

5TH SEMESTER

CURRICULAR STRUCTURE

AND

SYLLABI OF

FULL-TIME DIPLOMA COURSE IN

GIS & GPS

**PROPOSED CURRICULAR STRUCTURE FOR 5th SEMESTER OF
PART-III (3RD YEAR) OF THE FULL TIME DIPLOMA COURSE IN GIS & GPS**

WEST BENGAL STATE COUNCIL OF TECHNICAL EDUCATION													
TEACHING & EXAMINATION SCHEME FOR DIPLOMA IN ENGINEERING COURSES													
BRANCH: DIPLOMA IN GIS & GPS							SEMESTER: FIFTH						
SL. NO.	SUBJECT	CREDITS	PERIODS			EVALUATION SCHEME							
			L	TU	PR	INTERNAL SCHEME			ESE	PR #	TW @	TOTAL MARKS	
						TA	CT	TOTAL					
1	THEORETICAL	Advance Geographic Information System	3	3	-	-	10	20	30	70	-	-	100
2		Application of Geo-Informatics & Spatial Decision Support System.	3	3	-	-	10	20	30	70	-	-	100
3		Elective –I **	4	3	1	-	10	20	30	70	-	-	100
4	SESS/PR	Professional Practice III	2	-	-	3	-	-	-	-	25	25	50
5		GIS Practice- II	4	-	-	4	-	-	-	-	50	100	150
6		Digital Image Processing-II	4			4					50	50	100
7		Mission Projects in India	1	-	-	2					25	25	50
8		Project Part-1	4	-	-	8	-	-	-	-	75	125	200
	TOTAL		25	9	1	21	TOTAL MARKS		90	210	225	325	850

STUDENT CONTACT HOURS PER WEEK: 31 Hrs.

Theory and Practical Period of 60 Minutes each. .

**** Any one of the following**

1. Application of GIS in Agriculture 2. Application of GIS in Water Resources Management, 3. Application of GIS in watershed management

- External Assessment @ - Internal Assessment, **ESE** - End Semester Exam, **CT**- Class Test, **TA** - Teachers Assessment.

L – Lecture, **TU** –Tutorial, PR – Practical, TW – Term Work.

Name of the Course : Diploma in GIS & GPS (Advanced Geographic Information System)			
Course code :GIS & GPS / S5 /Th /ADVGIS		Semester : FIFTH	
Duration : 15 weeks		Maximum Marks : 100	
Teaching Scheme		Examination Scheme	
Theory : - 3 hrs/week		Continuous Intern al Assessment : 20 Marks	
Tutorial: - NIL		Attendance, Assignment & Quiz : - 10 Marks	
Practical : NIL		End Semester Examination : 70 Marks	
Credit :- 3			
Objective :-			
S.No			
1.	To study and understand the advanced concepts of Geographic Information System.		
2.	Acquire knowledge to prepare data model for GIS.		
3.	To know the future trends of GIS.		
Pre-Requisite :-			
S.No			
1.	Basic knowledge of Geographic Information System.		
Contents :			
Contents (Theory)		Hrs./Unit	Marks
Unit:1	<p>EARTH AS A GEOID</p> <p>1.1 The Planet Earth, Geoids, Concept of Spherical Geometry and Geodesy, concepts of Reference Spheroid and Mean Sea Level</p> <p>1.2 Introduction to different spheroid / ellipsoid systems with special reference to Everest and WGS-84 - Geometric Constants, Indian Geodetic Datum.</p> <p>1.3 Rectangular and Geographical Co-ordinate System - Conversion of latitudes and longitudes to linear distances, Coordinate Transformations, Geoidal parameters and their relationship.</p> <p>EARTH AS A SPHEROID</p> <p>1.4 Dimensions of some Spheroids, Definition and Determination of Geoid Undulation, Coordinate System used in Geodesy, Coordinate System used by Survey of India (ϕ, λ, H) and neighbouring countries, Redefinition of Horizontal and Vertical Datum in India, Indian Mean Sea Level Datum.</p> <p>ADVANCED TOPIC IN GEODESY:</p>	20	25

	1.5 Satellite Geodesy: Early satellites, Interferometry, Doppler, Point Positioning, Translocation, Observational systems, New Satellite gravity missions. 1.6 Modern Views on determination of shape of the Earth: Gravimetric Methods, Astrogeodetic methods.		
Unit: 2	GIS APPLICATION 2.1 Introduction. 2.2 Problem identification. 2.3 Designing a data model. 2.4 Project management. 2.5 Implementation problems. 2.6 Project evaluation. 2.7 Case studies.	16	25
Unit: 3	FUTURE TRENDS 3.1 Introduction 3.2 Advances in remote sensing 3.3 Classification in accuracy assessment 3.4 Advances in GIS 3.5 Internet GIS 3.6 Mobile GIS 3.7 Open GIS Consortium (OGC) 3.8 Decision support system	12	20
Total		48	70

Name of the Course : Diploma in GIS & GPS (Application of Geo-Informatics& Spatial Decision Support System)			
Course code :GIS & GPS / S5 /Th /AGISDSS		Semester : FIFTH	
Duration : 15 weeks		Maximum Marks : 100	
Teaching Scheme		Examination Scheme	
Theory : - 3 hrs/week		Continuous Internal Assessment : 20 Marks	
Tutorial: - NIL		Attendance, Assignment & Quiz : - 10 Marks	
Practical : NIL		End Semester Examination : 70 Marks	
Credit :- 3			
Objective :-			
S.No			
1.	To acquire knowledge on Geo-Informatics and Decision Support System.		
2.	Application of Decision Support System in different areas like Agriculture, water resource etc.		
Pre-Requisite :-			
S.No			
1.	Knowledge of Remote Sensing, Spatial Statics, Geographic Information System.		
Contents :			
Contents (Theory)		Hrs./Unit	Marks
Unit:1	Application of Geo-Informatics: 1.1 Introduction: Evolution of Geoinformatics technology in different application areas. 1.2 Indian satellite missions with application areas.	10	10
Unit: 2	Areas of Applications: 2.1 Application in Disaster Management, 2.2 Application Water and Soil. 2.3 Application in Urban Planning and Landuse/ Landcover. 2.4 Application in Environmental Management. 2.5 Application of Remote Sensing in Water resource evaluation. 2.6 Application of Remote Sensing in Watershed Management, Runoff & Soil Loss estimation based on empirical models, 2.7 Application of Remote Sensing in hydro-geomorphological studies for ground water.	20	30
Unit: 3	Spatial Decision Support System: 3.1 GIS and Decision Support Systems: Concept and characteristics of Decision Support Systems (DSS), Spatial Decision Support Systems (SDSS) and GIS	18	30

	<p>3.2 Multicriteria Decision Analysis(MCDA):Elements and Structure of MCDA, Multiobjective and Multiattribute analysis.</p> <p>3.3 Spatial Multicriteria Decision Analysis (SMDA): Framework of SMDA, Evaluation Criteria and GIS, Decision Alternatives and Constraints</p> <p>3.4 Criterion Weighting and Decision Rules: Estimation of Weights- Ranking, Rating, Pairwise Comparison and Trade-off analysis method; Decision Rules-Simple Additive Weighting method and Analytic Hierarchy Process</p>		
Total		48	70

Name of the Course : Diploma in GIS & GPS			
1.Application of GIS in Agriculture (Elective-I)			
Course code :GIS & GPS/ S5 /Th / ELEC-I		Semester : FIFTH	
Duration : 16 weeks		Maximum Marks : 100	
Teaching Scheme		Examination Scheme	
Theory : - 3 hrs/week		Continuous Internal Assessment : 20 Marks	
Tutorial: - NIL		Attendance, Assignment & Quiz : - 10 Marks	
Practical : NIL		End Semester Examination : 70 Marks	
Credit :- 3			
Objective :-			
S.No			
1.	To study analyse and acquire in depth knowledge of different practical problems in the field of Agriculture.		
2.	To learn how to apply concept of GIS in different areas/ practical problems.		
Pre-Requisite :-.			
S.No			
1.	Knowledge of Remote Sensing,GIS, and Digital Image Processing is required.		
Contents :			
Contents (Theory)		Hrs./Unit	Marks
Unit:1	1.1 Fundamental concepts of Agricultural Science: 1.1.1 Crops: Introduction – Yield parameters- spectral properties of crops- identification of crops and acreage estimation 1.1.2 Vegetation indices production forecasting through digital analysis monitoring and condition assessment – case studies.	10	15
Unit: 2	2.1 Soils 2.1.1 Introduction 2.1.2 Soil Survey methods 2.1.3 soil Classification 2.1.4 Land Evaluation. 2.1.5 Saline alkaline soils 2.1.6 Mapping using RS data	18	25
Unit: 3	3.1 Application of Geo-informatics in Agriculture: 3.1.1 Problems soil identification and mapping – Soil sedimentation and erosion- Soil conservation case studies. 3.1.2 Damage assessment, Detection of pest and diseases- damages due to droughts and floods –water-logging and salinity- stress detection. 3.1.3 Integrated surveys, Integrated surveys for sustainable development – watershed approach – Agriculture and forest development.	20	30

	3.1.4 GIS for drawing out action plans- case studies and recent development in Agro- climatic modelling – watershed planning.		
	Total	48	70

Name of the Course : Diploma in GIS & GPS			
2.Application of GIS in Water Resources Management(Elective-I)			
Course code :GIS & GPS/ S5 /Th / ELEC-I		Semester : FIFTH	
Duration : 16 weeks		Maximum Marks : 100	
Teaching Scheme		Examination Scheme	
Theory : - 3 hrs/week		Continuous Internal Assessment : 20 Marks	
Tutorial: - NIL		Attendance, Assignment & Quiz : - 10 Marks	
Practical : NIL		End Semester Examination : 70 Marks	
Credit :- 3			
Objective :-			
S.No			
1.	To study analyse and acquire in depth knowledge of different application areas where GIS is applied.		
2.	To learn how to apply concept of GIS in different practical problems in the field of water resource management.		
Pre-Requisite :-			
S.No			
1.	Knowledge of Remote Sensing,GIS, and Digital Image Processing is required.		
Contents :			
Contents (Theory)		Hrs./Unit	Marks
Unit:1	1.1 Concepts in Resources: 1.1.1 Resources classification systems, natural and cultural resources, renewable and non-renewable resources. 1.1.2 Resource Conservation: Remote sensing based Land use- Land cover mapping for resource monitoring and management Sustainable development of natural resources. 1.1.3 Land Resources: Introduction to soil, mineral resources, remote sensing in mapping soil. 1.1.4 Water Resource: Introduction to water resource- Surface water-ground water, water deciphering, 1.1.5 Water Quality inventory and monitoring - ground water –surface water. 1.1.6 Remote sensing in water resource mapping soil.	10	15
Unit: 2	2.1 Application of Remote Sensing and GIS in Water Resource Management: 2.1.1 Introduction 2.1.2 Remote sensing application in surface and sub surface water resources evaluation. 2.1.3 Water mining and pollution. 2.1.4 Issues in water resources management.	18	25
Unit: 3	3.1 Application of Remote Sensing and GIS in Water Resource evaluation. 3.1.1 Drought & flood Assessment.	20	30

	<p>3.1.2 Flood plain mapping.</p> <p>3.1.3 Soil moisture, water quality, snow & cloud mapping.</p> <p>3.1.3 Estimation of Aquatic biodiversity.</p> <p>3.1.4 Runoff and soil loss estimation.</p> <p>3.1.5 Site location for storage and diversion projects.</p> <p>3.1.6 Dam site selection, tunnel and canal Alignment</p> <p>3.1.7 Case Studies.</p>		
Total		48	70

Name of the Course : Diploma in GIS & GPS			
3.Application of GIS in Watershed Management(Elective-I)			
Course code :GIS & GPS/ S5 /Th / ELEC-I		Semester : FIFTH	
Duration : 16 weeks		Maximum Marks : 100	
Teaching Scheme		Examination Scheme	
Theory : - 3 hrs/week		Continuous Internal Assessment : 20 Marks	
Tutorial: - NIL		Attendance, Assignment & Quiz : - 10 Marks	
Practical : NIL		End Semester Examination : 70 Marks	
Credit :- 3			
Objective :-			
S.No			
1.	To study analyse and acquire in depth knowledge of different application areas where GIS is applied.		
2.	To learn how to apply concept of GIS in different practical problems in the field of watershed management.		
Pre-Requisite :-			
S.No			
1.	Knowledge of Remote Sensing, GIS, and Digital Image Processing is required.		
Contents :			
	Contents (Theory)	Hrs./Unit	Marks
Unit:1	1.1 Water Resources and Watershed Management: 1.1.1 Quality inventory and monitoring, quantity assessment – Parametric watershed modeling – dimensional consideration of basic dynamics – evaluation of hydrologic parameters	10	15
Unit: 2	2.1 Concept of watershed 2.1.1 Morphometric Analysis 2.1.2 Hydro-morph geologic interpretation techniques for targeting ground water potential zones in alluvial, sedimentary and hard rock areas, location of aquifer. 2.1.3 Watershed management, techniques of soil and water conservation.	18	25
Unit: 3	3.1 Remote Sensing in Watershed Management. 3.1.1 Drought & flood Assessment, flood plain mapping, soil moisture, water quality, snow & cloud mapping. 3.1.2 Estimation of Aquatic biodiversity, Runoff and soil loss estimation. 3.1.3 Site location for storage and diversion projects, dam site selection, and tunnel and canal alignment. 3.1.4 Case Studies.	20	30
Total		48	70

Name of the Course : GIS & GPS (DIGITAL IMAGE PROCESSING –II)	
Course code : GIS & GPS / S5 / P/ DIP-II	Semester : FIFTH
Duration : 15 weeks	Maximum Marks : 100
Teaching Scheme	Examination Scheme
Theory : - hrs/week	Continuous Internal Assessment : 50 Marks
Tutorial: - hrs/week	Attendance, Assignment & Quiz : -
Practical : 4 hrs/week	External Assessment : 50 Marks
Credit :- 4	
Aim :-	
S.No	
1.	Developing the advanced skill required for image processing related to Geographic Information system.
Objective :-	
S.No	Students will be able to:
1.	Learn and use different steps required for image processing.
2.	Perform analysis of digital images required for analysis in GIS.
3.	Process raw survey data obtained in the form of image for GIS..
4.	Perform interpretation of satellite imageries.
INSTRUCTIONS:	
S.No	
1.	Group size for Sessional work should be maximum 6 students.
2.	Each student from a group should handle the software required for Image Processing.
3.	Processing raw satellite images.
4.	A total number of 4 assignments (as per syllabus) must be prepared individually.
Pre-Requisite :-	
S.No	
1.	Preliminary theoretical concept of Digital Image Processing.
2.	Students should have basic knowledge of information system.
Contents : (Practical)	
Sl. No.	Assignments

1.	<p>1.0 Introduction to Image Processing</p> <p>1.1 Familiarization with ERDAS Imagine/Geomatica/ Open Source Software.</p> <p>1.2 Visualization; Import and Export of Satellite Data into various formats.</p> <p>1.3 Geocoding of Toposheet; Creating subset of Topo Sheet. Resolution merge.</p> <p>1.4 Loading of digital data into RS software; Conversion of digital data into image processing software format.</p> <p>1.5 Analysis of statistics, projection and datum for newly loaded data.</p>
2.	<p>2.0 Data Processing, Image Restoration and Enhancement.</p> <p>2.1 Digital images; Subsetting of data;</p> <p>2.2 Referencing of digital data; Re-projection of digital data.</p> <p>2.3 Displaying Individual Pixel Value and Image Information.</p> <p>2.4 Image rectification; Image enhancement techniques: Histogram equalization;</p> <p>2.5 Band ratioing; Image filtering; - Low Pass Filter, High Pass Filter, Principal Component Analysis (PCA).</p> <p>2.6 Map composition.</p>
3.	<p>3.0 Pattern Recognition and Image Classification.</p> <p>3.1 Image classification: Unsupervised classification.</p> <p>3.2 Training sets and supervised classification using Maximum likelihood and Minimum to Mean distance methods.</p> <p>3.3 Object based Classification.</p> <p>3.4 Accuracy assessment: User, Producer, Overall accuracies; K-Statistics; Image fusion. Stitching of scenes; Change detection from multi-date imagery;</p> <p>3.5 NDVI and density slicing of digital satellite data for forest density classification.</p>
4	<p>4.0 Programming for Image Processing</p> <p>4.1 Introduction to computers, Computer Programming; & programming concept' Development of algorithms and flow chart.</p> <p>4.2. Programming using concepts of variables, operators</p> <p>4.3. Programming using control structures</p> <p>4.4. Programming using functions and arrays</p> <p>4.5. Programming using strings</p> <p>4.6. Programming using data structure</p> <p>4.7. Programming using file handling</p> <p>4.8. Creation of forms and using control variables</p> <p>4.9. Creating menus in forms</p> <p>4.10. Introduction and application of PYTHON</p>

Name of the Course : GIS & GPS	
(GIS Practice-II)	
Course code :GIS & GPS /S5 /P / GISP-II	Semester : FIFTH
Duration : 15 weeks	Maximum Marks : 150
Teaching Scheme	Examination Scheme
Theory : - hrs/week	Continuous Intern al Assessment : 100 Marks
Tutorial: - hrs/week	Attendance, Assignment & Quiz : -
Practical : 4 hrs/week	External Assessment : 50 Marks
Credit :- 4	
Aim :-	
S.No	
1.	Developing the skill required for image processing related to Geographic Information system.
Objective :-	
S.No	Students will be able to:
1.	Learn and use different steps required for GIS related activities.
2.	Perform analysis related with Geo-informatics.
INSTRUCTIONS:	
S.No	
1.	Group size for Sessional work should be maximum 3 students.
2.	Each student from a group should handle the software required for Image Processing.
3.	Processing raw satellite images.
4.	A total number of 4 assignments (as per syllabus) must be prepared individually.
Pre-Requisite :-	
S.No	
1.	Preliminary concept of using computer.
2.	Students should have basic knowledge of Surveying.
Contents : (Practical)	
Sl. No.	Assignments
1.	1.0 Application of GIS in Urban Land Use Mapping. 1.1 Urban area classification; 1.2 Monitoring of Urban Plan and change detection. 1.3 Urban land use/land cover classification and mapping. 1.4 Urban mapping, zonation and field verifications. 1.5 Monitoring of urban environment. 1.6 Urban facility mapping; Traffic survey. 1.7 Solid waste management.

2.	<p>2.0 Disaster Management.</p> <p>2.1 Flood prone area mapping using satellite images and ancillary data.</p> <p>2.2 Forest fire risk mapping using satellite images and GIS.</p> <p>2.3 Landslide mapping and risk evaluation.</p> <p>2.4 Multivariate analysis and application of geoinformatics model for landslide hazard zonation.</p> <p>2.5 Drought prone area mapping using satellite images.</p> <p>2.6 Spatial variation of climatic data using GIS techniques for drought prediction.</p> <p>2.7 Terrain mapping in coastal region for coastal hazards prediction.</p> <p>2.8 Multiple hazard mapping using satellite images and modelling risk in GIS</p>
----	--

Name of the Course : GIS & GPS (PROFESSIONAL PRACTICE III)	
Course code :GIS & GPS /S5 /P / GISP-III	Semester : FIFTH
Duration : 15 weeks	Maximum Marks : 50
Teaching Scheme	Examination Scheme
Theory : - hrs/week	Continuous Internal Assessment : 25 Marks
Tutorial: - hrs/week	Attendance, Assignment & Quiz : - Marks
Practical : 3 hrs/week	External Assessment : 25 Marks
Credit :- 2	
Aim :-	
S.No	
1.	Development and evaluation of individual skills.
2.	Enhancement in soft skills through innovation.
3.	Development of professional approach
Objective :-	
S.No	Students will be able to:
1.	Acquire information from different sources.
2.	Prepare notes for given topic.
3.	Present given topic in a seminar.
4.	Interact with peers to share thoughts.
5.	Prepare a report on industrial visit, expert lecture.
Pre-Requisite :-	
S.No	
1.	Communication skill must be perfect.
Contents : (Practical)	
Sl. No.	Assignments
1.	Link up with Industries A proper and closed link with industries working on different GIS related projects may be maintained. Students may get recent technological / software developments from industry experts. A project report must be submitted after visit to the industry.
2.	Lectures by Professional / Industrial Expert be organized on any GIS related topic.
3.	Individual Assignments : Seminar and report preparation.
Text Books:- Nil.	
Reference books :- Nil	
Suggested List of Laboratory Experiments :- Nil	
Suggested List of Assignments/Tutorial :- Nil	

Name of the Course : GIS & GPS (Mission Projects in India)	
Course code :GIS & GPS /S5 /P / MPI	Semester : FIFTH
Duration : 15 weeks	Maximum Marks : 50
Teaching Scheme	Examination Scheme
Theory : - hrs/week	Continuous Internal Assessment : 25 Marks
Tutorial: - hrs/week	Attendance, Assignment & Quiz : - Marks
Practical : 3 hrs/week	External Assessment : 25 Marks
Credit :- 1	
S.No	
Objective :-	
S.No	Students will be able to:
1.	Acquire information from different Govt. agencies.
2.	Prepare notes for different projects of India.
3.	Prepare a presentation on a particular project of India
Pre-Requisite :-	
S.No	
1.	Communication skill must be perfect.
Contents : (Practical)	
Sl. No.	Study / Assignments
1.	1.0 Overview of IMSD, NRIS, NNRMS etc. 1.1 RGNDWM, Wasteland Development, Recharge, Land cover mapping, Micro-wave projects. 1.2 Functions of DOS (National level and state level) 1.3 Indian Remote Sensing Satellite Programme 1.4 National level and State level Mission Projects. 1.5 Natural Resources Mission Projects – other agencies.
2.	2.0 Status of Indian Space Programme vis-à-vis Space Programmes of other countries. 2.1 Contribution of ISRO in Indian space research. 2.3 Indian Space programmes: Mission Moon (Chandrayan),Mars Mission. 2.4 Himalayan Ecology
3.	Individual Assignments : Seminar and report preparation.
Text Books:- Nil.	
Reference books :- Nil	
Suggested List of Laboratory Experiments :- Nil	
Suggested List of Assignments/Tutorial :- Nil	

Name of the Course : GIS & GPS	
(Project-I)	
Course code :GIS & GPS / S5 / P /PR-I	Semester : FIFTH
Duration : 15 weeks	Maximum Marks : 200
Teaching Scheme	Examination Scheme
Theory : - hrs/week	Continuous Intern al Assessment : 125 Marks
Tutorial: - hrs/week	Attendance, Assignment & Quiz : -
Practical : 8 hrs/week	External Assessment : 75
Credit :- 4	
Aim :-	
S.No	
1.	Learning outcome of the syllabus upto Fifth Semester.
Objective :-	
S.No	Students will be able to:
1.	Identify different aspects related to a GIS projects.
2.	Identification of Problems.
3.	Finding solution of the problems.
4.	Preparation of project flow chart.
5.	Preparation of Detailed Project Report.
INSTRUCTIONS:	
S.No	
1.	Group size for Project work should be maximum 6 students.
2.	Collection of raw data, processing, analysing and interpretation of result in GIS environment.
Pre-Requisite :-	
S.No	
1.	Experience of handling Remote Sensing and GIS related Software.
2.	Students should have knowledge of Surveying, Computer, DBMS.
Contents : (Practical)	
Sl. No.	Assignments
1.	<p>Topic of the Project may be selected by Subject Teacher concerned. As example-</p> <ol style="list-style-type: none"> 1. Demographic shift of border area of West Bengal. 2. Identification of Flood prone area of West Bengal. 3. Selection of location of Primary schools in west Bengal based on some criterion. Etc. <p>The Project must include the following: Research. Identification of a research problem.</p>

	Review of literature. Observation. Validation Result Conclusion.etc.
--	--