CBSE | DEPARTMENT OF SKILL EDUCATION CURRICULUM FOR SESSION 2022-2023

GEOSPATIAL TECHNOLOGY (SUB. CODE-818)

JOB ROLE: GIS OPERATOR

CLASS – XI & XII

COURSE OVERVIEW:

Geospatial technology is an umbrella phrase associated with a range of various technologies which include remote sensing, Global Positioning System (GPS), Geographic Information System (GIS), information technologies, and field sensors, that are intended to facilitate the process of capturing/storing/ processing/ displaying/ disseminating information tied to a location.

This present course curriculum offers an opportunity for the students to understand the basics of geospatial technology for developing an interest in the principles, practical uses, and resources related to geospatial technologies. With the exponential growth of Indian geospatial market, this initiative is intended to develop the pool of manpower trained in this subject. This course will enable the students to get an insight into the diverse geospatial database concepts, creating and implementing of the same, GIS theory and spatial analysis, supplemented by extensive practical exercises. Also, it will help the students to acquire skills for further studies and to enter the professional world.

OBJECTIVES OF THE COURSE:

In this course, the students will be introduced to the fundamental concepts of Geospatial Technology and the career opportunities available in this field. This vocational course offers professional education dealing with mapping and Geospatial production to ensure that students obtain insight into Geospatial database concepts, creating and implementing database, spatial analysis, developing GIS applications, through both theoretical concepts and supported by extensive practical exercise with hands-on training using Geomatica industry standard software.

Followings are the main objectives of this course.

- To provide knowledge to students to compile, analyze, and present geospatial data. Students will learn these basic geospatial concepts while working with Rolta's Geomatica software.
- To familiarize the students with various dimensions of Geospatial Technology and career opportunities available in these fields.
- To develop creative thinking among students and make them technology-savvy so that they could be ready to join the Geospatial industry.

SALIENT FEATURES:

- Geospatial technologies with proven capabilities for supporting decision making can effectively support governance, enable sustainable development, assist in better management of business process as well as bring location-based information closer to the people.
- Geographic information has application in practically all walks of human existence.
- In the present economic scenario, there is an increasing demand for cost effectivesolutions for decision making which is likely to propel the usage of this technology and professionals across sectors in the near future.
- Geospatial technology is perhaps the only technology that can provide a holistic approach to the understanding of the interactions and inter-linkages between the earth's biophysical and social elements to strike an optimal balance between developmental and environmental goals.

LIST OF EQUIPMENT AND MATERIALS:

- Computers
- Rolta Geomatica Software (Provided by CBSE)
- Internet connectivity
- LCD Projector (optional)
- Projector Screen (optional)

CAREER OPPORTUNITIES:

Geospatial technology is ubiquitous and the expanse of its reach in multiple fields is growing rapidly. Most technologies require a spatial component and it is one of the pillars of emerging technologies. Be it our day-to-day activities or cutting-edge futuristic research, none can be visualized without geospatial information. A vast range of career opportunities are available in this field. Following are just few of them-

- Geospatial Data Technician
- Geospatial Scientist
- Image Scientist/ Analyst
- Geospatial Developer
- Geospatial Programmer
- Geospatial Database Engineer
- Forensic Analyst
- Criminal Intelligence Analyst

VERTICAL MOBILITY:

- GIS Operator -------GIS Assistant or Technician -------GIS Specialist ---------- GIS
  - Analyst -------- Senior GIS Analyst ---------- GIS Coordinator ----------GIS **Scientist/**
  - Manager.

OCCUPATIONS USING GEOSPATIAL TECHNOLOGY:

- Agriculture
- Archeology
- Banking and Financial Services
- Business
- Census
- Conservation
- Criminal Justice
- Defense and Intelligence
- Disaster Management
- Education
- Economic Development
- Education Administration
- Education and Research
- Elections
- Emergency Response
- Energy
- Engineering
- Environmental Health
- Environmental Law
- Environmental Planning
- Epidemiology
- Fire Science Forestry

GEOSPATIAL TECHNOLOGY (SUB. CODE-818)
CLASS – XI

Total Marks: 100 (Theory-60 + Practical-40)

	UNITS	NO. OF HOURS for Theory and Practical	MAX. MARKS for Theory and Practical
Part A	**Employability Skills**		
	Unit 1 : Communication Skills-III	13	2
	Unit 2 : Self-Management Skills-III	07	2
	Unit 3 : ICT Skills-III	13	2
	Unit 4 : Entrepreneurial Skills-III	10	2
	Unit 5 : Green Skills-III	07	2
	Total	**50**	**10**
Part B	**Subject Specific Skills**		
	Unit 1: Geospatial Overview a. Familiarization with GT software b. Familiarization with the Data Sources	08	05
	Unit 2: Maps & Cartography	20	10
	Unit 3: Remote Sensing	30	15
	Unit 4: Geographic Information System (GIS)	30	15
	Unit 5: Global round Positioning System (GPS)	15	05
	Total	**103**	**50**
Part C	**Practical Work**		
	Project	107	10
	Viva		05
	Practical File		10
	Demonstration of skill competency via Lab Activities		15
	Total	**107**	**40**
	GRAND TOTAL	**260**	**100**

NOTE: Detailed Curriculum/ Topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

GEOSPATIAL TECHNOLOGY (SUB. CODE-818)
CLASS – XII

Total Marks: 100 (Theory-60 + Practical-40)

	UNITS	NO. OF HOURS for Theory and Practical 260	MAX. MARKS for Theory and Practical 100
Part A	**Employability Skills**		
	Unit 1 : Communication Skills-IV*	13	-
	Unit 2 : Self-Management Skills-IV	07	3
	Unit 3 : ICT Skills-IV	13	3
	Unit 4 : Entrepreneurial Skills-IV	10	4
	Unit 5 : Green Skills-IV*	07	-
	Total	**50**	**10**
Part B	**Subject Specific Skills**		
	Chapter 1: Remote Sensing (RS)	30	18
	Chapter 2: Geographic InformationSystem (GIS)	30	17
	Chapter 3: Global Positioning System(GPS)	20	05
	Chapter 4: Trends in Geospatial Technology	20	05
	Chapter 5: Applications of Geospatial Technology	20	05
	Total	**120**	**50**
Part C	**Practical Work**		
	Project	90	10
	Viva		05
	Practical File		10
	Demonstration of skill competency via Lab Activities		15
	Total	**90**	**40**
	GRAND TOTAL	**260**	**100**

Note: *** marked units are to be assessed through Internal Assessment/ Student Activities. They are not to be assessed in Theory Exams**

DETAILED CURRICULUM/ TOPICS:

Part-A: EMPLOYABILITY SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills-IV*	13
2.	Unit 2: Self-management Skills-IV	07
3.	Unit 3: Information and Communication Technology Skills-IV	13
4.	Unit 4: Entrepreneurial Skills-IV	10
5.	Unit 5: Green Skills-IV*	07
	TOTAL DURATION	**50**

Note: *** marked units are to be assessed through Internal Assessment/ Student Activities. They are not to be assessed in Theory Exams**

Detailed Curriculum/ Topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

Part-B – SUBJECT SPECIFIC SKILLS

S. No.	Units	Duration in Hours
1.	Chapter 1: Remote Sensing (RS)	30
2.	Chapter 2: Geographic Information System (GIS)	30
3.	Chapter 3: Global Positioning System (GPS)	20
4.	Chapter 4: Trends in Geospatial Technology	20
5.	Chapter 5: Applications of Geospatial Technology	20
	TOTAL DURATION	**120**

UNIT	SUB-UNIT	SESSION/ACTIVITY
1. Remote Sensing (RS)	1.1. Introduction	• Introduction • Electromagnetic Spectrum • Stages in Remote Sensing • Wien's Displacement law • Various Interaction Responses of Sun rays
	1.2. Spectral Reflectance Signature	• Soil • Vegetation • Water • Rock • 5. Resolution and its types
	1.3. Digital Image Processing	• Image restoration • Statistical analysis • Image enhancement • Image classification • Band Rationing • NDVI • PVI
	1.4. Visual Interpretation of Satellite Data	• Tone • Shape • Size • Pattern • Texture • Shadow • Association
	1.5. Aerial Photo and its Interpretation	
	1.6. Advanced Remote Sensing Technologies	• Hyper Spectral Imagery • Thermal Remote Sensing • Microwave Remote Sensing
	1.7. Advantages and Benefits of RS	
2. Geographic Information System (GIS)	2.1. Introduction	• Spatial and Non-Spatial data
	2.2. GIS Data Element and Data Structure	• GIS functions • Data Structure
	2.3. Fundamentals of Database concepts	• Spatial data input • Attribute data input • Linking of both the data set

***Note :- To be assessed in practical only. No question shall be asked from this portion in Theory Exams.**

UNIT	SUB-UNIT	SESSION/ACTIVITY
	2.4. Data Input to GIS System	• Digitization • Data transfer • Key board entry
	2.5. GIS Data Editing	• Topology building • Topological errors • Location errors • Edge matching
	2.6. Attribute Data linking	
	2.7.Spatial and Non-Spatial data analysis	• Query- Boolean algebra • Dissolve • Overlay • Merge • Buffer analysis • TIN
	2.8. Map Projection and Coordinate System	• Projections • Coordinate systems • UTM • Datum • WGS84
	2.9. Digital Cartography	
	2.10. Advantages and Benefits of GIS	
3. Global Positioning System (GPS)	3.1. Introduction	• Introduction and History • Segments of GPS • dilatation
	3.2. GPS Accuracy and Accuracy factors	• Errors • Clock offset
	3.3. Types of GPS	• DGPS • Recreational • Mapping • Survey
	3.4. List of Global Navigation System	• Navistar • Glonass • Galileo
	3.5. GPS today & Limitations of GPS	
	3.6. Uses of GPS Technology	• In Survey and Mapping • In Height and location • In Vehicle tracking

***Note :- To be assessed in practical only. No question shall be asked from this portion in Theory Exams.**

UNIT	SUB-UNIT	SESSION/ACTIVITY
4. Trends in Geospatial Technology	4.1. Introduction	
	4.2. Remote Sensing Trends and Technology	• Trends in Technology • Trends in Application
	4.3. GIS Trends and Technology	• Web based GIS • Enterprise GIS • Mobile GIS • 3D visualization • Open GIS
	4.4. GPS Trends and Technology	• Stone age • Star age • Radio age • Satellite age • Latest Development
5. Applications of Geospatial Technology	5.1. Introduction	
	5.2. Watershed Studies	
	5.3. Flood Studies	
	5.4. Health Issues	
	5.5. Utility Studies	
	5.6. Security and Defense Studies	
	5.7. Urban and Infrastructure Studies	
	5.8. Disaster Relief Management	

***Note :- To be assessed in practical only. No question shall be asked from this portion in Theory Exams.**

UNIT	SUB-UNIT	SESSION/ACTIVITY
1. Projection of data	1.1 Dereferencing. 1.2 Coordinating System and components. 1.3 Image to map registration. 1.4 Image to image registration.	
2. Digitization	2.1.Building Topology	
3. Digital image Processing	3.1 Image enhancement. 3.2 Unsupervised classification. 3.3 Supervised classification.	
4. Geospatial data creation and editing	4.1. Querying (Location parameters, graphics etc.). 4.2. Projection data. 4.3. Building geo database.	
5. Spatial Analysis and Thematic Mapping	5.1. Overlay analysis 5.2. Reprocessing of data intersection, union dissolve, merge, clip. 5.3. Functional attribute and expression. 5.4. Statistics and Report generation.	

***Note :- To be assessed in practical only. No question shall be asked from this portion in Theory Exams.**

UNIT	SUB-UNIT	SESSION/ACTIVITY
6. Symbiology and layouts	6.1. Map surfing. 6.2. Preparing map and its layout. 6.3. Indexing. 6.4. Scale and annotation. 6.5. Preparing maps for presentation.	
7. On job training	7.1. Preparation of maps for. 1. Environment analysis. 2. Urban area. 3. Water bodies. 4. Agriculture and Forest Collecting ground truth with GPS Overlaying of different maps in GIS.	

***Note :- To be assessed in practical only. No question shall be asked from this portion in Theory Exams.**