement and Image Classification **15 Lectures**
Contrast enhancement: linear and non-linear; Spatial feature enhancement: spatial filtering, edge enhancement; band rationing, resolution merge. Supervised classification: classification algorithm and training site selection; unsupervised classification; Classification accuracy assessment.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. Karl Kraus (2007) Photogrammetry – Geometry from Images and Laser Scans, Walter de Gruyter, Berlin.
2. Wilfried Linder (2003) Digital Photogrammetry: Theory and Applications, Springer – Verlag, Berlin Heidelberg.
3. Wolf. P.R., (1974). Elements of Photogrammetry, McGraw Hill books Co., London.
4. Yves Egels, Michel Kasser (2002) Digital Photogrammetry, Taylor & Francis Group, London, UK.
5. Zhilin Li (2008) Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences, CRC Press, Taylor & Francis Group, London, UK.
6. S.K. Ghosh (2013). Digital Image Processing, Narosa, India
7. Chris McGlone J. (2013). Manual of Photogrammetry, American Society for Photogrammetry and Remote Sensing (ASPRS), USA.
8. Francesco Mancini Riccardo Salvini (2020) Applications of Photogrammetry for Environmental Research, ISPRS, MDPI
9. Rainer Sandau (2010). Digital Airborne Camera: Introduction and Technology, Springer Science & Business Media.
10. Jensen, J. R., (2006). Introductory Digital Image Processing: A Remote Sensing Perspective, 3rd

Edition, Prentice-Hall Inc., New Jersey.
11. Campbell, J. B. and Wynne, R.H., (2011). Introduction to Remote Sensing, 5th Edition, The Guilford Press, New York.
12. Pierre Soille (2013). Morphological Image Analysis: Principles and Applications, Springer Science & Business Media.
13. Wilhelm Burger (2010). Principles of Digital Image Processing: Core Algorithms, Springer Science & Business Media.
14. Jude Hemant (2020). Artificial Intelligence Techniques for Satellite Image Analysis Remote Sensing and Digital Image Processing, Springer, India.

Web References:

1. https://uwescience.github.io/sat-image-analysis/resources.html
2. https://agisoft.freshdesk.com/support/solutions/articles/31000153729-satellite-imageryprocessing
3. https://www.esa.int/SPECIALS/Eduspace_EN/SEMHA60P0WF_0.html
4. https://engineering.purdue.edu/~bouman/ece637/
6. www.isprs.org
7. www.hexagongeospatial.com

M. Sc. Geoinformatics (Part I) (Level-8) (Semester II)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Database Management System and Web GIS
Course Code: MMT-202 (MSU0325MML920H2)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Demonstrate organizational skills in file and database management.
2. Clarify the concepts and components of DBMS and entity modeling.
3. Understand web mapping and hosting principles.
4. Develop skill in data warehousing and indexing, Metadata Concepts and Design.
5. Differentiate web application and hosting platforms.

Unit I: Introduction to DBMS **15 Lectures**

File system vs DBMS – Database Management Systems – Database Architectures, Introduction to data, database, spatial database; Data Storage types , Database Structure Models; Types of Database management system; Normalization; Relational Database Management System, Spatial Relationships; Spatial model and techniques; Spatial-Entity, Data management using SQL.

Unit II: Introduction to RDBMS **15 Lectures**

Data constraint-primary key, foreign key, unique key, null, not null, Normalization, default key etc. SQL: Introduction to SQL, Features of SQL, Basic data types, SQL statements/commands, DDL,DML, DCL, Set operations in SQL, order by and group by clause like, between, in, like, view and join command Nested queries, Sorting , SQL functions: MAX, MIN SORT, COUNT, AVERAGE, Numeric, String, Date Functions, Type conversion functions.

Unit III: Fundamentals of Web-GIS **20 Lectures**

What is Web, Network and Internet; Introduction to Web Mapping; Web-GIS Data Formats, Web-GIS architectures and Tires, Dynamic and Static Web Mapping; Open Geospatial Consortium (OGC) and its specifications; what is Web GIS Service, OGC specifications for GIS web services (WMS, WFS, WCS, WPS, SLD etc.) Google Earth and Bhuvan; Open Source GIS.

Unit IV: Web-GIS Applications **10 Lectures**

Application of Web-GIS in e-Government; Application of Web GIS in e-Business; 3D Web-GIS; Internet mapping; Mobile GIS; Online GIS Analytics.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. Cartwright, W., Peterson, M. P., and Gartner G. (Eds) (2007), Multimedia Cartography, Springer, Berlin.
2. Kraak, M., and Ormeling, F., (2003). Cartography: Visualization of Geospatial Data, Pearson Education, New Delhi.
3. Kropla B., (2005). Beginning MapServer Open-Source GIS Development, Apress, New York.
4. Pinde Fu and Jiulin Sun, (2010). Web GIS: Principles and applications, ESRI Inc.,U.S.
5. Pinde Fu (2020). Getting to Know Web GIS, ESRI Inc.,U.S.
6. Tyler Mitchell (2015). Web Mapping Illustrated: Using Open Source GIS Toolkits, O′Reilly; 1ed.

Web References:

1. http://mapserver.gis.umn.edu
2. http://postgis.org/home
3. https://earthengine.google.com/

M. Sc. Geoinformatics (Part I) (Level-8) (Semester II)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Photogrammetry and Digital Image Processing Lab
Course Code: MMPR-203 (MSU0325MMP920H1)
Total Credits: 02
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Can easily handle the advance photogrammetry and DIP software.
2. To apply photogrammetry & Digital Image Processing technique to generate geospatial data.
3. Can perform various corrections like geometric, contrast, atmospheric etc. and apply filters to improve the image classification.
4. Can apply the knowledge of Photogrammetry and DIP in various thematic studies and problem solving.

Practical in Photogrammetry:

1. Introduction to Photogrammetry suite
2. Aerial Triangulation and Control Point Extraction
3. Close Range Photogrammetry
4. Digital Surface Model (DSM) and Digital Terrain Model (DTM) Generation
5. Orthophoto Generation

Practical in DIP:

1. Introduction to DIP software
2. Loading of image data, study of histogram and layer stacking
3. Image Rectification and Registration: Image to map, Image to image
4. Extracting area of Interest and Mosaicking
5. Image Enhancement Techniques: Contrast enhancement-linear and nonlinear
6. Spatial filtering- low and high frequency, edge enhancement
7. Resolution merges.
8. Supervised Classification
9. Unsupervised classification
10. Accuracy assessment

References:

1. Lillesand, T.M., Kiefer, R.W., and Chipman, J.W. 2004. Remote Sensing and Image Interpretation (5th Ed.). Wiley. (Wiley Student Edition).
2. Miller, V.C. 1961. Photogeology. New York: McGraw-Hill, Book Company, Inc.
3. Moffit, H.F., and Edward, M.M., 1980. Photogrammetry, Harperand Row Publishers, New York.
4. Panda, B.C. 2005. Remote Sensing – Principles and Applications. New Delhi: Viva Books Private Limited.8
5. Rampal, K.K. 1999. Handbook of Aerial Photography and Interpretation. New Delhi: Concept Publishing Company.
6. Rashid, S.M. (Ed.) 1993. Remote Sensing in Geography. Delhi: Manak Publications, Pvt. Ltd.
7. Reddy, M.A. 2006. Textbook of Remote Sensing and geographical Information Systems. Hyderabad: B.S. Publications.
8. Sabins F.F Jr.1987, Remote Sensing: Principles and Interpretation, W.H.Freeman & Co., New York.

Web References:

1. www.hexagongeospatial.com
2. www.nrsc.gov.in
3. https://bhuvan.nrsc.gov.in/
4. https://www.e-education.psu.edu/geog862/node/1407

M. Sc. Geoinformatics (Part I) (Level-8) (Semester II)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: DBMS, Web-GIS and Mini Project
Course Code: MMPR-204 (MSU0325MMP920H2)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Learn fundamentals of Web GIS and Familiar with Geo server.
2. Publish and share dynamics map using Geo-server.
3. Learn basic ethics of research.
4. Handle and analyze real world geospatial problems through mini project.

DBMS:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables
3. Write a SQL statement for implementing ALTER, UPDATE and DELETE
4. Write the queries to implement the joins
5. Write the query for implementing the following functions: MAX (), MIN (), AVG (), COUNT (), SORT ()
6. Write the query to implement the concept of Integrity constrains
7. Write the query to create the views
8. Perform the various operations for demonstrating the insertion, updation and deletion using the referential integrity constraints

Web-GIS with ArcGIS Online:

1. Introduction to ArcGIS Online
2. Creating Web Maps
3. WebGIS Applications with AppBuilder
4. Spatial Analysis in ArcGIS Online
5. Sharing and Collaboration
6. WebGIS and 3D Visualization

Mini Project:

Prepare a mini project based on GIS techniques

Web References:

1. https://geoserver.org/
2. https://en.wikipedia.org/wiki/GeoServer
3. https://www.osgeo.org/projects/geoserver/
4. https://www.geosolutionsgroup.com/technologies/geoserver/
5. https://github.com/geoserver/.

M. Sc. Geoinformatics (Part I) (Level-8) (Semester II)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Geodesy and Digital Cartography
Course Code: MET-205 (MSU0325MEL920H1)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Understand about geodesy, scale, projection systems and its principles and application.
2. Acquaint with data sources and methods of data collection
3. Get familiarize about generalization and symbolization of various levels of data.
4. Acquire knowledge on the usage of conventional sings, symbols, colors and patterns.
5. Get to know about the modern techniques of map production.

Unit I: Concept of Geodesy **10 Lectures**
Definition and fundamentals of geodesy; Spherical, ellipsoid and geoid shape of the earth; Grid and Graticule, Datums: Horizontal vs. Vertical.

Unit II: Map Projections **10 Lectures**
General principles of map projections, Classification, Choice of projections; Cartesian vs. Geodetic coordinate systems; WGS 84 and UTM projection system.

Unit III: Fundamentals of Cartography **20 Lectures**
History and Development of Cartography; Sources of cartographic data; Indexing of SOI toposheet; Scale: types and importance; Definition and classification of map; Elements of map; Map Design and its principles, Cartographic methods and techniques for preparation of maps and diagrams.

Unit IV: Digital Cartography **20 Lectures**
Concept of Digital Cartography, Digital Cartography: its comparisons with conventional cartography and GIS; Spatial and attribute database, Concept of base map, Symbolization, Generalization and Visualization; Colour system, Modern techniques of map production: animation, simulation, web maps and AI. VR in cartography.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. Dorling, D. and Fairborn, D. (1997): Mapping. Ways of Representing the World. Longman, Harlow.
2. Griffith, D. A. and Amehein (1997): Statistical Analysis for Geographers. Prentice Hall, Englewood Cliffs, New Jersey.
3. Strahler, A.N. (1971): The Earth Sciences. Harper and Row Publishers; New York.
4. Kraak M.J. (2010) Cartography: Visualization of Geospatial Data (3rd ed.), Pearson Edu. Ltd.
5. Tom Herring, "Geodesy Elsevier,2009,
6. Schwarze, V.S. Geodesy: The challenge of the 3rd millennium, Springer verlag, 2002.
7. James R.Smith, "Introduction to Geodesy", John wiley & Sons Inc. 1997
9. Dent, B.D.(1999): Cartography- Thematic Map Design, 5th Edition, WCB Mc Grew Hill, Boston.

Web References:

1. www.natmo.gov.in
2. www.surveyofindia.gov.in
3. www.gsi.gov.in
4. www.nbsslup.icar.gov.in
5. https://oceanservice.noaa.gov/podcast/jan18/nop12-geodesy.html

M. Sc. Geoinformatics (Part I) (Level-8) (Semester II)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Coastal Zone Studies
Course Code: MET-206 (MSU0325MEL920H2)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. To gain knowledge on Coastal zone, Coastal zone regulations, Beach profile, Surf zone and off shore.
2. To gain knowledge on Coastal waters, Estuaries, Wet lands and Lagoons, Living resources and Non-living resources.
3. To gain knowledge on Wave classification, Wave pressure, Wave energy and Wave Decay.
4. To Students can gain knowledge on Oceanographic Applications.

Unit I: Coastal Zone **15 Lectures**
Coastal zone; Coastal zone regulations; Beach profile, Surf zone, Off shore, Coastal waters , Estuaries, Wet lands and Lagoons; Living resources, Non-living resources.

Unit II: Wave Dynamics **15 Lectures**
Wave classification; Airy's Linear Wave theory; Deep water waves, Shallow water waves, Wave pressure, Wave energy, Wave Decay; Reflection, Refraction and Diffraction of waves, Breaking of waves, Wave force on structures, Vertical, Sloping and stepped barriers, Force on piles.

Unit III: Coastal Processes **10 Lectures**
Erosion and depositional shore features; Methods of protection; Littoral currents, Coastal aquifers; Sea water intrusion; Impact of sewage disposal in seas.

Unit IV: Oceanographic Applications **20 Lectures**
Use of Microwave data; CZCS studies; chlorophyll production index; various sensors used for coastal application; physical oceanographic parameter estimation; sea surface temperature; significant wave height; wind speed and direction; Oceanic Circulation, Tidal Variation, Sea Level Rise, Coastal Bathymetry.

Seminars, Tutorials, Problem solving session and group discussions on above four units**.**

References:

1. Richard Sylvester, "Coastal Engineering, Volume I and II", Elsevier Scientific Publishing Co., 1999. Quinn, A.D., "Design & Construction of Ports and Marine Structures", McGraw-Hill Book Co., 1999.
2. Ed. A.T. Ippen, "Coastline Hydrodynamics", McGraw-Hill Inc., New York, 1993.
3. Dwivedi, S.N., Natarajan, R and Ramachandran, S., "Coastal Zone Management in Tamil Nadu".

M. Sc. Geoinformatics (Part I) (Level-8) (Semester II)
(NEP-2020)
(Introduced from Academic Year 2023-24)

Title of Course: Field Project / On Job Training
Course Code: OJT-207 (MSU0325OJP920H)
Total Credits: 04
Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Improve their professional skills related to their employability.
2. Carry out field project on their own.
3. Effectively manage the assigned workload and complete given tusk.
4. Learn new concept and improve their knowledgebase.
5. Do team work and manage on job practical difficulties.

Duration:
One month during vacation

Joining Report of On Job Training:
Students are expected to join for their on job training with prior intimation to the department. They are expected to carry out work under the guidance of job supervisor.

On Job Training Placement:
Students can join any institution/ corporation/ industry as per their choice but within the scope of the subject area.

Total Contact Hours: 120 Hrs.

Note (s):

1. Students need to submit report of their work in prescribed format.
2. Internal assessment while on job training will be done by the job supervisor and need to be forwarded to the Department/ University.

9. Scheme of Teaching

Course Type	Course Code	Teaching Scheme		
		Theory and Practical		
		Lectures (Hours/ week)	Practical (Hours/ week)	Credit
SEMESTER-I				
Major Mandatory	MMT-101	4	--	4
	MMT-102	4	--	4
	MMPR-103	--	8	4
	MMPR-104	--	4	2
Major Elective	MET-105/106	4	--	4
Research Methodology	RM-107	4	--	4
Total (A)		**16**	**12**	**22**
SEMESTER-II				
Major Mandatory	MMT-201	4	--	4
	MMT-202	4	--	4
	MMPR-203	--	4	2
	MMPR-204	--	8	4
Elective Theory	MET-205/206	4	--	4
OJT	OJT-207	--	8**	4
Total (B)		**12**	**20**	**22**

10. Examination Pattern

Course Type	Course Code	Examination Scheme					
		University Assessment (UA)			Internal Assessment (IA)		
		Maximum Marks	Minimum Marks	Exam. Hours:Mi	Maximum Marks	Minimum Marks	Exam. Hours
SEMESTER-I							
Major Mandatory	MMT-101	80	32	3	20	8	1
	MMT-102	80	32	3	20	8	1
	MMPR-103	100	40	5	--	--	--
	MMPR-104	50	20	2:30	--	--	--
Major Elective	MET-105/106	80	32	3	20	8	1
Research Methodology	RM-107	80	32	3	20	8	1
Total (A)		**470**	--	--	**80**	--	--
SEMESTER-II							
Major Mandatory	MMT-201	80	32	3	20	8	1
	MMT-202	80	32	3	20	8	1
	MMPR-203	50	20	2:30	--	--	--
	MMPR-204	100	40	5	--	--	--
Elective Theory	MET-205/206	80	32	3	20	8	1
OJT	OJT-207	60	24	3	40	16	*
Total (B)		**450**	--	--	**100**	--	--

Theory:

For theory courses, such as MMT-101, MMT-102, etc., the examination pattern is as follows:
Maximum Marks: 80
Minimum Marks: 32
Examination Duration: 3 hours
Internal Assessment (IA):
Maximum Marks: 20
Minimum Marks: 8
Examination Duration: 1 hour

Practical:

Practical courses typically involve hands-on exercises and may not have only traditional written examination. However, if they do, the pattern would be specified for each practical course individually. For example, MMPR-104, MMPR-105, and others may have their own examination patterns.

On Job Training (OJT):

OJT-207, which stands for On-the-Job Training, has the following examination pattern:
University Assessment (UA):
Maximum Marks: 60
Minimum Marks: 24

Examination Duration: 3 hours
Internal Assessment (IA):
Maximum Marks: 40
Minimum Marks: 16

Research Methodology:

The research methodology course, RM-206, has the following examination pattern:
University Assessment (UA):
Maximum Marks: 80
Minimum Marks: 32
Examination Duration: 3 hours
Internal Assessment (IA):
Maximum Marks: 20
Minimum Marks: 8
Examination Duration: 1 hour

11. Nature of Question Paper and Scheme of Marking

There will be four questions in the question paper each carrying 20 marks. All questions shall be compulsory,

---

SHIVAJI UNIVERSITY, KOLHAPUR
P.G. Diploma in Geoinformatics (One Year)
SEMESTER-I/II/III/IV EXAMINATION, YYYY
Theory

PAPER No.----- Paper Title----------

Day and Date :------ **Total Marks: 80** **Duration : 03 Hours**

Instructions: 1) All questions are compulsory.

2) All questions carry equal marks.

Q. No. 1: Multiple Choice Questions (2 Marks Each) Marks **16**

Q. No. 2: Short Answer (Any Four out of Five) Marks **16**

Q. No. 3: Short Notes (Any Two out of Three) Marks **16**

Q. No. 4: Descriptive Answer (Any Two out of Four) Marks **32**

==========

SHIVAJI UNIVERSITY, KOLHAPUR
P. G. Diploma in Geoinformatics (One Year)
SEMESTER-I/II EXAMINATION, YYYY
Practical

PAPER No.----- Paper Title----------

Day and Date :------ **Total Marks: 80** **Duration: 03 Hours**

Instructions: 1) All questions are compulsory.

2) All questions carry equal marks.

Q. No. 1: Marks **20**

Q. No. 2: Marks **20**

Q. No. 3: Marks **20**

Q. No. 4: Marks **20**

==========

12. Equivalence of courses

P.G. Diploma in Geoinformatics (Semester I and II)

Old Course			Equivalent Course		
Course Code	**Title of Old Course**	**Credit**	**Course Code**	**Title of New Course**	**Credit**
72979	Surveying, Cartography and GPS	04	MSU0325MEL920G1	Fundamentals and Principles of Modern Surveying	04
72980	Fundamentals of Remote Sensing and Digital Image Processing	04	MSU0325MML920G1	Fundamentals and Applications of Remote Sensing	04
72981	Fundamentals of Geographical Information System (GIS)	04	MSU0325MML920G2	Geographical Information System GIS)	04
72982	Surveying, Cartography and GPS	04	MSU0325MMP920G2	Modern Surveying Lab	02
72983	Practical Photogrammetry, Remote Sensing and Digital Image Processing	04	MSU0325MMP920H1	Photogrammetry and Digital Image Processing Lab	02
72984	Geographical Information System (GIS)	04	MSU0325MMP920G1	Geographical Information System Lab	04