*M.Sc. Geo-informatics Syllabus - 2018*

**UTKAL UNIVERSITY**

**P.G DEPARTMENT OF GEOGRAPHY**

**Credit System (M.Sc. Geo-informatics): Details of the Courses and Credits – 2018**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **COURSE** |  | **COURSE TITLE** |  | **CREDITS** | **Credits to be** |
| **CODE** |  |  |  | **per** | **Completed** |
|  |  |  |  | **Course** | **Course-** |  | **semester-** |
|  |  |  |  |  | **wise** |  | **Wise** |
| **Core** |  | **SEMESTER I** |  |  |  |  |  |
|  |  |  |  |  |  |  |
| GI 101 |  | Principles of Remote Sensing& Aerial Photography | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 102 |  | Introduction to Geographical Information System | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 103 |  | Principles of Cartography and Map Interpretation | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| G1 104 |  | Introduction to Computer Programming C & C++ (P) | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 105 |  | GIS & GPS (P) | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
|  |  | **Total credits in semester I** | **20** | **20** | **20** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Core** |  | **SEMESTER II** |  |  |  |  |  |
| GI 201 |  | Digital Image Processing | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 202 |  | Database Management System (DBMS) | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 203 |  | Web technology, GIS Mapping & Programming | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 204 |  | Image Processing& Remote Sensing (P) | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 205 |  | Fundamental of Statistics & Statistical Methods (P) | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
|  |  | **Total credits in semester II** | **20** | **20** | **20** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Core** |  | **SEMESTER III** |  |  |  |  |  |
| GI 301 |  | Research Methodology & Research Proposal development | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 302 |  | Climate Change, Disaster Management and Environmental Sustainability | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 303 |  | Digital Elevation Models & its Applications | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 304 |  | Spatial analysis and Geo-spatial data processing using GIS Software’s (P) | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
| GI 305 |  | Term Paper & Seminar Presentation | 4 | **4** |  |  |
|  |  |  |  |  |  |  |
|  |  | **Total credits in semester III** | **20** | **20** | **20** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  | **SEMESTER IV** |  |  |  |  |  |
| **Elective** |  | Application of Geoinformatics in Sustainable development(Any two of the following fields/areas) |  |  |  |
| GI 401 |  | Urban & Regional Planning | 4 | **4** |  |
| GI 402 |  | Water Resource Management | 4 | **4** |  |
| GI 403 |  | Land use planning & development | 4 | **4** |  |
| GI 404 |  | Disaster Management | 4 | **4** |  |
| **Core** |  | **Core** |  |  |  |
| GI 405 |  | Application of Geo-informatics (RS,GIS & GPS) (P) | 4 | **4** |  |
| GI 406 |  | Project Work | 8 | **8** |  |
|  |  |  |  |  |  |
|  |  | **Total credits in semester IV** | 20 | **20** | **20** |
|  |  |  |  |  |  |
|  |  | **TOTAL CREDITS** |  | **80** |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | **80** |
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|  |  |  |  | *M.Sc. Geoinformatics Syllabus - 2018* |  |
|  |  |  |  |  |  |  |
|  | **Semester I** |  |  |  |  |
|  |  |  |  |  |  |  |
|  | Code No: GI: 101 | Title: Principles of Remote Sensing |  |  |
|  |  |  |  |  |  |  |
|  | No. of Credits: 4 |  | No. of Periods: 60 |  |
|  |  |  |  |  |  |  |
|  | **Sr.** | **Topics** |  | **Sub-topics** | **Lectures** |  |
|  | **No.** |  |  |  |  |  |
|  |  |  |  |  |  |
|  | 1 | Introduction to | Concepts Definition, History Development, | 15 |  |
|  |  | Remote Sensing | Stages in RS-EMR, EMR Spectrum, Theories |  |  |
|  |  |  |  | of EMR, Types of RS and Laws of Radiation |  |  |
|  | 2 | Interaction of EMR | Interaction with Earth’s atmosphere | 12 |  |
|  |  |  |  |  |  |
|  | 3 | Spectral Signature | Interaction with soil, water and vegetation | 8 |  |
|  |  |  |  |  |  |
|  | 4 | Platforms, | Types of platform, types of sensors, | 10 |  |
|  |  | Sensors, | Orbits | cameras and satellite orbits |  |  |
|  |  |  |  |  |  |
|  | 5 | Aerial photography & Remote Sensing Data Products | Principles of aerial photography and | 15 |  |
|  |  |  |  | Satellite Data Generation, formats and Satellite & Aerial Photograph data products |  |  |
|  |  |  |  |  |  |

**Books:**

1. Joseph, G. (2004): Fundamentals of Remote Sensing, Universities Press, Hyderabad, India
2. Lillesand, T. M., Kiefer, R. W. and Chipman, J. W. (2008): Remote Sensing and Image Interpretation, John Wiley & Sons, New Delhi
3. Sabins, F. F. (1996): Remote Sensing: Principles and Interpretation, W. H. Freeman and Company, San Francisco
4. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey
5. Drury, S. A. (2001): Image Interpretation in Geology, Blackwell, Oxford
6. Campbell, J. (2002): Introduction to Remote Sensing, Taylor & Francis, London
7. Anji Reddy, M. (2008): Textbook of Remote Sensing and Geographic Information System, B.S. Publication, Hyderabad

2

*M.Sc. Geoinformatics Syllabus - 2018*

|  |  |
| --- | --- |
| Code No: GI: 102 | Title: Introduction to Geographical Information System |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
|  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |
|  |  |  |  |
| 1 | Introduction to | Definitions, evolution, components and | 6 |
|  | GIS | Objectives |  |
|  |  |  |  |
| 2 | Hardware & | Hardware: Basic blocks of computer, processor, | 7 |
|  | Software | memory, Secondary storage devices, |  |
|  | requirements | input/output devices, Binary numbers. |  |
|  |  | Software: Operating System, application, |  |
|  |  | Compliers, editors. Overview of GIS software |  |
|  |  | Packages. |  |
| 3 | Spatial data | Types of Geographic data, levels of | 12 |
|  |  | measurements. Concepts of space and time, |  |
|  |  | layers coverage. Spatial data models, |  |
|  |  | Representation of Geographic features in vector, |  |
|  |  | raster data models. Concept of arc, node, |  |
|  |  | vertices and topology. Object oriented models: |  |
|  |  | advantages and disadvantages.  |  |
|  |  | . |  |
| 4 | Non-Spatial | Database and Data base Management System. | 12 |
|  | data | Conceptual implementation models, |  |
|  |  | Hierarchical, Network, Relational models. |  |
|  |  | RDBMS: components, concept, database |  |
|  |  | Spatial data input - Digitization, error identification. Errors: Types, | 8 |
|  |  | sources, correction. Editing and topology |  |
|  |  | Building |  |
| 6 | Concepts of GPS | History, types, navigation systems and | 15 |
|  |  | Applications |  |
|  |  |  |  |

Books:

1. Longley, P. A., Goodchild, M. F., Maguire, D. J., Rhind, D. W. (2002): Geographical Information Systems and Science, John Wiley & Sons, Chichester
2. Lo, C. P., Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hall of India, New Delhi
3. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York
4. Korte, G. B. (2001): The GIS Book, Onward Press, Bangalore
5. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi
6. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York
7. Heywood, I., Cornelisus, S., Carver, S. (2011): An Introduction to Geographical Information Systems, Pearson Education, New Delhi
8. Ahmed, E. L. Rabbany (2002): Introduction to Global Positioning Systems, Artech House, Boston

3

*M.Sc. Geoinformatics Syllabus - 2018*

|  |  |  |
| --- | --- | --- |
| Code No: GI: 103 | Title: Principles of Cartography and Map Interpretation |  |
|  |  |  |  |  |
| No. of Credits: 4 |  | No. of Periods: 60 |
|  |  |  |  |  |
| **Sr.** | **Topics** |  | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |  |
|  |  |  |  |  |
| 1 | Map scale |  | Types conversions, vertical exaggeration, | 5 |
|  |  |  | enlargement and reduction |  |
|  |  |  |  |  |
| 2 | Map projections |  | Concept, Classification, types and uses | 11 |
|  |  |  |  |  |
| 3 | Representation of |  | Choropleth, Isopleths and Dot method. | 15 |
|  | statistical data |  | Unimodal, two dimensional and three- |  |
|  |  |  | dimensional diagrams |  |
| 4 | Introduction to |  | Numbering, scales, grid reference, signs and | 5 |
|  | Survey of India |  | symbols, colour system |  |
|  | topographical |  |  |  |
|  | Maps. |  |  |  |
| 5 | Relief |  | Profiles, Identification and representation of | 12 |
|  | representation |  | landforms from toposheets of fluvial, |  |
|  | Techniques. |  | coastal, Aeolian and glacial landscapes |  |
| 6 | Interpretation of |  | Study and interpretation: SOI toposheet, | 12 |
|  | maps. |  | cadastral and thematic maps |  |
|  |  |  |  |  |

Books:

1. Singh, R. L. (1979): Elements of Practical Geography, Kalyani Publishers, New Delhi
2. Tamaskar, B. G., Deshmukh, V. M. (1974): Geographical Interpretation of Indian Topographical Maps, Orient Longman Ltd., Bombay
3. Croxton, F. E., Cowden, D. J., Klein, S. (1975): Applied General Statistics, Prentice-Hall of India, New Delhi
4. Frank, H. Althoen, S. C. (1994): Statistics Concepts and Applications, Cambridge University Press
5. Robinson, A. H., Morrison, J. L., Muehrcke, P. C., Kimerling, A. J. Guptill, S. C. (1995): Elements of Cartography, Wiley, New York
6. Yeates, M. (1974): An Introduction to Quantitative Analysis in Human Geography, McGraw-Hill, New York
7. Ramamurthy, K. (1982): Map Interpretation, Rex Printers, Madras
8. Vaidyanadhan, R. (1968): Index to a set of sixty Topographic Maps: Illustrating Specified Physiographic Features from India, Council of Scientific and Industrial Research, Ministry of Education, Government of India
9. Gupta, K. K. Tyagi, (1992): Working with maps, Survey of India Publication, DST, New Delhi
10. Understanding Map Projection (2003-2004): GIS by ESRI, Redlands

4

*M.Sc. Geoinformatics Syllabus - 2018*

|  |  |  |
| --- | --- | --- |
| Code No: GI: 104 | Title: Introduction to Computer Programming  C and C++ |  |
|  |  |  |  |  |
| No. of Credits: 4 |  | No. of Periods: 60 |
|  |  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** |  | **Lectures** |
| **No.** |  |  |  |  |
|  |  |  |  |
| 1 | Computer | Characteristics and limitations, Computer | 10 |
|  | Fundamentals | Architecture: Computer block diagram, Flow |  |
|  |  | chart, Operating System, data storages. |  |
|  |  | Networking: LAN, MAN, WAN, various topologies |  |
|  |  | like Ring, Bus, Star, Networking devices like hub, |  |
|  |  | repeaters, switch, bridge, router. |  |
|  |  | Web Concepts: OSI Model, URL, Ports, Firewall, |  |
|  |  | DNS, IP address, proxy, Session, cookies. |  |
|  |  | Client and server architecture: Various protocols |  |
|  |  | like Http, https, FTP, SMTP, POP3. |  |
|  |  | Distributed computing: Introduction to |  |
|  |  | Distributed networking and | Cloud computing |  |
| 2 | C Language | Introduction to C: History of Programming | 25 |
|  |  | language, importance of computer languages, |  |
|  |  | Understanding Compiler. |  |  |
|  |  | Input /Output functions: Console input output, |  |
|  |  | Formatted input output. |  |  |
|  |  | Data types and operators: types and uses of |  |
|  |  | various operators. |  |  |
|  |  | Control structures: Various looping mechanism, |  |
|  |  | types of loops. |  |  |
|  |  | Introduction to Array: | Understanding Array, |  |
|  |  | Working with Single multidimensional array. |  |
|  |  | Limitations of array, Structure Unions. |  |
|  |  | Introduction to functions: Need of function, |  |
|  |  | defining, calling function, different types of |  |
|  |  | functions. Understanding of pointer. |  |
|  |  | File handling: Reading and writing the data to |  |
|  |  | File |  |  |
| 3 | C++Language | Introduction to OOP: Importance of OOP | 25 |
|  |  | Understanding Classes, objects, Methods and |  |
|  |  | Properties. Characteristic of OOP: Abstraction, |  |
|  |  | Inheritance, Polymorphism, Encapsulation. |  |
|  |  | OOP and POP: Difference between OOP and POP |  |
|  |  | Constructors and destructors: Creating classes |  |
|  |  | and objects. Memory allocation of Objects. |  |
|  |  | Heap and stack memory. Managing input /Output |  |
|  |  | File handling: C++ stream classes, formatted I/O |  |
|  |  | Manipulators. Access modifiers: modifying access |  |
|  |  | of Classes, methods using public, private |  |
|  |  | keywords. Functions and Operators: Function |  |
|  |  | overloading and Overriding, Operator |  |
|  |  | precedence, Operator overloading, Friend and |  |
|  |  | virtual function. |  |  |
| Books: |  |  |  |  |

1. Kernighan, R. (1998): C Programming Language, (ANSI C Version), Prentice Hall, New Jersey
2. Balagurusamy, E. (2006): Object Oriented Programming with C++, Tata McGraw Hill, New Delhi
3. Balagurusamy, E. (2002): Programming in ANSI C, Tata McGraw Hill, New Delhi
4. Kanetkar, Y. (2000): Let US C++, BPB publications, New Delhi

 5. Kanetkar, Y. (2001): Let Us C, BPB Publications, New Delhi

 6. P K SINHA, Computer Fundamentals, , BPB Publications, New Delhi

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| --- | --- | --- | --- |
| Code No: GI: 105 | Title: GIS & GPS (P) |  |  |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
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| **Sr.** | **Topics** | **Sub-topics** |  | **Lectures** |
| **No.** |  |  |  |  |
|  |  |  |  |  |
| 1 | Computer Basics | Basics of Computer & File Management |  |  4 |
|  |  | Text editing, data management& overview of GIS Software’s |  |
|  |  | Basics of Computer & File Management |  |  |
| 2 | Spatial data input | Geo-referencing, Digitisation, Spatial and Non-spatial data management |   | 5 |
|  |  | Spatial data Manipulation & editing (Transformation, Topology building, editing Projection) |  |  |
|  |  |  |  |  |
| 3 |  | Integration of RS & GIS, Creation of Thematic maps, Choropleth & Dot Methods, Charts |  | 4 |
|  |  Spatial analysis | Spatial analysis (Buffering, Overlaying, Dissolve |  |  |
|  |  | Integration of RS & GIS, Creation of Thematic maps, Choropleth & Dot Methods, Charts |  |  |
|  |  | Spatial analysis (Buffering, Overlaying, Dissolve |  |  |
| 4 | GPS & Field Survey | Introduction to GPS &Identification of features in the field using aerial photographs and/or satellite images |  | 2 |
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|  |  |  |  |  |

Books:

1. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi
2. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York
3. Makrewski, J. (1999): GIS Multi-criteria Analysis, John Wiley and Sons, New York
4. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York
5. Longley, P. A., Goodchild, M. F., Maguire, D. J. Rhind, D. W. (2002): Geographical Information Systems and Science, John Wiley & Sons, Chichester

6. Lo, C. P. Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hall of India, New Delhi.

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| **Semester II** |  |  |  |  |

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| Code No: GI: 201 | Title: Digital Image Processing |  |  |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
|  |  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** |  | **Lectures** |
| **No.** |  |  |  |  |
|  |  |  |  |  |
| 1 | Introduction to | Digital images: Types |  | 12 |
|  | Digital imageProcessing | Sources of errors: Atmospheric, radiometric |  |
|  |  | Image rectification: Geometric correction, radiometric correction, noise removal |  |  |
| 2 | Image | Contrast enhancement: Linear, non-linear, logarithmic and exponential, Gaussian Stretch, density slicing. Spatial filtering: low frequency, highfrequency, edge enhancement, bandrationing and band combination |  | 12 |
|  | enhancement |  |  |  |
|  | techniques |  |  |  |
| 3 | Digital imageclassification | Classification scheme: |  | 12 |
|  |  | Supervised classification: Training sites selection and statistical information Extraction, Discriminate functions. Classifier: Maximum Likelihood, Euclidian distance, Mahalanobis distance, Parallelopiped. |  |  |
|  |  | Unsupervised classification.Classification accuracy assessment and error Matrix |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  4 | Histogram Equalization | Image Subtraction, Image Averaging, Spatial Filtering,Smoothing,SharpeningFilters, Frequency Domain Filters,Homomorphic Filtering, Principal Components |  12 |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Books:

1. Richards, J. A, Jia, X. (1999): Remote Sensing and Digital Image Processing, Springer, Verlag Berlin
2. Cha, B., Dattaa, D., Majumdar (2001): Digital Image Processing Analysis, Prentice-Hall of India, New Delhi
3. Nag, P. Kudrat, M. (1998): Digital Remote Sensing, Concept Publishing Company, New Delhi
4. Jensen, J. R. (2005): Introductory Digital Image Processing, Prentice Hall, New Jersey
5. Lillesand, T. M., Kiefer, R. W. Chipman, J. W.(2008): Remote Sensing and Image Interpretation, John Wiley & Sons, New Delhi
6. Sabins, F. F. (1996): Remote Sensing: Principles an Interpretation, W. H. Freeman Company, New York

 *M.Sc. Geo-informatics Syllabus - 2018*

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| Code No: GI: 202 | Title: Database Management System |  |
|  |  |  |  |  |
| No. of Credits: 5 |  | No. of Periods: 75 |
|  |  |  |  |  |
| **Sr.** | **Topics** |  | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |  |
|  |  |  |  |
| 1 | DBMS | Introduction: DBMS, RDBMS, SQL and | 8 |
|  |  |  | Oracle architecture |  |
|  |  |  | Data base security concept and advantages |  |
|  |  |  | of RDBMS and ER modelling |  |
| 2 | Controlling user | Control database access, | 10 |
|  | access |  | Privileges, creating user, concept of Role, |  |
|  |  |  | creating, granting privileges to role, |  |
|  |  |  | Revoking privileges. Changing password |  |
| 3 | Managing schema | Data types, DDL, DML, DCL | 10 |
|  | object |  | Constraints: types of constraints, Primary |  |
|  |  |  | key, foreign key, check constraint, Not Null, |  |
|  |  |  | Altering constraint, concept of backup |  |
|  |  |  | Recovery. |  |
|  |  |  | Overview of Index, view |  |
| 4 | Manipulating | Basic select statement, selecting specific | 10 |
|  | dataset | using | column, using arithmetic expressions, |  |
|  | SQL statement | defining column alias, Using where clause |  |
| 5 | Restricting & | Using comparison condition (=,<=,>=etc), | 10 |
|  | Sorting data | using logical operator: AND, OR, NOT, |  |
|  |  |  | using BETWEEN, LIKE conditions |  |
|  |  |  | Rule of Precedence. Using order by clause |  |
| 6 | SQL Function | Concept of function, types, group functions, | 9 |
|  | displaying data | Use of group by, having clause. Types of |  |
|  | from multiple | joins, concept of sub-query, types of sub |  |
|  | tables, Sub-query | Queries |  |
| 7 | PL/SQL |  | Introduction to PL/SQL, variables and types | 18 |
|  |  |  | Declaration in PL/SQL. |  |
|  |  |  | Simple program in PL/SQL: Assignment |  |
|  |  |  | operator, output statement, accepting input |  |
|  |  |  | From user. |  |
|  |  |  | Simple program in PL/SQL using table: |  |
|  |  |  | syntax of using ‘select’ statement in PL/SQL, |  |
|  |  |  | ‘If’ statement and Loops in PL/SQL. Creating |  |
|  |  |  | procedure, function, cursor, trigger |  |
|  |  |  | Packages |  |
|  |  |  |  |  |

Books:

1. Deshpande, P. S. (2008): SQL & PL/SQL for Oracle 10g, Blackbook, Dreamtech Press, New Delhi
2. Freeman, R. G. (2000): Oracle DBA 7.3 to 8 Upgrade, Dreamtech Press, New Delhi
3. http://docs.oracle.com/cd/B19306\_01/server.102/b14220.pdf
4. http://www.smart-soft.co.uk/tutorial.html
5. http://ask2seenu.blogspot.in/2011/09/best-oracle-plsql-ebooks-download-for.html

 *M.Sc. Geo-informatics Syllabus - 2018*

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| --- | --- | --- |
| Code No: GI: 203 | Title: Web Technology, GIS Mapping & Programming  |  |
|  |  |  |  |  |
| No. of Credits: 4 |  | No. of Periods: 60 |
|  |  |  |  |  |
| **Sr.** | **Topics** |  | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |  |
|  |  |  |  |  |
| 1 | .NET Language |  | Introduction: .Net architecture. CLR, CLS, | 35 |
|  |  |  | CTS, JIT compiler |  |
|  |  |  | C # .net: Introduction to C# .net. Syntax used in defining classes, methods, variables Interface abstract class: Understanding abstract classes, access modifiers andabstract classes, access modifiers and Interface. Creating and using Custom interfaces, Sample programs |  |
|  |  |  | Implementing OOP: Introduction to classes |  |
|  |  |  | used in .net, Implementing OOPs |  |
|  |  |  | characteristics, Working with windows forms |  |
|  |  |  | application, console application, building |  |
|  |  |  | Logic in the sample application. |  |
|  |  |  | Event handling: handling various events in |  |
|  |  |  | Windows forms application |  |
|  |  |  | Exception handling: Usage of Try, catch and |  |
|  |  |  | Finally block. |  |
|  |  |  | .Net interoperability: Working with managed |  |
|  |  |  | and unmanaged code |  |
|  |  |  | Windows forms application |  |
|  |  |  | Exception handling: Usage of Try, catch and |  |
|  |  |  | Finally block. |  |
|  |  |  | .Net interoperability: Working with managed |  |
|  |  |  | and unmanaged code |  |
| 2 | Arc Object |  | SDK development environment, | 25 |
|  |  |  | basic customizations, deploying and sharing customizations, Maps and layers, workspaces, |  |
|  |  |  | Geometry operators, graphic elements, |  |
|  |  |  | Cursors, Geo-processing and Engine SDK |  |
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|  | **The Programming Language HTML,JAVA SCRIPT & PYTHON** |  |
|  |  |  |  |  |
| **3** | HTML |  | Introduction: HTML, various HTML tags like | 15 |
|  |  |  | imaGI, Text, Color, Frames and Tables |  |
|  |  |  | Working with tables: Creating Tables, |  |
|  |  |  | Introduction to frames |  |
|  |  |  | CSS: Cascading Styling sheets, Introduction |  |
|  |  |  | to DHTML |  |
| 4 | Java script |  | Introduction to java script, importance of | 30 |
|  |  |  | Java script, creating sample program. |  |
|  |  |  | Data type operators: Various Data type and |  |
|  |  |  | its importance. Understanding and using |  |
|  |  |  | various types of operators. |  |
|  |  |  | Iterative mechanisms: Various looping |  |
|  |  |  | mechanism, Understanding loops. |  |
|  |  |  | If else and Switch case |  |
|  |  |  | Binding: Creating dynamic web paGIs |  |
|  |  |  | Understanding DOM API, Dojo Framework |  |
|  |  |  | and Digits. |  |
|  |  |  | Debugging in web application: working with |  |
|  |  |  | developer tools in browser. |  |
|  |  |  |  |  |
|  |  |  | Layout engines used in various browsers |  |
| 5 | Python |  | Introduction to python, python vs. .NET vs. | 30 |
|  |  |  | JAVA. Data type operators: Data types, Basic sample programming control flow, arrays, list and strings. |  |
|  |  |  | Classes modules: Creating modules and |  |
|  |  |  | Working with windows forms. |  |
|  |  |  | Event handling: Handling various events in |  |
|  |  |  | Windows forms application. |  |
|  |  |  | Exception handling: UsaGI of Try, catch |  |
|  |  |  | block.Debugging: debugging script for windows forms based application |  |
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1. Evjen, B., Hollis, B., Rockford, L. (2006): Professional VB.NET (2003), Wiley Publishing Inc. USA
2. Holzner, S. (2010): Visual Basics.NET Programming Black Book, Paraglyph Press USA Dreamtech Press
3. http://www.ebooksdownloadfree.com/Miscellaneous/C-Black-Book-BI20346.html
4. http://www.tutorialspoint.com/csharp/csharp\_tutorial.pdf
5. www.completecsharptutorial.com
6. http://help.arcgis.com/en/sdk/10.0/arcobjects\_net/conceptualhelp/index.html
7. https://www.dur.ac.uk/resources/its/info/guides/93AMLGIS.pdf
8. <http://ebookily.org/pdf/arcobject-c>

 9. Balagurusamy, E. (2011): Programming with JAVA- a Primer, Tata-McGraw Hill Education Pvt. Ltd., New Delhi

10. Horton, I. (2008): Beginning Java 2, Wiley-India Inc., New Delhi

11. Lutz, M. (2010): Programming Python, O’Relly Media California,

(URL: http://itbook.info/book614)

12.https://wiki.python.org./moin/BeginnersGuide/nonprogrammers

13.Holzner, S. (2008): HTML Black Book, Dreamtech Press, India Paraglyph Press, USA

***M.Sc. Geo-informatics Syllabus - 2018***

|  |  |  |
| --- | --- | --- |
| Code No: GI: 204 | Title: Image Processing & Remote Sensing Practical |  |
|  |  |  |  |  |
| No. of Credits: 5 |  | No. of Practical’s: 15 |
|  |  |  |  |  |
| **Sr.** | **Topics** |  | **Sub-topics** | **Practical’s** |
| **No.** |  |  |  |  |
|  |  |  |  |  |
| 1 | Familiarization |  | Loading of image data, identification of | 1 |
|  | with image |  | objects on visual display, study of |  |
|  | processing system | histograms and layer information |  |
| 2 | Image |  | Linear and non- linear contrast | 3 |
|  | enhancement |  | enhancement, Band rationing, edge |  |
|  | techniques |  | enhancement, high and low pass filtering, |  |
|  |  |  | density slicing |  |
| 3 | Image registration | Registration of bases map/ topomap, image | 3 |
|  |  |  | to map, image to image |  |
|  |  |  |  |  |
| 4 | Image |  | Classification : Supervised, unsupervised | 3 |
|  | Classification |  | and use of different algorithms |  |
|  |  |  |  |  |
| 5 | Accuracy analysis |  | Producer, user accuracy, overall and | 2 |
|  |  |  | mapping accuracy, Kappa Coefficient |  |
|  |  |  |  |  |
| 6 | Vector layers |  | Generation of Vector layer, editing and | 2 |
|  |  |  | topology building, area and perimeter |  |
|  |  |  | Estimation |  |
|  |  |  |  |  |
| 7 | Presentation |  | Map composition | 1 |
|  |  |  |  |  |

(Note: For 5 credits 5 hrs. practical’s a week)

Books:

1. ERDAS (2010): ERDAS field Guide, ERDAS incorporation, Norcross, GA, USA
2. http://GIospatial.intergraph.com/Libraries/Tech\_Docs/Erdas\_Field\_Guide.sflb.ashx
3. Gupta, R. P. (2003): Remote Sensing Geology, Springer, Verlag Berlin

*M.Sc. Geoinformatics Syllabus - 2018*

|  |  |  |  |
| --- | --- | --- | --- |
| Code No: GI: 205 | Title: fundamental of statistics &Statistical Methods (P) |  |  |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
|  |  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** |  | **Lectures** |
| **No.** |  |  |  |  |
|  |  |  |  |  |
| 1 | Geographic data | Sources, types, discrete and continuous |  | 12 |
|  |  | series, scales of measurements, population, |  |
|  |  | sample and sampling techniques |  |  |
| 2 | Organization of | Frequency distribution, moments of |  | 12 |
|  | data | Distribution, Central tendency & Dispersion |  |  |
|  |  |  |  |  |
| 3 | Matrices | Matrix Algebra: Types and properties | of | 12 |
|  |  | Matrices. |  |  |
|  |  | Addition, subtraction, multiplication | and |  |
|  |  | Inverse |  |  |
| 4 | Correlation and | Correlation: concepts and methods |  | 12 |
|  | Regression | Regression: bi-variate, linear, exponential, |  |
|  |  | Logarithmic, power-law. |  |  |
|  |  | Multivariate regression and correlation. |  |  |
|  |  | Principal Component Analysis (PCA) |  |  |
| 5 | Probability | Normal, Binomial and Poison |  | 12 |
|  |  |  |  |  |

Books:

1. Hammond, R. and McCullough, P. (1991): Quantitative Techniques in Geography, Clarendon Press, Oxford
2. Gregory, S. (1978): Statistical Methods for Geographers, Longman, London
3. Frank, H. and Althorn, S. C. (1994): Statistics: Concepts Applications, Cambridge University Press, Cambridge
4. Ebdon, D. (1977): Statistics in Geography, Basil Blackwell, Oxford
5. RoGIrson, P. A. (2010): Statistical Methods for Geography, SaGI Publications, London

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| --- | --- | --- | --- |
| **Semester III** |  |  |  |

*M.Sc. Geoinformatics Syllabus - 2018*

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| --- |
| Code No: GI: 301 Title: Research methodology and research proposal development |
| No. of Credits: 4 No of Lectures:-60 |
| **Sr No.** | **Topics** | **Lectures** |
| 1 | Concept and Definition of Social Science Research, Salient Features of Students Research, Classification of Research, Basic Norms of Scientific Community  Research Process Model: Steps and Interpretation | 15 |
| 2 | Selecting and Justifying a Research Topic Source of suggestions for Topics, Techniques for Generating Research Topics  Preliminaries of Research The Issue, Problem Identification or Statement of Problem, Research Rationale, Scope and Limitation, Assumption or Premise, Research Objectives and Hypothesis, Budgeting and Working with a Supervisor, Development of a Research Proposal. | 15 |
| 3 | Coordination Schema (Assembling the components of a research e.g. Objectives, Parameters, Variables and Values), Utility, Format, Fitting, Approach, Steps, Construction Methods of Data Collection, Source (Primary and Secondary), Types, Reconnaissance, observation, survey, interviews (Structure and Unstructured and Scheduled), Group Discussion, Key Informants, Methods for Developing a Structured Questionnaire and Survey | 15 |
| 4 | Literature Review Finding the literature (Types Searching Skills etc), Managing the Literature (Keeping Track, Annotating, Summary and Critical Comment), Using the Literature (Exploring a Topic, Developing a Research Question, Articulating a Rationale and Designing Method), The Formal Literature Review (Purpose, Coverage, The Writing Process, Style and Tone)  Planning for the Research Project Need, Network Planning, Resources and Scheduling, Role of Network Planning in Research | 15 |

Books-:

# Research Methodology: Methods and Techniques by [C R Kothar](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=C+R+Kothari&search-alias=stripbooks)i

# [Research Design: Qualitative, Quantitative, and Mixed Methods Approaches](https://www.goodreads.com/book/show/130731.Research_Design) by [John W. Creswel](https://www.goodreads.com/author/show/75233.John_W_Creswell)

#  3. Research Methodology by [D K Bhattacharyya](https://www.google.co.in/search?tbo=p&tbm=bks&q=inauthor:%22D+K+Bhattacharyya%22)

*M.Sc. Geoinformatics Syllabus - 2018*

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| --- |
| Code No:302 Climate Change, Disaster management & Environmental Sustainability |
|  No. of Credits: 4 No of Lectures:-60 |
| **Sr no** | **Topics**  | **Sub-topics** | **Lectures** |
| 1 | Climate Change | Climate change and Coastal Erosion, Climate change and its impacts on environment, Global Warming, Greenhouse Gases & Ozone depletion, El-Nino & Southern oscillation (ENSO), La-Nina, Monitoring weather phenomena & Weather forecast. | 20 |
| 2 | Disaster management | Concept and dimension of Disaster Management, Types, Occurrence & characteristics of natural Disasters: Earthquake, Flood, Cyclone, Drought, Volcanic Eruption, Tsunami, Land Slide, Bushfire, Epidemic.The concept of disaster management cycle (Post Disaster review, Prevention, Mitigation, Preparedness, Disaster Impact, Response, Recovery & Development)  | 20 |
| 3 | Environmental sustainability | Population & Economic Development, Poverty and Environment, sustainable Development: Concept, Goal & Dimension, PrinciplesStrategies of sustainable living | 20 |

Books-:

1. CLIMATE CHANGE NOW - The Story of Carbon Colonisation by  [S.S Jeevan](https://www.flipkart.com/author/ss-jeevan), [Richard Mahapatra](https://www.flipkart.com/author/richard-mahapatra),Down To Earth Publication.

# 2. Climate Change: What Everyone Needs to Know(r) by [Joseph Romm](https://www.goodreads.com/author/show/102575.Joseph_Romm).

3. Disaster Management: Future Challenges and Opportunities Book by Jagbir Singh

# 4. Environmental Sustainability: Role of Green Technologies by [P. Thangavel](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=P.+Thangavel&search-alias=stripbooks) (Editor), [G. Sridevi](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=G.+Sridevi&search-alias=stripbooks) (Editor)

*M.Sc. Geo-informatics Syllabus - 2018*

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| --- |
| Code No:303 Digital Elevation Model & its Applications |
|  No. of Credits: 4  |
| **Sr no** | **Topics**  | **Sub-topics** |  |
| 1 | Concept of DEM | Digital Elevation Model(DEM), Digital Surface Model(DSM)& Digital Terrain Model(DTM)Need for DEM, Structures of DEM- Line Model, TIN, Grid network |  |
| 2 | Data Sources and Sampling methods | Products derived from DEMSampling methods: Selective, Purposive, Progressive, Composite sampling |  |
| 3 | Applications of DEM | Terrain analysis and land evaluationGeological & Geomorphological mapping,Model waterflow for Hydrology, Watershed management, Mapping Purpose & Educational Program.  |  |

Books-:

# Digital Elevation Model Technologies and Applications: The Dem Users Manual By [Dave F. Maune](https://www.amazon.com/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&text=Dave+F.+Maune&search-alias=books&field-author=Dave+F.+Maune&sort=relevancerank)

# <https://coast.noaa.gov/data/docs/geotools/2017/presentations/Maune.pdf>

# Digital Terrain Modelling, Development and Applications in a Policy Support Environment By  **Peckham**, Robert Joseph, **Jordan**, Gyozo (Eds.)

# <https://onlinelibrary.wiley.com/doi/pdf/10.1002/9781118786352.wbieg0768>

# http://www.isprs.org/proceedings/XXXVIII/1\_4\_7-W5/paper/Aktaruzzaman-138.pdf

*M.Sc. Geoinformatics Syllabus - 2018*

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| Code No: GI: 304 | Title: Spatial Analysis |  |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
|  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |
|  |  |  |  |
| 1 | Introduction to | Significance of spatial analysis. Overview of | 5 |
|  | Spatial analysis | tools for analysis |  |
|  |  |  |  |
| 2 | Spatial analysis – | Overlay operations: Point-in-polygon, Line- | 10 |
|  | Vector based | in-polygon, polygon-in-polygon. |  |
|  |  | Single layer operations: Feature |  |
|  |  | identification, extraction, classification |  |
|  |  | manipulation. |  |
|  |  | Multilayer operation: Union, intersection, |  |
|  |  | symmetrical difference, update, merge, |  |
|  |  | append and dissolve |  |
| 3 | Spatial analysis – | Map algebra, grid based operations, local, | 10 |
|  | Raster based | focal, zonal and global functions, cost |  |
|  |  | surface analysis, optimal path and proximity |  |
|  |  | search |  |
| 4 | Network analysis | Concepts, evaluation of network complexity | 10 |
|  |  | using Alpha-gamma indices. C-matrices for |  |
|  |  | evaluating connectivity of the network. |  |
|  |  | Network data model. Path analysis. |  |
|  |  | Linear referencing and segmentation. |  |
|  |  | Types of network analysis: Optimum cyclic |  |
|  |  | path, vehicle routing, path determination |  |
|  |  | and cost-path analysis. |  |
|  |  | Geocoding |  |
| 5 | Point pattern | Methods for evaluating point patterns: | 5 |
|  | analysis | clustered and random distribution |  |
|  |  |  |  |
| 6 | Surface | Interpolation methods: Trend surface | 10 |
|  | analysis | analysis, IDW, kriging, measures of |  |
|  |  | arrangement and dispersion, |  |
|  |  | autocorrelation, semi-variogram, DEM, TIN, |  |
|  |  | slope, aspect, hill shade and view shed |  |
| 7 | Spatial | Role of spatial model, explanative, predictive | 10 |
|  | modelling | and normative models. |  |
|  |  | Correlation-regression analysis in model |  |
|  |  | building. |  |
|  |  | Handling complex spatial query and case |  |
|  |  | studies |  |

Books:

1. Demers, M. N. (2000): Fundamentals of Geographic Information Systems, John Wiley and Sons, New Delhi
2. Burrough, P. A. and McDonnell, R. A. (2000): Principles of Geographical Information Systems, Oxford University Press, New York
3. Makrewski, J. (1999): GIS Multi-criteria Analysis, John Wiley and Sons, New York
4. Chang, K. T. (2008): Introduction to Geographic Information Systems, Avenue of the Americas, McGraw-Hill, New York
5. Longley, P. A., Goodchild, M. F., Maguire, D. J. Rhind, D. W. (2002): Geographical Information Systems and Science, John Wiley & Sons, Chichester
6. Lo, C. P. Yeung, A. W. (2002): Concepts Techniques of Geographical Information Systems, Prentice-Hall of India, New Delhi

**Code No: GI: 305** *M.Sc. (Geo-informatics) Syllabus - 2018*

**Term Paper & Seminar Presentation**

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| **Semester IV (Any two)** |  |  |  |

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| Code No: GI: 401 | Title: Urban & Regional Planning |  |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
|  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |
|  |  |  |  |
| 1 | Urban & Regional Area Analysis | Urbanization & Trends in urbanization, Urban morphology, Theories of Urban morphological growth, Concentric Zone Theory, Sector Theory, Multiple Nuclei Theory, Quantitative & Qualitative application of Town Urban resources, services & facilities analysis.  | 20 |
|  |  |  |  |
|  |  |  |  |
| 2 | Urban issues & Planning | Land useDrainage & SewerageTransportSlumsUrban Poverty | 20 |
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| 3 | Geo-Spatial technology for Urban Environmental Planning | Green space PlanningEnvironmental Impact Assessment(EIA) & EcologyEcosysystem AnalysisForest MappingWetland Management  | 20 |
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Books-:

# Urban and Regional Planning by Peter Hall & [Mark Tewdwr-Jones](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Mark+Tewdwr-Jones&search-alias=stripbooks).

# The Urban and Regional Planning Reader (Routledge Urban Reader Series). By Eugénie Birch

# Planning and Urban Design Standards (Ramsey/Sleeper Architectural Graphic Standards Series) by Frederick R. Steiner &  [Kent Butler](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_3?ie=UTF8&field-author=Kent+Butler&search-alias=stripbooks)

# Urban Planning: Theory &amp; Practice 1st Edition by M. Pratap Rao

*M.Sc. (Geo-informatics) Syllabus - 2018*

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| --- | --- | --- |
| Code No: GI: 402 | Title: WATER RESOURCE MANAGEMENT |  |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
|  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |
|  |  |  |  |
| 1 | Water Resource Assessment | Morph metric Analysis of Fluvial Landscape Testing, The Laws of Morphmetry (laws of Stream Order, Length,area,Slope,& algometric growth),Drainage Density, Sinuosity index as a measure of stream pattern vs. water volume & Capacity.  | 20 |
|  |  |  |  |
|  |  |  |  |
| 2 | Watershed Analysis & Planning | Concept of River basin,Catchment,Watershed,Watershed Delineation(Flow Direction, Flow Accumulation,Sink,Stream Ordering, Flow Length,Contour,watershed management. Types of watersheds-:Micro & Macro Level Watersheds | 20 |
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| 3 | Water Resource Management & Development | Integrated Water Resource Management(IWRM)Role of International Agencies in implementing IWRMIWRM Case StudyWater Availability & DemandCoastal Zone Management.Water Quality(Surface & Ground Water)Role of River Basin Organizations(RBO’s) in Basin Management | 20 |
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**Books-:**

# Watershed Management, Kindle Edition By  [Madan Mohan Das](https://www.amazon.in/s/ref%3Ddp_byline_sr_ebooks_1?ie=UTF8&text=Madan+Mohan+Das&search-alias=digital-text&field-author=Madan+Mohan+Das&sort=relevancerank) (Prentice Hall of India)

# Integrated Watershed Management: Principles and Practice by Isobel W Heathcote.

#  **3. Hydrology of Small Watersheds by P V Seethapathi**

*M.Sc. (Geo-informatics) Syllabus - 2018*

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| Code No: GI: 403 | Title: Land use Planning & Development |  |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
|  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |
|  |  |  |  |
| 1 | Land use Planning & Development | Urban & Rural Land useClassification Scheme of Rural & Urban Land useLand use PoliciesIntegration of Land use Planning & Infrastructure. | 20 |
|  |  |  |  |
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| 2 | Land use Change & Development | Climate Change Through Land use Planning.Social Equity Through Land use Planning.Local Economic Deelopment Through Land use planning.  | 20 |
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| 3 | Natural Hazards & Land use Planning. | Flood Risk Sensitive & Land use Planning.Earthquake Risk & Land use Planning.Heat wave Risk & & Land use Planning. | 20 |
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**Books-:**

 **1.** Land use planning and development regulation law by Julian Conrad Juergensmeyer

2. Land-use planning for sustainable development by Jane Silberstein.

3. Integrated Land Use Planning for Sustainable Agriculture and Rural Development by M. V. Rao, V. Suresh Babu, Suman Chandra, G. Ravindra Chary.

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| --- | --- | --- |
| Code No: GI: 404 | Title: Disaster Management |  |
|  |  |  |  |
| No. of Credits: 4 | No. of Periods: 60 |
|  |  |  |  |
| **Sr.** | **Topics** | **Sub-topics** | **Lectures** |
| **No.** |  |  |  |
|  |  |  |  |
| 1 | Natural Hazards & Disasters | Concept, types, Occurence & Characteristics of natural disasters:-Earthquake, Flood, Cyclone, Drought & Tsunami.New Disaster Threats: Heat Wave, Lightening & Thunderstorm | 20 |
|  |  |  |  |
|  |  |  |  |
| 2 | Disaster Management | Concept of Disaster ManagementConcept of Vulnerability & Risk in the Disaster Management.Major Requirements for Coping with the disaster management.Disaster Policy.Disaster Management Cycle. | 20 |
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| 3 | Comprehensive Disaster Management Plan | Components-: Contingency Planning, Natural Plan & Legislation, Warning System, Public Awareness & Community Participation.Role of Government,NGO’s,Stakeholders,International agencies in disaster management | 20 |
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**Books-:**

# Disaster Management by  [Jagbir Singh](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Jagbir+Singh&search-alias=stripbooks) .

# Disaster Management  by   [Harsh K. Gupta](https://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Harsh+K.+Gupta&search-alias=stripbooks).

# https://www.researchgate.net/publication/277327554\_Introduction\_to\_Disaster\_Management

**Code No: GI: 405**

 **Applications of GIS & RS Practical**

**Code No: GI: 406**

 **PROJECT WORK**