Program Outcome of this course

Sl. No.	Description	POs
1	Qualitative improvement in Civil Engineering education	PO1
2	Usage of Geospatial technologies in problem solving	PO2
3	Sustainable development of cities and communities	PO3
4	Understand Environment and develop climate smart action plans	PO4
5	Natural Resource management and disaster resilience	PO5
6	Critical Analysis of problems and Innovations in developmental planning.	PO6
7	Design and development of Geoinformatics- based solutions.	PO7
8	Subject specific skill development	PO8
9	Socio-economic development through efficient project management	PO9
10	Providing inputs for transparent administration through e-governance	PO10
11	Innovation and creativity through research and development	PO11
12	Entrepreneurship	PO12

Geoinformatics Project Planning and Management			
Course Code	**22CGI31**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:02	SEE Marks	50
Total Hours of Pedagogy	40 Hours of teaching +10-12 sessions of SDA	Total Marks	100
Credits	04	Exam Hours	03.00

Course Learning objectives:

- To familiarize them how to select particular project with plan, quality with cost and time.
- To develop skills to hand project in organization.
- To enable the students to formulate, execute and manage Geoinformatics projects.

Module-1

Introduction: Definition of plan, project, program and scheme. Functions of planning and management. Components of Geoinformatics project. Types of projects. **GIS Project Planning:** Project phases and Project lifecycle, project stake holders, system development life cycle, GIS software evaluation and selection, Hardware considerations and acquisition, Techno-economic feasibility analysis, project formulation, product and project design, Project proposals.

Module-2

Project Costs and Appraisal: Elements of cost, costing techniques, cost components of a geo-informatics project-Manpower, Hardware and software costs, and Maintenance cost, organizational cost, service charges, outsourcing cost, Cost budgeting. Project appraisal Methods -Discounting and non-discounting techniques, Benefit Cost Ratio, Break Even Point Analysis, Cost and Return simulation, Return on Investment. **Project Time, Quality and Cost Management:** Project scheduling-Network analysis, PERT and CPM techniques, Gant chart, Time and Cost crashing. Project cost and time control, feedback mechanisms, quality control / quality assurance. Data standards, ISO standards.

Module-3

Planning A Geo-informatics Project: Types of Geo-informatics projects, GIS Strategic Plan, Needs Assessment and Requirements Analysis, Organizational Involvement, Evaluating Existing Data, Accuracy, Completeness. Software and hardware Selection, Technical Environment, Assessing Costs and Benefits. **Project Scope and Risk Management:** Project scope definition, scope verification, scope change control, risk management planning, project risk identification, quantitative and qualitative risk analysis, risk response planning, risk monitoring and control.

Module-4

GIS Organizations: Vision, mission, goals and objectives, organizational chart, organizational approaches-democratic, authoritative, roles and responsibilities of personnel, recruitments, training, motivation, organizational behaviour, conflict resolving, team building, promotion/demotion.

Module-5

Management Issues in GIS: Making GIS efficient, effective and safe to use, data as management issue, GIS as a management tool, impact of broad societal issues. **Trends in GIS:** Enterprise GIS, Corporate GIS, BPO in GIS, Spatial Data Warehouse, Interoperability and Open GIS, NSDI.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Three Unit Tests each of **20 Marks**
2. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks**
   to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

1. A Guide to the Project Management Body of Knowledge(PMBOK Guide)Project Management Institute PM I6th edition 2017
2. Project Estimating and Cost Management (Project Management Essential Library) by ParvizF.Rad2001
3. Data Analytics for Engineering and Construction Project Risk Management BYIvan Damnjanovic, Kenneth Reinschmidt Springer International Publishing 2020.

Web links and Video Lectures (e-Resources):

- . https://1lib.in/book/5243197/3b23f7?dsource=recommend

Skill Development Activities Suggested

- To develop project with cost and time.
- To develop the skills to organising the different projects.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

Sl. No.	Description	Blooms Level
CO 1	To understand different phases of geoinformatics projects and planning needs.	I,II
CO 2	To learn elements of cost, cost budgeting and network analysis.	II, III
CO 3	To apply GIS technology on corporate, health, business sector, Understand project scope and risk analysis.	III, IV
CO 4	To develop organisational structure and how to motivate the employee and resolve the conflict.	IV, V
CO	To develop effective tools to manage the database in GIS and open source GIS.	V, VI

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								X				
CO2		X										
CO3		X				X						
CO4						X			X			
CO5											X	X

Geoinformatics in Urban Planning and Management			
Professional elective 3			
Course Code	**22CGI321**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03.00

Course Learning objectives:

- Student would be able to understand the concepts and principles large scale mapping and spatial analysis.
- To use the tools and techniques of geo-informatics for efficient planning and management of urban area.
- To get knowledge about application of urban areas.

Module-1

Large Scale Mapping and Cadastral Information System: Technologies for Large Scale Mapping (LSM) of urban areas, Issues in Large Scale Mapping (LSM), Integrated approach to LSM using Total Station and DGPS, Concept of Cadastre, classification of cadastral survey, development of cadastral information system, need for Land Information System (LIS), SVAMITVA (Survey of villages and mapping with improvised technology in village areas) objective and work flow.

Module-2

Urban Mapping and Spatial Analysis: Urbanisation process and growth trend, problems of urbanisation, Urban GIS, spatial analytical techniques, conceptual modelling of urban processes; Urban Sprawl: Change detection in Land Use Land Cover, Monitoring physical growth of urban area. **Urban Planning:** Plans – planning needs, types of plans, urban and regional planning; Zoning of Land Use, Object oriented GIS data modelling for urban design, urban infrastructure, Site selection for urban development, site suitability analysis for utilities and civic amenities,

Module-3

Demographic and Business GIS Applications: Geo-Demographics Population distribution maps, Market analysis ,retail site selection, healthcare planning, financial services planning, educational institutions planning, water demand modelling and planning distribution network, real estate inventory, mapping and GIS. Crime Analysis, Electoral Redistricting. **Network Applications:** Transportation demand modelling and analysis, transportation planning, Vehicle Routing and Scheduling, Vehicle Tracking and Navigation, intelligent transportation systems, streets network analysis, Water and sewage related-GIS based urban water demand analysis, pipeline planning and alignment.

Module-4

Urban Ecology Applications: Urban area heat budgeting, Logistic management and spatial planning for solid waste management. Noise pollution, Visibility pollution. **Cultural GIS:** Mapping heritage buildings, monuments, places of worship, tourism spots, recreation facilities, sports facilities and serving on web GIS.

Module-5

Urban Governance (E- Governance): E-Governance of urban regions: mapping administrative boundaries, city base map generation, property enumeration and property GIS, Asset mapping; tax revenue rationalization, Metropolitan Spatial Data Infrastructure, metropolitan information management system, Urban GIS and Smart Cities.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Three Unit Tests each of **20 Marks**
2. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks**
      to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- Modeling Urban Dynamics: Mobility, Accessibility and Real Estate Value by Marius Theriault, Francois Des Rosiers(auth.)Wiley-ISTE,2010.
- GIS in Sustainable Urban Planning and Management by Flacke Johannes, Maarseveen Martin van, MartinezJavierCRCPress2019
- Intelligent Transport System in Smart Cities: Aspects and Challenges of Vehicular Networks and Cloud byRodolfo I. Meneguette, Robson E. De Grande, Antonio A. F. Loureiro Springer International Publishing 1stedition2018

Web links and Video Lectures (e-Resources):

- . https://1lib.in/book/5243197/3b23f7?dsource=recommend

Skill Development Activities Suggested

- To get familiarized the skills on smart city planning.
- To develop the model for network analysis etc.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

Sl. No.	Description	Blooms Level
CO 1	To get familiarise latest technology for data capturing in urban area and creating LIS.	I, II
CO 2	To understand concept of planning needs in urban and regional area	II,III
CO 3	To Develop GIS on geo-demography, business and urban infrastructures.	III,IV
CO	To Develop GIS on urban ecology and in the field of culture and recreation	IV,V

Mapping of COS and POs

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12
CO1		X										
CO2				X								
CO3							X					
CO4					X	X						
CO5							X			X		

Geoinformatics in Marine and Coastal Resources Management			
(Professional Elective Course-3)			
Course Code	**22CGI322**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03.00

Course Learning objectives:

  i. The student would be able to use RS/GIS in various modeling tools in understanding the Earth's oceans,the ocean resources and their management.
  ii. They have been exposed to geo-informatics applications to oceanography, marine and coastalenvironment.
  iii. To learn the Applications on Coastal Resource Management

Module-1

Introduction: Types of marine and coastal resources, properties of sea water, thermocline and pycnocline, air-sea interactions, Upwelling and Down welling, El Nino-Sothern Oscillation (ENSO) phenomena. Role of oceans in the climate system. Generic spatial data- processing tasks: Sensor calibration, Atmospheric correction, Positional registration, Geophysical product derivation, etc.

Module-2

Oceanographic Studies: Interdisciplinary nature of oceanography, ocean processes, platforms and sensors for oceanography, spectral bands for study of ocean parameters, Mesoscale ocean features (Eddies, Fornts, other phenomena), Physical and Biological oceanography applications of geoinformatics, large ocean phenomena with human impact.

Module-3

Coastal Engineering Applications: The Coast- beaches and shoreline processes, Coastal erosion and protection, Hydrodynamics of pollution dispersion, Modelling of suspend sediment. Coastal Bathymetry; Coastal Geomorphology, Coastal habitat (Mangrove, Coral reefs, wet lands etc).

Module-4

Coastal Zone Applications: Introduction – Major issues/problem – coastal wetland classification – thematic maps on coastal resources- site suitability analysis for aquaculture – Coastal Regulation zone – Coastal aquifer modelling using GIS-Integrated coastal Zone Management–conflict analysis –Resources association.

Module-5

Meteorology and Climate Applications: Estimation of weather and climate parameters, and modelling aspects, global climatology. Rainfall mapping, potential and actual Evapo-transpiration, Hydrometeorology: atmospheric water content, cloud mapping, rain forecasting, artificial rain, cyclone forecasting, Using satellite data for climate monitoring.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Three Unit Tests each of **20 Marks**
2. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks**
      to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- Measuring the Oceans from space by Ian. S Rabinson Springer 2004
- Discovering the Oceans from Space (Vol-1,Vol-2) by Ian.S Rabinson springer2010
- Essentials of Oceanography by Alan P Trujillo and Harold V Thurman by10thedition2012
- Satellite Meteorology by R R Kelkar B S publications Second edition 2017
- GIS for Coastal Zone Management by Darius Bartlett and Jennifer Smith C R C Press200

Web links and Video Lectures (e-Resources):

- . https://1lib.in/book/3574775/66d182?dsource=recommend

Skill Development Activities Suggested

- To learn skills in applications of Ocean and metrological.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

Sl. No.		Description	Blooms Level
CO 1		To understand concepts of marine resources and Ocean phenomenon.	I,II
CO 2		To acquire knowledge about processing of ocean and applications of Physical and Biological oceanography.	II,III
CO 3		To get knowledge on modelling on Coastal engineering application.	III,IV
CO		To Develop database for applications of coastal zone management.	IV V

Mapping of COS and POs

	P 01	P 02	P 03	P 04	P 05	P 06	P 07	P 08	P 09	P 010	P 011	P 012
CO1					X							
CO2				X	X							
CO3				X							X	
CO4							X					
CO5		X					X					

Geoinformatics in Demography, Business and Infrastructure (Professional Elective Course-3)				
Course Code	**22CGI323**	CIE Marks		50
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks		50
Total Hours of Pedagogy	40	Total Marks		100
Credits	03	Exam Hours		03.00

Course Learning objectives:

- On completion of study of this subject the student would be able to analyse demographic data, economic data, epidemiological data and others and use it for making spatially informed decision.

Module-1

Geodemographics: Spatial distribution of population according to age, gender, and socio-group, racial and socio economic segregation, geoethnography, labour market exploration, health equality, crime analysis, population and environmental linkage, spatial planning, temporal analysis, spatial dispersal and sparsity, changing pattern of demography, GIS functionality for demographic analysis.

Module-2

Business GIS: Competitive market analysis, trade area analysis, site analysis and selection for distribution centres and shopping centres, customer service stations, facility management, target marketing, market demographics demographic analysis for marketing based on customer profiling, lifestyle matching and consumer behaviour, sales promotion planning, advertisements targeting; geo-markets eg mentation by product category, sales territory rationalization, forecasting market potential and modelling sales.

Module-3

Health GIS: Spatial epidemiology: RS and GIS in study of epidemics and their control- malaria, leprosy, polio, TB, filarialsls, dengue, chikengunya, cholera, AIDs Cancer; disease mapping, ecological analysis, disease clustering, bioterrorism and disease surveillance, infectious disease modeling. Health infrastructure and facility location mapping, planning future health facility requirement, disease surveillance and monitoring and other health indicators, Karnataka Health Systems Development Project, health an disease all as of India and medical geography, internet and health GIS, integrated disease surveillance system, spatial distribution and spread of diseases.

Module-4

Power: Site suitability assessment for power plants- thermal, hydroelectric, nuclear, mini-hydroelectric power plants, wind power, and impact assessment. Electrification and network planning, GIS in management of electricity distribution network, underground cable maintenance and management in power sector, GIS as decision support system,

Telecommunication: Applications of GIS in telecommunication industry, internet GIS for telecommunication, facility management in telecommunication industry, optical fiber cable alignment.

Transportation: Transportation GIS: vehicle routing and scheduling, optimizing routes and schedules, delivery routing/fleet management, vehicle navigation, vehicle tracking system, intelligent transportation system
Module-5
Tourism: Tourism internet GIS applications, tourism planning, tourism marketing, tourism research, tourism impact, ecotourism planning, **Archaeology:** RS and GIS applications in mapping cultural heritage, spotting historical monument sand sites, identification of palaeo rivers, GIS of historical maps.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks**
- to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- "GIS and GPS based asset management for Road and Railway Transportation Systems"-GPS based vehicle tracking system.
- Demography and Infrastructure: National and Regional Aspects of Demographic Change Wilhelm Kucksh in richs(auth.),Tobias Kronenberg, Wilhelm Kucksh in richs (eds.)Springer Netherlands 1st edition 2011

Web links and Video Lectures (e-Resources):

- www.gisdevelopment.net,
- www.esri.com
- www.aboutgis.com

Skill Development Activities Suggested

- To develop the skill on Demography, Business GIS and Health GIS.
- To learn skill on communication on network and Archaeology mapping.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

Sl. No.		Description	Blooms Level
CO 1		To understand concepts of Geo demographics distribution and analysis	I,II
CO 2		To Acquire knowledge about analysis and marketing in GIS	II,III
CO 3		To get knowledge about spatial disease distribution and modelling	IV,V
CO		To understand the concepts of power, communication and transportation	I,II

Mapping of COS and POs

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12
CO1		X										
CO2						X						
CO3							X					
CO4			X									
CO5											X	

Geoinformatics in Disaster Management (Professional Elective-4)				
Course Code	**22CGI331**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03.00

Course Learning objectives:

- To introduce various types of natural disasters and application of Geoinformatics inputs for disastermanagement and
- Geospatial technology use for mapping, impact assessment, forewarning, preparedness and mitigation of adverse effects.

Module-1

Introduction: Definition, classification of disasters, Institutional frame work for disaster management in India, importance of Geoinformatics in Disaster Management, Satellites and sensors for disaster management. Role of satellite-based communication systems in disaster management.

Module-2

Drought and Forest Fires: Drought types and causes, delineation of drought vulnerable areas mapping, Use of RS and GIS in Meteorological, hydrological and agricultural drought severity mapping and monitoring. Forest fire causes, forest fire management using geospatial information system.

Module-3

Cyclones and Floods: Causes for cyclone formation, Life cycle of a cyclone, Cyclone tracking, Cyclone early warning, impact assessment and management. Types of floods, causes and mitigation measures, flood early warning, flood affected area mapping and damage assessment, flood risk analysis using RS and GIS.

Module-4

Geological Disasters Management: Causes of earthquake, RS and GIS application for post-quake rehabilitation, micro-level seismic zonation, space technology applications for Tsunami disaster management, types of volcanoes, role of remote sensing in mapping and hazard assessment, landslide vulnerability mapping.

Module-5

Disaster Preparedness: Geo-informatics in crisis management, multi-hazard risk assessment and early warning systems, risk communication including through citizen science and crowd sourcing, The role of GIS and SDI as an integrated framework in emergency response and multi-agency coordination, Local preparedness, Relief management-Shelter, Sustainable recovery through build back better, Damage and Loss Assessment, climate change adaptation and disaster risk reduction, International Space Charter for Disasters and Sentinel Asia.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks**
     to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- Proceedings of International Conference on Remote Sensing for Disaster Management by Peddada Jagadeeswara Rao, Kakani Nageswara Rao, Sumiko Kubo Springer International Publishing 1stedition2019
- Global Changes and Natural Disaster Management: Geo-information Technologies by Saied Pirasteh, Jonathan Li (eds.) Springer International Publishing 1st edition 2017.
- Natural Disaster Management by Jon Ingleton (Editor), Leigh Trowbridge (Illustrator) Tudor RoseHoldings1999
- Disaster Management Handbook by Jack Pinkowski CRCPress1stedition2008
- Disasters in India can Remote Sensing Dosomething by VR Rao,L Lalitha, PP NageswaraRao1983.

Web links and Video Lectures (e-Resources):

- https://1lib.in/book/3574775/66d182?dsource=recommend

Skill Development Activities Suggested

- To get familiarized in applications on disaster management.
- To do projects on disaster management

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

Sl. No.	Description	Blooms Level
CO 1	To get familiarised to types and remote sensing use in disaster management.	I,II
CO 2	To understand the concepts of drought and forest fire using RS technology.	II,III
CO 3	To understand the concepts of cyclones and floods using RS and GIS.	II,III
CO	To Develop database for the geological disaster in GIS platform.	IV,V

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								X				
CO2					X							
CO3					X							
CO4											X	
CO5		X				X	X					

Geoinformatics in Weather and Climate Studies (Professional Elective Course-4)			
Course Code	**22CGI332**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03.00

Course Learning objectives:

- To understand concepts of weather and climate studies.
- They have been exposed to geo-informatics in crop production, soil and water conservation techniques.
- To learn the management skill on climate change and integrated pest and meteorology applications.

Module-1

Elements of weather and Climate: Global and regional variations in the temperature, pressure, wind, humidity, precipitation, the modifying factors like latitude, altitude, distance to the ocean and/ or sea, orientation of mountain ranges toward prevailing winds and ocean currents. Atmospheric circulations and Oceanic circulations, interdisciplinary nature of climate system.

Module-2

Basics of agro-meteorology, Weather-borne Disasters and their Impacts: Identification of critical weather variables affecting crop production, Vegetation indices for crop stress detection, Characteristics of agro-climatic zones of India and Karnataka. Weather in relationship to crop growth, productivity, crop water requirements, irrigation scheduling, soil and water conservation techniques.

Module-3

Integrated Pest management: The biotic and abiotic components of an ecosystem. Spatial distribution and spread of Crop Pests / diseases, Identification of endemic zones of crop pests and diseases, the role of geoinformatics in integrated pest management, Spatial information kiosks in the rural development. etc.

Module-4

Satellite Meteorology: Principles of meteorological remote sensing, characteristics of satellite sensors, Indian satellites/sensors for meteorology, weather systems observed in satellite imagery, Monitoring the progress of monsoons, tropical weather systems, extra- tropical weather systems, Interaction between tropical and mid-latitude systems.

Module-5

Climate Change Management: Causes of climate change, Indicators of climate change, Basics of climate change adaptations, Global regulations, International Geosphere Biosphere programmes, Indian National Programmes, role of Geoinformatics in climate change studies, geoinformatics inputs for climate change management.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

3. Three Unit Tests each of **20 Marks**
4. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks**
    to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

6. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
7. The question paper will have ten full questions carrying equal marks.
8. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
9. Each full question will have a sub-question covering all the topics under a module.
10. The students will have to answer five full questions, selecting one full question from each module

---

Suggested Learning Resources:

Books

- SatelliteMeteorologybyRRKelkarBSpublicationsSecondedition2017
- MonsoonPredictionbyRRKelakar,2008,B.S.Publications,Hyderabad
- Climate Change–A Holistic View, by RR Kelakar, 2010. B.S. Publications, Hyderabad
- Global Change studies ScientificresultsfromIGBPin1994
- Managing Weather and Climate Risks in Agriculture by Mannava V.K. Sivakumar, Raymond P.Motha Springer 1st edition 2007
- Weather and Climate by Encyclopaedia Britannica 2008

Web links and Video Lectures (e-Resources):

- https://1lib.in/s/Weather%20and%20Climate%20Studies%20in%20geoinformatics

---

Skill Development Activities Suggested

- To learn the skills on weather and climate application.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

Sl. No.		Description	Blooms Level
CO 1		To understand concepts of Weather and Climate studies	I,II
CO 2		To acquire knowledge about agro-meteorology, Weather borne disasters and their imapcts.	II,III
CO 3		To get knowledge on creating spatial database for pest and diseases.	IV,V
CO		To acquire knowledge about satellite meteorology	III,IV

Mapping of COS and POs

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12
CO1				X								
CO2					X							
CO3		X			X							
CO4											X	
CO5				X		X					X	

Geoinformatics in Water Resource Management				
(Professional Elective Course-4)				
Course Code	**22CGI333**	CIE Marks	50	
Teaching Hours/Week (L:P:SDA)	03:00:00	SEE Marks	50	
Total Hours of Pedagogy	40	Total Marks	100	
Credits	03	Exam Hours	03.00	

Course Learning objectives:

- This course will enable the students to use RS and GIS tools in the integrated water resource management, glaciology and watershed development.

Module-1

Introduction: Hydrology–definition and its importance, hydrological cycle, water budgeting, water demand estimation, surface water bodies, water content in ocean, sea, ice, lakes, dams, tanks, rivers and ground, water resources cenario in India and Karnataka, RS and GIS applications in water resources development and management.

Module-2

Surface Fresh Water: Rainfall mapping, potential and actual evapo-transpiration, atmospheric water content, rainfall estimation & forecasting, monitoring of snow-covered area and snowmelt runoff estimation, Surface Fresh Water: river diversion studies, site suitability for surface storages and hydro-electric power plants.

Module-3

Irrigation and Watershed Management: Mapping and monitoring of catchment and command areas, land irrigability mapping, agriculture water demand estimation for different crops, tank information system, wetland mapping, siltation mapping; Watershed: delineation, morphometric analysis, rainfall-surface runoff model, reservoir sedimentation, water-harvesting structures, watershed development planning, Concept of Natural Recharge and Artificial Recharge, Uses of DEM.

Module-4

Ground Water: Concepts of Ground water, types of Aquifers, Lineament studies, Groundwater Resources of India, Groundwater Resources of Karnataka. Theory of Groundwater flow- Darcy's law and its applications. Ground water quality assessment, ground water prospect zones mapping and ground water information system.

Module-5

Groundwater development and management: Planning and management of groundwater. Methods of artificial groundwater recharge; rainwater harvesting, problems of over-exploitation of groundwater; water management inruralandurbanareas,geologicalandgeophysicalmethodsofgroundwater exploration

Water Quality Physical and chemical properties of water, quality criteria for different uses, groundwater quality provinces of India, Ground water contamination.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

5. Three Unit Tests each of **20 Marks**
6. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks**
   to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

11. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
12. The question paper will have ten full questions carrying equal marks.
13. Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
14. Each full question will have a sub-question covering all the topics under a module.
15. The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Books

- GIS for Water Resources and Watershed Management-John GLyon
- Application of GIS in Hydrology and Water Resources Management-K. Kovar
- Geographic Information Systems in Water Resources Engineering-Lynn E. Johnson
- Introduction to Environmental Remote Sensing–Barrett EC
- Remote Sensing principles and interpretation –Sabins F.F
- Ground Water Assessment, Development and Management–K.R. Karanath–Tata McGraw Hill Publishing Co.Ltd.
- Groundwater–C.F. Tolman–McGraw-Hill Book Co. Inc.

Web links and Video Lectures (e-Resources):

- https://1lib.in/

Skill Development Activities Suggested

- To develop skill on water resources management practical in different software.
- To collect the filed data using DGPS and GPS.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

Sl. No.		Description	Blooms Level
CO 1		To understand concepts of Water resource development and hydrological tools	II,III
CO 2		To acquire knowledge about surface water and mapping	I,II
CO 3		To get knowledge about irrigation and watershed management.	II
CO		To understand ground water prospect mapping and information system	IV,V

Mapping of COS and POs

	P O1	P O2	P O3	P O4	P O5	P O6	P O7	P O8	P O9	P O10	P O11	P O12
CO1	X											
CO2					X							
CO3				X								
CO4						X	X					
CO5									X		X	

Project Phase-I			
Course Code	**22CGI34**	CIE Marks	1 00
Teaching Hours/Week (L:P:SDA)	00:06:00	SEE Marks	---
Credits	03	Exam Hours	---

Course Learning objectives:

- Support independent learning.
- Guide to select and utilize adequate information from varied resources maintaining ethics. •
- Guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
- Develop interactive, communication, organisation, time management, and presentation skills.
- Impart flexibility and adaptability.
- Inspire independent and team working.
- Expand intellectual capacity, credibility, judgement, intuition.
- Adhere to punctuality, setting and meeting deadlines.
- Instil responsibilities to one self and others.
- Train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas.

Project Phase-1 Students in consultation with the guide/s shall carry out literature survey/ visit industries to finalize the topic of the Project. Subsequently, the students shall collect the material required for the selected project, prepare synopsis and narrate the methodology to carry out the project work.

Seminar: Each student, under the guidance of a Faculty, is required to

- Present the seminar on the selected project orally and/or through power point slides.
- Answer the queries and involve in debate/discussion.
- Submit two copies of the typed report with a list of references.
- The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

• Demonstrate a sound technical knowledge of their selected project topic.

• Undertake problem identification, formulation, and solution.

• Design engineering solutions to complex problems utilising a systems approach.

• Communicate with engineers and the community at large in written an oral forms.

• Demonstrate the knowledge, skills and attitudes of a professional engineer.

Societal Project			
Course Code	**22CGI35**	CIE Marks	1 00
Teaching Hours/Week (L:P:SDA)	00:06:00	SEE Marks	---
Credits	03	Exam Hours	---

Course Learning objectives:

• Support independent learning.
• Guide to select and utilize adequate information from varied resources maintaining ethics.
• Guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly.
• Develop interactive, communication, organisation, time management, and presentation skills.
• Impart flexibility and adaptability.
• Inspire independent and team working.
• Expand intellectual capacity, credibility, judgement, intuition.
• Adhere to punctuality, setting and meeting deadlines.
• Instil responsibilities to one self and others.
• Train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas

Project Phase-1 Students in consultation with the guide/s shall carry out literature survey/ visit industries to finalize the topic of the societal Project. Subsequently, the students shall collect the material required for the selected project, prepare synopsis and narrate the methodology to carry out the project work.

Seminar: Each student, under the guidance of a Faculty, is required to

• Present the seminar on the selected societal project orally and/or through power point slides.
• Answer the queries and involve in debate/discussion.
• Submit two copies of the typed report with a list of references.

The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

• Demonstrate a sound technical knowledge of their selected societal project topic.

• Undertake problem identification, formulation, and solution.

• Design engineering solutions to complex problems utilising a systems approach.

• Communicate with engineers and the community at large in written an oral forms.

 • Demonstrate the knowledge, skills and attitudes of a professional engineer.

Internship			
Course Code	**22CGII36**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	00:06:00	SEE Marks	50
Credits	03	Exam Hours	03

Course Learning objectives:

Internship provide students the opportunity of hands-on experience that include personal training, time and stress management, interactive skills, presentations, budgeting, marketing, liability and risk management, paperwork, equipment ordering, maintenance, responding to emergencies etc. The objective are further,

- To put theory into practice.
- To expand thinking and broaden the knowledge and skills acquired through course work in the field.
- To relate to, interact with, and learn from current professionals in the field.
- To gain a greater understanding of the duties and responsibilities of a professional.
- To understand and adhere to professional standards in the field.
- To gain insight to professional communication including meetings, memos, reading, writing, public speaking, research, client interaction, input of ideas, and confidentiality.
- To identify personal strengths and weaknesses.
- To develop the initiative and motivation to be a self-starter and work independently.

Internship/Professional practice: Students under the guidance of internal guide/s and external guide shall take part in all the activities regularly to acquire as much knowledge as possible without causing any inconvenience at the place of internship.

Seminar: Each student is required to

• Present the seminar on the internship orally and/or through power point slides.

• Answer the queries and involve in debate/discussion.

• Submit the report duly certified by the external guide.

• The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum mark. The minimum passing mark for SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

2.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

• Gain practical experience within industry in which the internship is done.

• Acquire knowledge of the industry in which the internship is done.

• Apply knowledge and skills learned to classroom work.

• Develop a greater understanding about career options while more clearly defining personal career goals.

• Experience the activities and functions of professionals.

• Develop and refine oral and written communication skills.

• Identify areas for future knowledge and skill development.

• Expand intellectual capacity, credibility, judgment, intuition.

• Acquire the knowledge of administration, marketing, finance and economics.