DEPARTMENT OF CIVIL ENGINEERING
ANNA UNIVERSITY, CHENNAI

OUR VISION:

Department of Civil Engineering, Anna University, shall strive hard to develop and impart technical knowledge and professional skills required for Civil and Geoinformatics Engineering practice through excellence in teaching, research and consultancy to address sustainable infrastructure development needs at local, national and International levels.

OUR MISSION:

Department of Civil Engineering, Anna University shall contribute to technological and development by

1. Providing a firm scientific and technological base in Civil and Geo-informatics Engineering to achieve self- reliance.
2. Providing quality education through innovation in teaching practices at par with global standards.
3. Nurturing leadership and entrepreneurship qualities with ethical values.
4. Developing and disseminating latest knowledge and technologies in emerging areas of Civil and Geoinformatics Engineering.
5. Sharing intellectual resources and infrastructure facilities through collaborative partnership.
6. Ensuring supporting conditions for enhancing the employability skills.

ANNA UNIVERSITY, CHENNAI

UNIVERSITY DEPARTMENTS
B.E. GEOINFORMATICS

REGULATIONS – 2019

CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

The Programme B.E. Geoinformatics will help to

PEO1	Excel in successful careers in Geospatial and Information Technology industries and in Geospatial research on par with global standards
PEO2	Posses necessary professional capabilities in Geospatial data collection, analysis, innovative thinking and synthesis for solving real world problems.
PEO3	Demonstrate entrepreneurship skills, leadership qualities and to work in teams on trans disciplinary projects.
PEO4	Have required competence to provide robust solutions using modern instrumentation and software tools
PEO5	Imbibe requisite qualities to practice the geospatial technology with professional ethics

PROGRAMME OUTCOMES (POs)

Graduates of B.E. Geoinformatics students will be able to

PO1	Knowledge of Engineering Sciences	Apply the Knowledge of mathematics, science and Engineering fundamentals in the field of Geoinformatics Engineering.
PO2	Problem Analysis	Identify, formulate and provide solution for multi-disciplinary Problems using Geoinformatics.
PO3	Design / development of Solutions	design and evaluate solutions for efficient management of natural, socio-economic resources through intervention of Geoinformatics tools.
PO4	Investigations	Conduct investigations of geoinformatics engineering problems including literature survey, appropriate methodology, analysis, interpretation of data and synthesis of information to provide valid conclusion
PO5	Use of Modern Technology	Design, use and apply modern technology, tools and software to address and solve the problems with due understanding of the limitations.
PO6	Individual and Team work	Function effectively as on individual and as member or leader in diverse teams and in multi-disciplinary settings and demonstrating a capacity for self-management and teamwork, decision-making based on open -mindedness, objectivity and rational analysis.
PO7	Communication	Communicate effectively with the engineering community and also with society at large, and write reports and make effective presentations.
PO8	Engineer and Society	Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to Geo Informatics Engineering Practice.
PO9	Ethics	Understand the commitment to professional ethics and responsibilities of Geo Informatics Engineers and to contribute to the comprehensive societal development

PO10	Environment and Sustainability	Understand the Socio economic impact of Geo Informatics Engineering solutions for sustainable development
PO11	Project Management and Finance	Demonstrate Knowledge of management and business practices, such as risk and change management and understand their limitations
PO12	Life Long Learning	Develop ability to engage in independent and life-long learning to improve competence by critical examination of the outcomes of one's actions in addressing Geo Informatics Engineering issues and learning from corrective and preventive measures.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

Graduates of B.E. Geoinformatics students will be able to

PSO1	Knowledge of Geoinformatics discipline	Demonstrate in-depth knowledge of Geoinformatics engineering discipline with an ability to evaluate, analyse and synthesise existing and new knowledge.
PSO2	Critical analysis of Geoinformatics Engineering problems and innovations	Critically analyze complex Geoinformatics problems and apply independent judgment for synthesizing information and make innovative advances in a theoretical, practical policy context.
PSO3	Conceptualization and evaluation of engineering solutions to Geoinformatics engineering issues.	Conceptualize and solve Geoinformatics engineering problems, evaluate potential solutions and arrive at technically feasible, economically viable and environmentally sound solutions with due consideration of health, safety and socio cultural factors.

1. **PEO / PO Mapping:**

Programme Educational Objectives	Programme Outcomes											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
II	✓	✓	✓		✓			✓			✓	✓
III		✓	✓	✓				✓				✓
IV	✓	✓	✓	✓	✓			✓			✓	✓
V			✓					✓	✓	✓		✓

CO-PO Mapping –

		Course Name	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
YEAR I	SEMESTER I	Technical English															
		Engineering Mathematics I															
		Engineering Physics															
		Engineering Chemistry															
		Problem Solving and Python Programming															
		தமிழர் மரபு /Heritage of Tamils															
		Basic Sciences Laboratory															
		Problem Solving and Python Programming Laboratory															
		English Laboratory$															
	SEMESTER II	Professional Communication															
		Engineering Mathematics II															
		Engineering Graphics															
		Basics of Electrical and Electronics Engineering															
		Engineering Mechanics															
		Physics for Geoinformatics Engineering															
		தமிழரும்ததொழில்நுட்பமும் /Tamils and Technology															
		Workshop Practices Laboratory															
		Electrical and Electronics Engineering Laboratory															
		Communication Laboratory / Foreign Language$															

YEAR II	SEMESTER III	Transform Techniques and Statistics															
		Spatial Database Management System	2	2	3		3			1				1	3	2	1
		Surveying I	3	2	3	2	3	2	3	2	1	2		3	3	3	3
		Remote Sensing I	2	2	1	2		1		2		3	2	2	3	3	3
		Photogrammetry	2	2	3	3	2	1		1	1		2	2	2	2	2
		Surveying Laboratory I	3	2	3	3	3								3	3	3
		Remote Sensing and Photogrammetry Laboratory	2		2	3	2	2			2				3	3	3
		Elective – Humanities I															
	SEMESTER IV	Total Quality Management	3	1	1	1	1	2	1	2	1	2	2	2	3	2	3
		Remote Sensing II	3	3	3	3									2	3	2
		Cartography and GIS	2	2	1	2	2	2							3	3	1
		Object Oriented Programming Using C++	2	2	2	2	2	1						2	2	3	3
		Geodesy	3	3	3	3	2	2	1				2	1	3	3	1
		Surveying II	2	3	2	2	2		1						2	3	3
		Surveying Laboratory II	3	3	3	2	2				2				2	2	2
		Cartography and GIS Laboratory	3	3	3	3	2								3	3	3

YEAR III	SEMESTER V	Elective – Humanities I															
		Audit Course I															
		Spatial data adjustment	3	2	1	2	3	-	-	-	-	-	-	-	2	3	3
		Digital Image Processing	2	2	2	2	3	1		2			1	1	2	3	2
		Total Station and GPS Surveying	3	2	3	2	3				2		1	2	2	2	3
		Professional Elective I															
		Digital Image Processing Laboratory	2	2	2	2	3	3	1		2	2	2	2	3	2	3
		Total Station and GPS Surveying Laboratory	2	2	2	2	2				2				3	3	3
		Summer Internship (2 Weeks)	3	3	3	2	2	1	2	1	2	3	2	1	3	2	2
	SEMESTER VI	Spatial Analysis and Applications	2	2	2	1	2	1					1	1	2	2	2
		Environmental Sciences															
		Audit Course II															
		Soft Computing Techniques	3	1	3	3	3								2	3	3
		Professional Elective II															
		Professional Elective III															
		Open Elective I															
		Spatial Analysis and Applications Laboratory	2	2	2	3	3	1		2	2	2	2	3	2	3	2
		Survey Camp	2	2	2	2	3			2	3	3	2	2	3	2	2

YEAR IV	SEMESTER VII	Decision Support System for Resource Management	2	1	1	2	1	1	1					2	3	3	2
		Geospatial analysis with R Programming	3	2	3	2	2	1	1		1		1	1	3	3	3
		Mat Lab Programming and Applications	2	3	2	2	2		3						3	3	2
		Professional Elective IV															
		Professional Elective V															
		Open Elective II															
		Customization Laboratory	3	3	3	2	3								2	3	3
		Project I	2	2	3	3	2	2	2	1	2	2	3	2	2	2	2
	SEMESTER VIII	Project II	2	2	3	3	2	2	2	1	2	2	3	2	2	2	2

PROFESSIONAL ELECTIVE

Course Name	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12	PSO1	PSO2	PSO3
Climate Change Studies	2	2	3	3	2	1		1	1		2	2	2	2	2
Big data Analytics	2	2	2	1	2								3	3	2
Urban Geoinformatics	2	3	2	2	3	2	1			2	2	2	3	3	2
Hydrology and Water Resources Engineering for Geoinformatics	3	2	2	2	2	1	2	1			2	2	3	2	2
Transportation Geoinformatics	2	2	1	1	2	1	1	1	1	1	1	1	2	3	2
Environmental Geoinformatics	2	3	3	3	3	2	3	2	2			3	3	2	3
Airborne and Terrestrial Laser Mapping	3	3	3	3	3	2					3	2	3	3	3
Advanced Geo Data Analysis	3	3	3										3	3	3
Oceanography and Coastal Processes	3	3	2	2	2	1	1		1	1		1	3	3	3
Health GIS	1	2	1	2	2	1							3	2	2
Geoinformatics for Agriculture and Forestry	2	2	2	3	2		1	1			2	3	3	3	3
GIS based Disaster Preparedness and Mitigation	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3
Planetary Remote sensing	3	2	2	2	2				1				2	2	
Satellite Meteorology	3	3	3	2	1	3	3	1	1		1		3	3	3
Web GIS	-	-	1	-	3	-	-	-	2	-	-	2	1	2	1
Geology for Geoinformatics															
Mobile Application development	2	2	2		2				1				2	3	2

ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS B
B.E. GEOINFORMATICS
REGULATIONS -2019
CHOICE BASED CREDIT SYSTEM
CURRICULA AND SYLLABI FOR I TO VIII SEMESTERS
(Applicable to Students admitted from the Academic Year 2022-2023 onwards)

SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS5151	Technical English	HSMC	3	0	0	3	3
2.	MA5158	Engineering Mathematics I	BSC	3	1	0	4	4
3.	PH5151	Engineering Physics	BSC	3	0	0	3	3
4.	CY5151	Engineering Chemistry	BSC	3	0	0	3	3
5.	GE5153	Problem Solving and Python Programming	ESC	3	0	0	3	3
6.	GE5154	தமிழர் மரபு /Heritage of Tamils	HSMC	1	0	0	1	1
PRACTICALS								
7.	BS5161	Basic Sciences Laboratory	BSC	0	0	4	4	2
8.	GE5161	Problem Solving and Python Programming Laboratory	ESC	0	0	4	4	2
9.	GE5163	English Laboratory$	EEC	0	0	2	2	1
			TOTAL	16	1	10	27	22

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	HS5251	Professional Communication	HSMC	2	0	0	2	2
2.	MA5252	Engineering Mathematics II	BSC	3	1	0	4	4
3.	GE5151	Engineering Graphics	ESC	1	0	4	5	3
4.	EE5251	Basics of Electrical and Electronics Engineering	ESC	3	0	0	3	3
5.	GE5152	Engineering Mechanics	ESC	3	1	0	4	4
6.	PH5201	Physics for Geoinformatics Engineering	BSC	3	0	0	3	3
7.	GE5252	தமிழரும் ததொழில்நுட்பமும் / Tamils and Technology	HSMC	1	0	0	1	1
PRACTICALS								
8.	GE5162	Workshop Practices Laboratory	ESC	0	0	4	4	2
9.	EE5261	Electrical and Electronics Engineering Laboratory	ESC	0	0	4	4	2
10.	GE5262	Communication Laboratory / Foreign Language$	EEC	0	0	4	4	2
			TOTAL	16	2	16	34	26

$ Skill Based Course

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	MA5301	Transform Techniques and Statistics	BSC	3	1	0	4	4
2.	GI5301	Spatial Database Management System	ESC	3	0	0	3	3
3.	GI5302	Surveying I	PCC	3	0	0	3	3
4.	GI5303	Remote Sensing I	PCC	3	0	0	3	3
5.	GI5304	Photogrammetry	PCC	3	0	0	3	3
6.		Elective - Humanities I	HSMC	3	0	0	3	3
PRACTICALS								
7.	GI5311	Surveying Laboratory I	PCC	0	0	4	4	2
8.	GI5312	Remote Sensing and Photogrammetry Laboratory	PCC	0	0	2	2	1
9.	GE5361	Professional Development[$]	EEC	0	0	2	2	1
			TOTAL	**18**	**1**	**6**	**27**	**23**

$ Skill Based Course

SEMESTER III

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	GE5451	Total Quality Management	HSMC	3	0	0	3	3
2.	GI5401	Remote Sensing II	PCC	3	0	0	3	3
3.	GI5402	Cartography and GIS	PCC	3	0	0	3	3
4.	GI5403	Object Oriented Programming Using C++	PCC	2	0	2	4	3
5.	GI5404	Geodesy	PCC	3	0	0	3	3
6.	GI5405	Surveying II	PCC	3	0	0	3	3
PRACTICALS								
7.	GI5411	Surveying Laboratory II	PCC	0	0	4	4	2
8.	GI5412	Cartography and GIS Laboratory	PCC	0	0	2	2	1
			TOTAL	**17**	**0**	**8**	**25**	**21**

SEMESTER V

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.		Elective - Humanities I	HSMC	3	0	0	3	3
2.		Audit Course I*	AC	3	0	0	3	0
3.	GI5501	Spatial data adjustment	PCC	3	0	0	3	3
4.	GI5502	Digital Image Processing	PCC	3	0	0	3	3
5.	GI5551	Total Station and GPS Surveying	PCC	3	0	0	3	3
6.		Professional Elective I	PEC	3	0	0	3	3
PRACTICALS								
7.	GI5511	Digital Image Processing Laboratory	PCC	0	0	4	4	2
8.	GI5512	Total Station and GPS Surveying Laboratory	PCC	0	0	2	2	1
9.	GI5513	Summer Internship (2 Weeks)	EEC	0	0	0	0	1
			TOTAL	**18**	**0**	**6**	**24**	**19**

*** Audit Course is optional**

SEMESTER VI

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	GI5601	Spatial Analysis and Applications	PCC	3	0	0	3	3
2.	GE5251	Environmental Sciences	BSC	3	0	0	3	3
3.		Audit Course II*	AC	3	0	0	3	0
4.	GI5602	Soft Computing Techniques	PCC	3	0	0	3	3
5.		Professional Elective II	PEC	3	0	0	3	3
6.		Professional Elective III	PEC	3	0	0	3	3
7.		Professional Elective IV	PEC	3	0	0	3	3
8.		Open Elective I	OEC	3	0	0	3	3
PRACTICALS								
9.	GI5611	Spatial Analysis and Applications Laboratory	PCC	0	0	4	4	2
10.	GI5612	Survey Camp	EEC	-	-	-	-	2
			TOTAL	**24**	**0**	**4**	**28**	**25**

*** Audit Course is optional**

SEMESTER VII

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
THEORY								
1.	GI5701	Decision Support System for Resource Management	PCC	3	0	0	3	3
2.	GI5702	Geospatial analysis with R Programming	PCC	3	0	0	3	3
3.	GI5703	Matlab Programming and Applications	PCC	3	0	2	5	4
4.		Professional Elective V	PEC	3	0	0	3	3
5.		Professional Elective VI	PEC	3	0	0	3	3
6.		Open Elective II	OEC	3	0	0	3	3
PRACTICALS								
8.	GI5711	Customization Laboratory	PCC	0	0	2	2	1
9.	GI5712	Project I	EEC	0	0	6	6	3
			TOTAL	18	0	10	28	23

SEMESTER VIII

S. NO.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
PRACTICALS								
1.	GI5811	Project II	EEC	0	0	16	16	8
			TOTAL	0	0	16	16	8

TOTAL CREDITS: 167

HUMANITIES AND SOCIAL SCIENCES (HSMC) – MANAGEMENT AND OTHERS

Sl. No	Course Code	Course Title	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1.	HS5151	Technical English	3	0	0	3	1
2.	GE5154	தமிழர் மரபு /Heritage of	1	0	0	1	1
3.	HS5251	Professional Communication	2	0	0	2	2
4.	GE5252	தமிழரும் ததொழில்நுட்பமும் / Tamils	1	0	0	1	1
5.	GE5451	Total Quality Management	3	0	0	3	4
					Total Credits:	10	

HSMC- ELECTIVES – HUMANITIES I (ODD SEMESTER)

Sl. No	Course Code	Course Title	Periods per week			Credits
			Lecture	Tutorial	Practical	
1.	HU5171	Language and Communication	3	0	0	3
2.	HU5172	Values and Ethics	3	0	0	3
3.	HU5173	Human Relations at Work	3	0	0	3
4.	HU5174	Psychological Processes	3	0	0	3
5.	HU5175	Education, Technology and Society	3	0	0	3
6.	HU5176	Philosophy	3	0	0	3
7.	HU5177	Applications of Psychology in Everyday Life	3	0	0	3

BASIC SCIENCE COURSE [BSC

Sl. No	Course Code	Course Title	Periods Per week			Credits	Semester
			Lecture	Tutorial	Practical		
1.	MA5158	Engineering Mathematics I	3	1	0	4	1
2.	PH5151	Engineering Physics	3	0	0	3	1
3.	CY5151	Engineering Chemistry	3	0	0	3	1
4.	BS5161	Basic Sciences Laboratory	0	0	4	2	1
5.	MA5252	Engineering Mathematics II	3	1	0	4	2
6.	PH5201	Physics for Geoinformatics Engineering	3	0	0	3	2
7.	MA5301	Transform Techniques and Statistics	3	1	0	4	3
8.	GE5251	Environmental Sciences	3	0	0	3	6
					Total Credits	26	

ENGINEERING SCIENCE COURSE [ESC]

Sl. No	Course Code	Course Title	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1.	GE5153	Problem Solving and Python Programming	3	0	0	3	1
2.	GE5161	Problem Solving and Python Programming Laboratory	0	0	4	2	1
3.	GE5151	Engineering Graphics	1	0	4	3	2
4.	GE5162	Workshop Practices Laboratory	0	0	4	2	2
5.	EE5251	Basics of Electrical and Electronics Engineering	3	0	0	3	2
6.	GE5152	Engineering Mechanics	3	1	0	4	2
7.	EE5261	Electrical and Electronics Engineering Laboratory	0	0	4	2	2
8.	GI5301	Spatial Database Management System	3	0	0	3	3
					Total Credits	**22**	

PROFESSIONAL CORE COURSES [PCC]

Sl. No	Course Code	Course Title	Periods Per Week			Credits	Semester
			Lecture	Tutorial	Practical		
1.	GI5302	Surveying I	3	0	0	3	3
2.	GI5303	Remote Sensing I	3	0	0	3	3
3.	GI5304	Photogrammetry	3	0	0	3	3
4.	GI5311	Surveying Laboratory I	0	0	4	2	3
5.	GI5312	Remote Sensing and Photogrammetry Laboratory	0	0	2	1	3
6.	GI5401	Remote Sensing II	3	0	0	3	4
7.	GI5402	Cartography and GIS	3	0	0	3	4
8.	GI5403	Object Oriented Programming Using C++	2	0	2	3	4
9.	GI5404	Geodesy	3	0	0	3	4
10.	GI5405	Surveying II	3	0	0	3	4
11.	GI5411	Surveying Laboratory II	0	0	4	2	4
12.	GI5412	Cartography and GIS Laboratory	0	0	2	1	4
13.	GI5501	Spatial data adjustment	3	0	0	3	5
14.	GI5502	Digital Image Processing	3	0	0	3	5
15.	GI5551	Total Station and GPS Surveying	3	0	0	3	5
16.	GI5511	Digital Image Processing Laboratory	0	0	4	2	5

17.	GI5512	Total Station and GPS Surveying Laboratory	0	0	2	1	5
18.	GI5601	Spatial Analysis and Applications	3	0	0	3	6
19.	GI5602	Soft Computing Techniques	3	0	0	3	6
20.	GI5611	Spatial Analysis and Applications Laboratory	0	0	4	2	6
21.	GI5701	Decision Support System for Resource Management	3	0	0	3	7
22.	GI5702	Geospatial analysis with Python and R Programming	3	0	0	3	7
23.	GI5703	MatLab Programming and Applications	3	0	2	4	7
24.	GI5711	Customization Laboratory	0	0	2	1	7
					Total Credits	**61**	

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

Sl. No	Course Code	Course Title	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1.	GE5163	English Laboratory[$]	0	0	2	1	1
2.	GE5261	Communication Laboratory / Foreign Language[$]	0	0	4	2	2
3.	GE5363	Professional Development	0	0	2	1	3
4.	GI5513	Summer Internship (2 Weeks)	0	0	0	1	5
5.	GI5612	Survey Camp	-	-	-	2	6
6.	GI5712	Project I	0	0	6	3	7
7.	GI5811	Project II	0	0	16	8	8
					Total Credits	**18**	

AUDIT COURSES (AC)

Registration for any of these courses is optional to students

Sl. No	Course Code	Course Title	Periods per week			Credits	Semester
			Lecture	Tutorial	Practical		
1.	AD5091	Constitution of India	3	0	0	0	5/6
2.	AD5092	Value Education	3	0	0	0	
3.	AD5093	Pedagogy Studies	3	0	0	0	
4.	AD5094	Stress Management by Yoga	3	0	0	0	
5.	AD5095	Personality Development Through Life Enlightenment Skills	3	0	0	0	
6.	AD5096	Unnat Bharat Abhiyan	3	0	0	0	
7.	AD5097	Essence of Indian Knowledge Tradition	3	0	0	0	
8.	AD5098	Sanga Tamil Literature Appreciation	3	0	0	0	
					Total Credits:	**0**	

PROFESSIONAL ELECTIVE COURSES

S. NO.	Course Code	Course Title	Periods Per Week			Credits
			Lecture	Tutorial	Practical	
1.	GI5001	Climate Change Studies	3	0	0	3
2.	GI5002	Big data Analytics	3	0	0	3
3.	GI5003	Urban Geoinformatics	3	0	0	3
4.	GI5004	Hydrology and Water Resources Engineering for Geoinformatics	3	0	0	3
5.	GI5005	Transportation Geoinformatics	3	0	0	3
6.	GI5006	Environmental Geoinformatics	3	0	0	3
7.	GI5007	Airborne and Terrestrial Laser Mapping	3	0	0	3
8.	GI5008	Advanced Geo Data Analysis	3	0	0	3
9.	GI5009	Oceanography and Coastal Processes	3	0	0	3
10.	GI5010	Health GIS	3	0	0	3
11.	GI5011	GIS based Disaster Preparedness and Mitigation	3	0	0	3
12.	GI5012	Planetary Remote Sensing	3	0	0	3
13.	GI5013	Satellite Meteorology	3	0	0	3
14.	GI5014	Web GIS	3	0	0	3
15.	GI5015	Mobile Application development	3	0	0	3
16.	GI5071	Geoinformatics for Agriculture and Forestry	3	0	0	3
17.	GE5076	Professional Ethics in Engineering	3	0	0	3
18.	AG5027	Geology for Geoinformatics	3	0	0	3

SUMMARY

Name of the Programme									
	Subject Area	Credits Per Semester							
		I	II	III	IV	V	VI	VII	VIII	
1.	HSMC	4	3	3	3	3	0	0	0	16
2.	BSC	12	7	4	0	0	3	0	0	26
3.	ESC	5	14	3	0	0	0	0	0	22
4.	PCC	0	0	12	18	12	8	11	0	61
5.	PEC	0	0	0	0	3	9	6	0	18
6.	OEC	0	0	0	0	0	3	3	0	6
7.	EEC	1	2	1	0	1	2	3	8	18
8.	Credit / Audit Course					-	-			
	Total	**22**	**26**	**23**	**21**	**19**	**25**	**23**	**08**	**167**

HS5151 TECHNICAL ENGLISH L T P C

3 0 0 3

OBJECTIVES

- To build lexical competency and accuracy that will help learners to use language effectively.
- To learn various reading strategies that will enable learners to comprehend the different modes of reading materials of varied levels of complexity.
- To comprehend the linguistic aspects of various rhetorical structures and functions of Technical English and use them effectively in writing.

UNIT I INTRODUCING ONESELF 9

Theory:

Reading: Descriptive passages (From Newspapers / Magazines) – Writing: Writing a coherent paragraph (Native Place, School Life) – Grammar: Simple present tense, Present continuous tense - Vocabulary development: One word substitution.

UNIT II DIALOGUE WRITING 9

Theory:

Reading: Reading a print interview (Comprehension and inference questions) - Writing: Writing a checklist - Dialogue writing – Grammar: Simple past tense – Question formation (Wh-Questions, 'Yes' or 'No' Questions, Tag Questions) – Vocabulary Development: Lexical items relevant to the theme of the given unit.

UNIT III FORMAL LETTER WRITING 9

Theory:

Reading: Reading motivational essays on famous Engineers and Technologists (Answering Open – Ended and Closed Questions) – Writing: Writing formal letters/ emails – Grammar: Future tenses, Subject and verb agreement - Vocabulary Development: Collocations – Fixed expressions.

UNIT IV WRITING LETTERS OF COMPLAINT 9

Theory:

Reading: Reading Problem – Solution Articles/Essays Drawn From Various Sources – Writing: Making Recommendations – Writing a complaint Letter – Letter / email to the Editor – Note Making – Grammar: Use of modal verbs – Phrasal verbs – Cause-and-effect sentences – Vocabulary Development: Connectives, Use Of cohesive devices in writing, Technical vocabulary.

UNIT V WRITING DEFINITIONS AND PRODUCT DESCRIPTION 9

Theory:

Reading: Reading graphical material for comparison (Advertisements & Infographics) – Writing: Writing Definitions - One-line & extended definition – Compare-and-contrast paragraphs - Grammar: Adjectives – Degrees of comparison – Compound nouns – Compound words - Vocabulary Development: Use of Discourse Markers – Suffixes (Adjectival endings).

TOTAL: 45 PERIODS

LEARNING OUTCOMES:

On completion of the course, the students will be able to:

- Use appropriate language structures and lexical items in authentic contexts.
- Read both general and technical texts and comprehend their denotative and connotative meanings.
- Write different kinds of formal documents with grammatical and lexical appropriacy.

Assessment Pattern

- Two written internal assessments to test learner's progress in grammar, vocabulary, reading and writing skills.
- End Semester exam to be tested in two parts: Theory exam for three hours and listening and speaking skills for two hours.

MA5158	ENGINEERING MATHEMATI CS – I (Common to all branches of B.E. / B.Tech. Programmes in I Semester)	L T P C 3 1 0 4

OBJECTIVES:

- To develop the use of matrix algebra techniques that is needed by engineers for practical applications.
- To familiarize the students with differential calculus.
- To familiarize the student with functions of several variables. This is needed in many branches of engineering.
- To make the students understand various techniques of integration.
- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications.

UNIT I MATRICES 12

Eigenvalues and Eigenvectors of a real matrix – Characteristic equation – Properties eigenvalues and eigenvectors – Cayley-Hamilton theorem – Diagonalization of matrices Reduction of a quadratic form to canonical form by orthogonal transformation – Nature quadratic forms.

UNIT II DIFFERENTIAL CALCULUS 12

Limit of function - One sided limit - Limit Laws - Continuity - left and right continuity - types of discontinuities - Intermediate Value Theorem - Derivatives of a function - Differentiation rules - Chain rule - Implicit differentiation - logarithmic differentiation - Maxima and minima - Mean value theorem - (Optional: Polar coordinate system - Differentiation in polar coordinates).

UNIT III FUNCTIONS OF SEVERAL VARIABLES 12

Partial derivatives – Homogeneous functions and Euler's theorem – Total derivative – Differentiation of implicit functions - Change of variables - Jacobians - Partial differentiation of implicit functions - Taylor's series for functions of two variables - Errors and approximations - Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

UNIT IV INTEGRAL CALCULUS 12

Definite and Indefinite integrals - Substitution rule - Techniques of Integration - Integration by parts, Trigonometric integrals, Trigonometric substitutions, Integration of rational functions by partial fraction, Integration of irrational functions - Improper integrals.

UNIT V MULTIPLE INTEGRALS 12

Double integrals - Change of order of integration - Double integrals in polar coordinates - Area enclosed by plane curves - Triple integrals - Volume of solids - Change of variables in double and triple integrals.

TOTAL :60 PERIODS

OUTCOMES:

At the end of the course the students will be able to

- Use the matrix algebra methods for solving practical problems.
- Apply differential calculus tools in solving various application problems.
- Able to use differential calculus ideas on several variable functions.
- Apply different methods of integration in solving practical problems.
- Apply multiple integral ideas in solving areas, volumes and other practical problems.

TEXTBOOKS:

1. Grewal B.S., “Higher Engineering Mathematics”, Khanna Publishers, 44th Edition, New Delhi, 2017.
2. James Stewart, "Calculus with Early Transcendental Functions", Cengage Learning, 6th Edition, New Delhi,2013.
3. Joel Hass, Christopher Heil and Maurice D.Weir, "Thomas' Calculus", Pearson, 14th Edition, New Delhi, 2018.
4. Narayanan S. and Manicavachagom Pillai T. K., “Calculus" Volume I and II, S. Viswanathan Publishers Pvt. Ltd., Chennai, 2009.

REFERENCES:

1. Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), 7th Edition, New Delhi, 2009.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2015.
3. Greenberg M.D., “Advanced Engineering Mathematics”, Pearson Education2nd Edition, 5th Reprint, Delhi, 2009.
4. Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”,Narosa Publications, 5th Edition, New Delhi, 2017.
5. Peter V.O’Neil, “Advanced Engineering Mathematics”, Cengage Learning India Pvt., Ltd, 7th Edition, New Delhi , 2012.
6. Ramana B.V., “Higher Engineering Mathematics”, Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010.

PH5151 **ENGINEERING PHYSICS** **L T P C**

(Common to all branches of B.E / B.Tech programmes) **3 0 0 3**

OBJECTIVE

- To make the students in understanding the importance of mechanics.
- To equip the students on the knowledge of electromagnetic waves.
- To introduce the basics of oscillations, optics and lasers.
- To enable the students in understanding the importance of quantum physics.
- To elucidate the application of quantum mechanics towards the formation of energy bands in crystalline materials.

UNIT I MECHANICS 9

Moment of inertia (M.I) - Radius of gyration - Theorems of M .I - M.I of circular disc, solid cylinder , hollow cylinder , solid sphere and hollow sphere - K.E of a rotating body – M.I of a diatomic molecule – Rotational energy state of a rigid diatomic molecule - centre of mass – conservation of linear momentum – Relation between Torque and angular momentum - Torsional pendulum.

UNIT II ELECTROMAGNETIC WAVES 9

Gauss's law – Faraday's law - Ampere's law - The Maxwell's equations - wave equation; Plane electromagnetic waves in vacuum, Conditions on the wave field - properties of electromagnetic waves: speed, amplitude, phase, orientation and waves in matter - polarization - Producing electromagnetic waves - Energy and momentum in EM waves: Intensity, waves from localized sources, momentum and radiation pressure - Cell-phone reception. Reflection and transmission of electromagnetic waves from a non-conducting medium-vacuum interface for normal incidence.

UNIT III OSCILLATIONS, OPTICS AND LASERS 9

Simple harmonic motion - resonance - waves on a string - standing waves - traveling waves - Energy transfer of a wave - sound waves - Doppler effect - reflection and refraction of light waves - total internal reflection - interference - interferometers - air wedge experiment. Theory of laser - characteristics - Spontaneous and stimulated emission - Einstein's coefficients - population inversion - Nd-YAG laser, CO_2 laser, semiconductor laser - applications.

UNIT IV BASIC QUANTUM MECHANICS 9

Photons and light waves - Electrons and matter waves - The Schrodinger equation (Time dependent and time independent forms) - meaning of wave function - Normalization - Particle in a infinite potential well - Normalization, probabilities and the correspondence principle.

UNIT V APPLIED QUANTUM MECHANICS 9

The harmonic oscillator - Barrier penetration and quantum tunneling - Tunneling microscope - Resonant diode - Finite potential wells - particle in a three dimensional box - Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands.

TOTAL: 45 PERIODS

OUTCOME

After completion of this course, the students should able to

- Understanding the importance of mechanics.
- Express the knowledge of electromagnetic waves.
- Know the basics of oscillations, optics and lasers.
- Understanding the importance of quantum physics.
- Apply quantum mechanical principles towards the formation of energy bands in crystalline materials.

TEXT BOOKS

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education, 2017.
2. D.Halliday, R.Resnick and J.Walker. Principles of Physics. John Wiley & Sons, 2015.
3. N.Garcia, A.Damask and S.Schwarz. Physics for Computer Science Students. Springer-Verlag, 2012.

REFERENCES

1. R.Wolfson. Essential University Physics. Volume 1 & 2. Pearson, 2016.
2. D.J.Griffiths. Introduction to Electrodynamics. Pearson Education, 2015
3. K.Thyagarajan and A.Ghatak. Lasers: Fundamentals and Applications. Springer, 2012.

CY5151	ENGINEERING CHEMISTRY (COMMON TO ALL BRANCHES)	L T P C 3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of polymers, their properties and some of the important applications.
- To impart knowledge on the basic principles and preparatory methods of nanomaterials.
- To facilitate the understanding of the laws of photochemistry, photoprocesses and instrumentation & applications of spectroscopic techniques.
- To familiarize the operating principles and applications of energy conversion, its processes and storage devices.
- To inculcate sound understanding of water quality parameters and water treatment techniques.

UNIT I POLYMER CHEMISTRY 9

Introduction: Functionality-degree of polymerization. Classification of polymers- natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic and living); condensation and copolymerization. Properties of polymers: Tg, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension. Structure, Properties and uses of: PE, PVC, PC, PTFE, PP, Nylon 6, Nylon 66, Bakelite, Epoxy; Conducting polymers – polyaniline and polypyrrole.

UNIT II NANOCHEMISTRY 9

Basics-distinction between molecules, nanomaterials and bulk materials; size-dependent properties. Types –nanoparticle, nanocluster, nanorod, nanowire and nanotube. Preparation of nanomaterials: sol-gel, solvothermal, laser ablation, chemical vapour deposition, electrochemical deposition and electro spinning. Characterization - Scanning Electron Microscope and Transmission Electron Microscope - Principle and instrumentation (block diagram). Properties (optical, electrical, mechanical and magnetic) and Applications of nanomaterials - medicine, agriculture, electronics and catalysis.

UNIT III PHOTOCHEMISTRY AND SPECTROSCOPY 9

Photochemistry: Laws of photochemistry - Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law (derivation and problems). Photo physical processes – Jablonski diagram. Chemiluminescence, photo-sensitization and photoquenching – mechanism and examples. Spectroscopy: Electromagnetic spectrum - absorption of radiation - electronic, vibrational and rotational transitions. Width and intensities of spectral lines. Atomic absorption spectroscopy, UV-Vis and IR spectroscopy- principles, instrumentation (Block diagram) and applications.

UNIT IV ENERGY CONVERSIONS AND STORAGE 9

Nuclear fission - controlled nuclear fission - nuclear fusion - differences between nuclear fission and fusion - nuclear chain reactions - nuclear energy - light water nuclear power plant – fast breeder reactor. Solar energy conversion - solar cells. Wind energy. Batteries - types of batteries – primary battery (dry cell), secondary battery (lead acid, nickel-cadmium and lithium-ion-battery). Fuel cells – H_2-O_2 and microbial fuel cell. Explosives – classification, examples: TNT, RDX, Dynamite; Rocket fuels and propellants – definition and uses.

UNIT V WATER TECHNOLOGY 9

Water – sources and impurities – water quality parameters: colour, odour, pH, hardness, alkalinity, TDS, COD and BOD. Boiler feed water – requirement – troubles (scale & sludge, caustic embrittlement, boiler corrosion and priming & foaming. Internal conditioning – phosphate, calgon and carbonate treatment. External conditioning - zeolite (permutit) and ion exchange demineralization. Municipal water treatment process – primary (screening, sedimentation and coagulation), secondary (activated sludge process and trickling filter process) and tertiary (ozonolysis, UV treatment, chlorination, reverse osmosis).

TOTAL: 45 PERIODS

OUTCOMES:

- To recognize and apply basic knowledge on different types of polymeric materials, their general preparation methods and applications to futuristic material fabrication needs.
- To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.
- To identify and apply suitable spectroscopic technique for material analysis and study different forms of photochemical reactions.
- To recognize different forms of energy resources and apply them for suitable applications in energy sectors.
- To demonstrate the knowledge of water and their quality in using at different industries.

TEXT BOOKS:

1. Jain P. C. & Monica Jain., "Engineering Chemistry", 16th Edition, Dhanpat Rai Publishing Company (P) Ltd, New Delhi, 2015.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2012.
3. S.S.Dara, "A text book of Engineering Chemistry", Chand Publications, 2014.

REFERENCE BOOKS:

1. Schdeva M V, "Basics of Nano Chemistry", Anmol Publications Pvt Ltd
2. B.Sivasankar, "Instrumental Methods of Analysis", Oxford University Press. 2012.
3. Friedrich Emich, "Engineering Chemistry", Scientific International Ltd.
4. V RGowariker, N V Viswanathan and Jayadev Sreedhar, "Polymer Science" New AGE International Publishers, 2009.

GE5153 PROBLEM SOLVING AND PYTHON PROGRAMMING L T P C
3 0 0 3

OBJECTIVES:

- To know the basics of algorithmic problem solving.
- To develop Python programs with conditionals and loops.
- To define Python functions and use function calls.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

UNIT I INTRODUCTION TO COMPUTING AND PROBLEM SOLVING 9

Fundamentals of Computing - Computing Devices - Identification of Computational Problems - Pseudocodes and Flowcharts – Instructions – Algorithms – Building Blocks of Algorithms – Introduction to Python Programming - Python Interpreter and Interactive Mode - Variables and Identifiers - Arithmetic Operators- Values and Types - Statements.

Suggested Activities:

- Developing Pseudocodes and flowcharts for real life activities such as railway ticket booking using IRCTC, admission process to undergraduate course, academic schedules during a semester etc.
- Developing algorithms for basic mathematical expressions using arithmetic operations.
- Installing Python.
- Simple programs on print statements, arithmetic operations.

Suggested Evaluation Methods:

- Assignments on pseudocodes and flowcharts.
- Tutorials on Python programs.

UNIT II CONDITIONALS AND FUNCTIONS 9

Operators – Boolean Values – Operator Precedence – Expression – Conditionals: If-Else Constructs - Loop Structures/Iterative Statements - While Loop - For Loop - Break Statement - Function Call and Returning Values - Parameter Passing - Local and Global Scope - Recursive Functions.

Suggested Activities:

- Simple Python program implementation using Operators, Conditionals, Iterative Constructs and Functions.
- Implementation of a simple calculator.
- Developing simple applications like calendar, phone directory, to-do lists etc.
- Flow charts for GCD, Exponent Functions, Fibonacci Series using conditionals and iterative statements.
- External learning - Recursion vs. Iteration.

Suggested Evaluation Methods:

- Tutorials on the above activities.
- Group Discussion on external learning.

UNIT III SIMPLE DATA STRUCTURES IN PYTHON 10

Introduction to Data Structures – List – Adding Items to a List – Finding and Updating an Item – Nested Lists - Cloning Lists - Looping Through a List - Sorting a List - List Concatenation - List Slices - List Methods - List Loop - Mutability - Aliasing - Tuples: Creation, Accessing, Updating, Deleting Elements in a Tuple, Tuple Assignment, Tuple as Return Value, Nested Tuples, Basic Tuple Operations – Sets.

Suggested Activities:

- Implementing python program using lists, tuples, sets for the following scenario:
  Simple sorting techniques

  Student Examination Report
  Billing Scheme during shopping.
- External learning - List vs. Tuple vs. Set – Implementing any application using all the three data structures.

Suggested Evaluation Methods:

- Tutorials on the above activities.
- Group Discussion on external learning component.

UNIT IV STRINGS, DICTIONARIES, MODULES 10

Strings: Introduction, Indexing, Traversing, Concatenating, Appending, Multiplying, Formatting, Slicing, Comparing, Iterating - Basic Built-In String Functions - Dictionary: Creating, Accessing, Adding Items, Modifying, Deleting, Sorting, Looping, Nested Dictionaries Built-in Dictionary Function – Finding Key and Value in a Dictionary – Modules – Module Loading and Execution – Packages - Python Standard Libraries.

Suggested Activities:

- Implementing Python program by importing Time module, Math package etc.
- Creation of any package (student's choice) and importing into the application.

Suggested Evaluation Methods:

- Tutorials on the above activities.

UNIT V FILE HANDLING AND EXCEPTION HANDLING 7

Introduction to Files – File Path – Opening and Closing Files – Reading and Writing Files – File Position - Exception: Errors and Exceptions, Exception Handling, Multiple Exceptions.

Suggested Activities:

- Developing modules using Python to handle files and apply various operations on files.
- Usage of exceptions, multiple except blocks - for applications that use delimiters like age, range of numerals etc.
- Implementing Python program to open a non-existent file using exceptions.

Suggested Evaluation Methods:

- Tutorials on the above activities.
- Case Studies.

TOTAL: 45 PERIODS

OUTCOMES:

On completion of the course, students will be able to:

CO1: Develop algorithmic solutions to simple computational problems.
CO2: Develop and execute simple Python programs.
CO3: Write simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python lists, tuples, dictionaries etc.
CO6:Read and write data from/to files in Python programs.

TEXT BOOK:

1. Reema Thareja, "Python Programming: Using Problem Solving Approach", Oxford University Press, 2017.
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, Shroff/O'Reilly Publishers, 2016.

   (http://greenteapress.com/wp/thinkpython/).

REFERENCES:

1. Guido van Rossum, Fred L. Drake Jr., "An Introduction to Python – Revised and Updated for Python 3.2", Network Theory Ltd., 2011.
2. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and Expanded Edition, MIT Press , 2013
3. Charles Dierbach, "Introduction to Computer Science using Python", Wiley India Edition, 2016.
4. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
5. Kenneth A. Lambert, "Fundamentals of Python: First Programs", Cengage Learning, 2012

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓
CO2	✓		✓		✓							✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

GE5154	தமிழர் மரபு	L T P C 1 0 0 1

அலகு I **மொழி மற்றும் இலக்கியம்**: 3

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்விலக்கியங்கள் - சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் - பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலக்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II **மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை**: 3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள்– பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III **நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்**: 3

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV **தமிழர்களின் திணைக் கோட்பாடுகள்**: 3

தமிழகத்தின் தாவரங்களும், விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் – சங்ககால நகரங்களும் துறை முகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும்

அலகு V **இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு**: 3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

GE5154 **HERITAGE OF TAMILS** **L T P C**
1 0 0 1

UNIT I LANGUAGE AND LITERATURE 3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE 3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT III FOLK AND MARTIAL ARTS 3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT IV THINAI CONCEPT OF TAMILS 3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE 3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book

BS5161 **BASIC SCIENCES LABORATORY** **L T P C**

(Common to all branches of B.E. / B.Tech Programmes) **0 0 4 2**

PHYSICS LABORATORY: (Any Seven Experiments)

OBJECTIVE

- To inculcate experimental skills to test basic understanding of physics of materials including properties of matter, thermal and optical properties.
- To induce the students to familiarize with experimental determination of velocity of ultrasonic waves and band gap determination.

LIST OF EXPERIMENTS

1. Torsional pendulum - Determination of rigidity modulus of wire and moment of inertia of disc
2. Non-uniform bending - Determination of Young's modulus
3. Uniform bending – Determination of Young's modulus.
4. Lee's disc Determination of thermal conductivity of a bad conductor
5. Potentiometer-Determination of thermo e.m.f of a thermocouple
6. Laser- Determination of the wave length of the laser using grating
7. Air wedge - Determination of thickness of a thin sheet/wire
8. a) Optical fibre -Determination of Numerical Aperture and acceptance angle

   b) Compact disc- Determination of width of the groove using laser.
9. Acoustic grating- Determination of velocity of ultrasonic waves in liquids.
10. Ultrasonic interferometer – determination of the velocity of sound and compressibility of liquids
11. Post office box -Determination of Band gap of a semiconductor.
12. Spectrometer- Determination of wavelength using gating.
13. Photoelectric effect
14. Michelson Interferometer.
15. Estimation of laser parameters.
16. Melde's string experiment

TOTAL: 30 PERIODS

OUTCOME

Upon completion of the course, the students will be able

- To determine various moduli of elasticity and also various thermal and optical properties of materials.
- To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.

CHEMISTRY LABORATORY: (Minimum of 8 experiments to be conducted)

OBJECTIVES:

- To inculcate experimental skills to test basic understanding of water quality parameters, such as, acidity, alkalinity, hardness, DO, chloride and copper.

- To induce the students to familiarize with electroanalytical techniques such as, pH metry, potentiometry and conductometry in the determination of impurities in aqueous solutions.
- To demonstrate the analysis of metals and polymers by spectroscopy and viscometry methods.

LIST OF EXPERIMENTS:

1. Estimation of HCl using Na_2CO_3 as primary standard and Determination of alkalinity in water sample.
2. Determination of total, temporary & permanent hardness of water by EDTA method.
3. Determination of DO content of water sample by Winkler‟s method.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of copper content of the given solution by Iodometry.
6. Determination of strength of given hydrochloric acid using pH meter.
7. Determination of strength of acids in a mixture of acids using conductivity meter.
8. Estimation of iron content of the given solution using potentiometer.
9. Estimation of iron content of the water sample using spectrophotometer (1, 10-Phenanthroline / thiocyanate method).
10. Estimation of sodium and potassium present in water using flame photometer.
11. Determination of molecular weight of polyvinylalcohol using Ostwald viscometer.
12. Pseudo first order kinetics-ester hydrolysis.
13. Corrosion experiment-weight loss method.
14. Phase change in a solid.

TOTAL: 30 PERIODS

OUTCOMES:

- To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.
- To determine the amount of metal ions through volumetric and spectroscopic techniques
- To determine the molecular weight of polymers by viscometric method.
- To quantitatively analyse the impurities in solution by electroanalytical techniques
- To design and analyse the kinetics of reactions and corrosion of metals

TEXTBOOKS:

1. Laboratory Manual- Department of Chemistry, CEGC, Anna University (2014).
2. Vogel’s Textbook of Quantitative Chemical Analysis (8^{th} edition, 2014).

GE5161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY L T P C
0 0 4 2

OBJECTIVES:

- To understand the problem solving approaches.
- To learn the basic programming constructs in Python.
- To articulate where computing strategies support in providing Python-based solutions to real world problems.
- To use Python data structures - lists, tuples, dictionaries.
- To do input/output with files in Python.

EXPERIMENTS:

1. Identification and solving of simple real life or scientific or technical problems, and developing flow charts for the same.
2. Python programming using simple statements and expressions.
3. Scientific problems using Conditionals and Iterative loops.
4. Implementing real-time/technical applications using Lists, Tuples.
5. Implementing real-time/technical applications using Sets, Dictionaries.
6. Implementing programs using Functions.
7. Implementing programs using Strings.
8. Implementing programs using written modules and Python Standard Libraries.
9. Implementing real-time/technical applications using File handling.
10. Implementing real-time/technical applications using Exception handling.
11. Exploring Pygame tool.
12. Developing a game activity using Pygame like bouncing ball, car race etc.

TOTAL: 60 PERIODS

OUTCOMES:

On completion of the course, students will be able to:

CO1: Develop algorithmic solutions to simple computational problems
CO2: Develop and execute simple Python programs.
CO3: Structure simple Python programs for solving problems.
CO4: Decompose a Python program into functions.
CO5: Represent compound data using Python data structures.
CO6: Apply Python features in developing software applications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓									✓
CO2	✓		✓		✓							✓
CO3	✓	✓	✓									✓
CO4	✓	✓	✓	✓	✓							✓
CO5	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓
CO6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

GE5163 **ENGLISH LABORATORY** **L T P C**
0 0 2 1

OBJECTIVES :

- To improve the communicative competence of learners
- To help learners use language effectively in academic /work contexts
- To develop various listening strategies to comprehend various types of audio materials like lectures, discussions, videos etc.
- To build on students' English language skills by engaging them in listening, speaking and grammar learning activities that are relevant to authentic contexts.
- To use language efficiently in expressing their opinions via various media.

UNIT I INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION 6

Listening for general information-specific details- conversation: Introduction to classmates - Audio / video (formal & informal); Telephone conversation; Listening to voicemail & messages; Listening and filling a form. Speaking - making telephone calls-Self Introduction; Introducing a friend; - politeness strategies- making polite requests, making polite offers, replying to polite requests and offers- understanding basic instructions(filling out a bank application for example).

UNIT II NARRATION AND SUMMATION 6

Listening - Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities. Speaking - Narrating personal experiences / events-Talking about current and temporary situations & permanent and regular situations* - describing experiences and feelings- engaging in small talk- describing requirements and abilities.

UNIT III DESCRIPTION OF A PROCESS / PRODUCT 6

Listening - Listen to product and process descriptions; a classroom lecture; and advertisements about products. Speaking – Picture description- describing locations in workplaces- Giving instruction to use the product- explaining uses and purposes- Presenting a product- describing shapes and sizes and weights- talking about quantities(large & small)-talking about precautions.

UNIT IV CLASSIFICATION AND RECOMMENDATIONS 6

Listening – Listening to TED Talks; Listening to lectures - and educational videos. Speaking – Small Talk; discussing and making plans-talking about tasks-talking about progress- talking about positions and directions of movement-talking about travel preparations- talking about transportation-

UNIT V EXPRESSION 6

Listening – Listening to debates/ discussions; different viewpoints on an issue; and panel discussions. Speaking -making predictions- talking about a given topic-giving opinions- understanding a website-describing processes

TOTAL : 30 PERIODS

LEARNING OUTCOMES:

At the end of the course, learners will be able

- To listen and comprehend complex academic texts
- To speak fluently and accurately in formal and informal communicative contexts
- To express their opinions effectively in both oral and written medium of communication

ASSESSMENT PATTERN

- One online / app based assessment to test listening /speaking
- End Semester **ONLY** listening and speaking will be conducted online.
- Proficiency certification is given on successful completion of listening and speaking internal test and end semester exam.

HS5251 PROFESSIONAL COMMUNICATION L T P C

2 0 0 2

OBJECTIVES

- To comprehend various reading materials relevant to technical context and understand the main and supporting ideas of the reading materials.
- To write effective job applications along with detailed CV for internship or placements.
- To explore definitions, essay and report writing techniques and practice them in order to develop associated skills.

UNIT I TECHNICAL COMMUNICATION 6

Theory:

Reading: Reading the Interview of an Achiever and Completing Exercises (Skimming, Scanning and Predicting) – Writing: Writing a Short Biography of an Achiever Based on Given Hints – Grammar: Asking and Answering Questions, Punctuation in Writing, Prepositional Phrases

UNIT II SUMMARY WRITING 6

Theory:

Reading: Reading Technical Essays/ Articles and Answering Comprehension Questions – Writing: Summary Writing – Grammar: Participle Forms, Relative Clauses

UNIT III PROCESS DESCRIPTION 6

Theory:

Reading: Reading Instruction Manuals – Writing: Writing Process Descriptions – Writing Instructions – Grammar: Use of Imperatives, Active and Passive Voice, Sequence Words

UNIT IV REPORT WRITING 6

Theory:

Reading: Reading and Interpreting Charts/Tables and Diagrams – Writing: Interpreting Charts/Tables and Diagrams, Writing a Report – Grammar: Direct into Indirect Speech, Use of Phrases

UNIT V WRITING JOB APPLICATIONS 6

Theory:

Reading: Reading a Job Interview, SOP, Company Profile and Completing Comprehension Exercises – Writing: Job Applications and Resumes And Sops-Grammar: Present Perfect and Continuous Tenses.

TOTAL : 30 PERIODS

LEARNING OUTCOMES

On completion of the course, the students will be able to:

- Read and comprehend technical texts effortlessly.
- Write technical reports and job application for internship or placement.
- Learn to use language effectively in a professional context.

Assessment Pattern

- Two written internal assessments to test learner's progress in grammar, reading and writing skills.
- End Semester exam to be tested in two parts: Theory exam for three hours and listening and speaking skills along with vocabulary for two hours.

MA5252	ENGINEERING MATHEMATICS – II (Common to all branches of B.E. / B.Tech. Programmes in II Semester)	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To acquaint the students with the concepts of vector calculus which naturally arises in many engineering problems.
- To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.
- To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.
- To acquaint the students with Differential Equations which are significantly used in Engineering problems.
- To make the students appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.

UNIT I VECTOR CALCULUS **12**

Gradient and directional derivative - Divergence and Curl - Irrotational and Solenoidal vector fields - Line integral over a plane curve - Surface integral - Area of a curved surface - Volume integral - Green's theorem, Stoke's theorem and Gauss divergence theorem - Verification and application in evaluating line, surface and volume integrals.

UNIT II ANALYTIC FUNCTION **12**

Analytic functions – Necessary and sufficient conditions for analyticity - Properties – Harmonic conjugates – Construction of analytic function - Conformal mapping – Mapping by functions - Bilinear transformation $w = c + z,\ az,\ 1/z,\ z^2$

UNIT III COMPLEX INTEGRATION **12**

Line integral - Cauchy's integral theorem - Cauchy's integral formula - Taylor's and Laurent's series - Singularities - Residues - Residue theorem - Application of residue theorem for evaluation of real integrals - Use of circular contour and semicircular contour with no pole on real axis.

UNIT IV DIFFERENTIAL EQUATIONS **12**

Method of variation of parameters - Method of undetermined coefficients - Homogenous equations of Euler's and Legendre's type - System of simultaneous linear differential equations with constant coefficients.

UNIT V LAPLACE TRANSFORMS **12**

Existence conditions - Transforms of elementary functions - Transform of unit step function and unit impulse function - Basic properties - Shifting theorems - Transforms of derivatives and integrals - Initial and Final Value Theorems – Inverse Transforms – Convolution Theorem – Transform of periodic functions - Application to solution of linear ordinary differential equations with constant coefficients.

TOTAL : 60 PERIODS

OUTCOMES:

Upon successful completion of the course, students will be able to:

- Calculate grad, div and curl and use Gauss, Stokes and Greens theorems to simplify calculations of integrals.
- Construct analytic functions and use their conformal mapping property in application problems.
- Evaluate real and complex integrals using the Cauchy's integral formula and residue theorem.
- Apply various methods of solving differential equation which arise in many application problems.
- Apply Laplace transform methods for solving linear differential equations.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2015.
2. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, New Delhi, 2017.

REFERENCES:

1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.,), 7th Edition, New Delhi, 2009.
2. Glyn James, "Advanced Modern Engineering Mathematics", Pearson Education, 4th Edition, New Delhi, 2011.
3. Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, 5th Edition, New Delhi, 2017.
4. Peter V.O'Neil, "Advanced Engineering Mathematics", Cengage Learning India Pvt., Ltd, 7th Edition, New Delhi, 2012.
5. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd., 11th Reprint, New Delhi, 2010.

GE5151 **ENGINEERING GRAPHICS** **LT P C**
1 0 4 3

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:

1. Drawing free hand sketches of basic geometrical shapes and multiple views of objects.
2. Drawing orthographic projections of lines and planes.
3. Drawing orthographic projections of solids.
4. Drawing development of the surfaces of objects.
5. Drawing isometric and perspective views of simple solids.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) **1**
Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning.

UNITI PLANE CURVES AND FREE HANDSKETCHING **14**
Basic Geometrical constructions, Curves used in engineering practices-Conics – Construction of ellipse, parabola and hyperbola by different methods – Construction of cycloid – construction of involutes of square and circle - Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNITII PROJECTION OF POINTS, LINES AND PLANE SURFACES **15**
Orthographic projection- principles-Principle planes-First angle projection-Projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes-Determination of true lengths and true inclinations by rotating line method and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

UNITIII PROJECTION OF SOLIDS **15**
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method.

UNITIV PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES **15**
Sectioning of solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes.

UNITV ISOMETRIC AND PERSPECTIVE PROJECTIONS **12**
Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms pyramids and cylinders by visual ray method and vanishing point method.

COMPUTER AIDED DRAFTING (DEMONSTRATION ONLY) **3**
Introduction to drafting packages and demonstration of their use

TOTAL (L: 15 + P: 60)=75 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:

1. Draw free hand sketching of basic geometrical shapes and multiple views of objects.
2. Draw orthographic projections of lines and planes
3. Draw orthographic projections of solids
4. Draw development of the surfaces of objects
5. Draw isometric and perspective views of simple solids.

TEXT BOOKS:

1. Bhatt, N. D.,Panchal V M and Pramod R. Ingle, "Engineering Drawing", Charotar Publishing House, 53rd Edition, 2014.
2. Parthasarathy, N. S. and Vela Murali, "Engineering Drawing", Oxford University Press, 2015

REFERENCES:

1. Agrawal, B. and Agrawal C.M., "Engineering Drawing", Tata McGraw, N.Delhi, 2008.
2. Gopalakrishna, K. R., "Engineering Drawing", Subhas Stores, Bangalore, 2007.
3. Natarajan, K. V., "A text book of Engineering Graphics", 28thEd., Dhanalakshmi Publishers, Chennai, 2015.
4. Shah, M. B., and Rana, B. C., "Engineering Drawing", Pearson, 2ndEd., 2009.
5. Venugopal, K. and Prabhu Raja, V., "Engineering Graphics", New Age,2008.

Publication of Bureau of Indian Standards:

1. IS 10711 – 2001: Technical products Documentation – Size and lay out of drawing sheets
2. IS 9609 (Parts 0 & 1) – 2001: Technical products Documentation – Lettering.
3. IS 10714 (Part 20) – 2001 & SP 46 – 2003: Lines for technical drawings.
4. IS 11669 – 1986 & SP 46 – 2003: Dimensioning of Technical Drawings.
5. IS 15021 (Parts 1 to 4) – 2001: Technical drawings – Projection Methods.

Special points applicable to University Examinations on Engineering Graphics:

1. There will be five questions, each of either or type covering all units of the syllabus.
2. All questions will carry equal marks of 20 each making a total of 100.
3. The answer paper shall consist of drawing sheets of A3 size only.
4. The students will be permitted to use appropriate scale to fit solution within A3 size.
5. The examination will be conducted in appropriate sessions on the same day.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.9				0.9					0.6		0.6	0.6	0.9	0.6
2	0.9									0.6		0.6	0.6	0.6	
3	0.9				0.9					0.6		0.6	0.6	0.6	
4	0.9		0.6		0.9					0.6		0.6	0.6	0.6	
5	0.9		0.9		0.9					0.6		0.6	0.6	0.6	

EE5251 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVES:

- To understand the basic concepts of electric circuits, magnetic circuits and wiring.
- To understand the operation of AC and DC machines.
- To understand the working principle of electronic devices and circuits.

UNIT I BASIC CIRCUITS AND DOMESTIC WIRING 9

Electrical circuit elements (R, L and C)-Dependent and independent sources – Ohm's Law-Kirchhoff's laws - mesh current and node voltage methods (Analysis with only independent source) - Phasors – RMS-Average values-sinusoidal steady state response of simple RLC circuits. Types of wiring- Domestic wiring - Specification of Wires-Earthing-Methods-Protective devices.

UNIT II THREE PHASE CIRCUITS AND MAGNETIC CIRCUITS 9

Three phase supply – Star connection – Delta connection –Balanced and Unbalanced Loads-Power in three-phase systems – Comparison of star and delta connections – Advantages-Magnetic circuits-Definitions-MMF, Flux, Reluctance, Magnetic field intensity, Flux density, Fringing, self and mutual inductances-simple problems.

UNIT III ELECTRICAL MACHINES 9

Working principle of DC generator, motor-EMF and Torque equation-Types –Shunt, Series and Compound-Applications. Working principle of transformer-EMF equation-Operating principles of three phase and single phase induction motor-Applications. Working principles of alternator-EMF equation-Operating principles of Synchronous motor, stepper motor-Applications.

UNIT IV BASICS OF ELECTRONICS 9

Intrinsic semiconductors, Extrinsic semiconductors – P-type and N-type, P-N junction, VI Characteristics of PN junction diode, Zener effect, Zener diode, Zener diode Characteristics-Rectifier circuits-Wave shaping.

UNIT V CURRENT CONTROLLED AND VOLTAGE CONTROLLED DEVICES 9

Working principle and characteristics - BJT, SCR, JFET, MOSFET.

TOTAL: 45 PERIODS

OUTCOMES:

CO1 To be able to understand the concepts related with electrical circuits and wiring.
CO2 To be able to study the different three phase connections and the concepts of magnetic circuits.
CO3 Capable of understanding the operating principle of AC and DC machines.
CO4 To be able to understand the working principle of electronic devices such as diode and zener diode.
CO 5 To be able to understand the characteristics and working of current controlled and voltage controlled devices.

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

TEXT BOOKS:

1. Kothari DP and I.J Nagrath, “Basic Electrical and Electronics Engineering”, McGraw Hill Education, 2014
2. Del Toro, “Electrical Engineering Fundamentals”, Second edition, Pearson Education, New Delhi, 1989.
3. John Bird, “Electrical Circuit theory and technology”, Routledge; 5th edition, 2013

REFERENCES:

1. Thomas L. Floyd, ‘Electronic Devices’, 10th Edition, Pearson Education, 2018.
2. Albert Malvino, David Bates, ‘Electronic Principles, McGraw Hill Education, 7th edition, 2017
3. Kothari DP and I.J Nagrath, “Basic Electrical Engineering”, McGraw Hill, 2010.
4. Muhammad H. Rashid, “Spice for Circuits and electronics”, 4th ed., Cengage India,2019

GE5152 **ENGINEERING MECHANICS** **L T P C**
3 1 0 4

COURSE OBJECTIVES: The main learning objective of this course is to prepare the students for:

1. Applying the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
2. Applying the concept of reaction forces (non-concurrent coplanar and noncoplanar forces) and moment of various support systems with rigid bodies in 2D and 3D in equilibrium. Reducing the force, moment, and couple to an equivalent force - couple system acting on rigid bodies in 2D and 3D.
3. Applying the concepts of locating centroids/center of gravity of various sections / volumes and to find out area moments of inertia for the sections and mass moment of inertia of solids.
4. Applying the concepts of frictional forces at the contact surfaces of various engineering systems.
5. Applying the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

UNIT I STATICS OF PARTICLES (9+3)

Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions, Statics of Particles -Forces in a Plane, Resultant of Forces, Resolution of a Force into Components, Rectangular Components of a Force, Unit Vectors. Equilibrium of a Particle- Newton's First Law of Motion, Space and Free-Body Diagrams, Forces in Space, Equilibrium of a Particle in Space.

UNITII EQUILIBRIUM OF RIGID BODIES (9+3)

Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors, Moment of a Force about a Point, Varignon's Theorem, Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors, Mixed Triple Product of Three Vectors, Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Addition of Couples, Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces, Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections.

UNITIII DISTRIBUTED FORCES (9+3)

Centroids of lines and areas – symmetrical and unsymmetrical shapes, Determination of Centroids by Integration , Theorems of Pappus-Guldinus, Distributed Loads on Beams, Centre of Gravity of a Three-Dimensional Body, Centroid of a Volume, Composite Bodies , Determination of Centroids of Volumes by Integration.

Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration , Polar Moment of Inertia , Radius of Gyration of an Area , Parallel-Axis Theorem , Moments of Inertia of Composite Areas, Moments of Inertia of a Mass - Moments of Inertia of Thin Plates , Determination of the Moment of Inertia of a Three-Dimensional Body by Integration

UNIT IV FRICTION (9+3)

The Laws of Dry Friction. Coefficients of Friction, Angles of Friction, Wedges, Wheel Friction. Rolling Resistance, Ladder friction.

UNITV DYNAMICS OF PARTICLES (9+3)

Kinematics - Rectilinear Motion and Curvilinear Motion of Particles. Kinetics- Newton's Second Law of Motion -Equations of Motions, Dynamic Equilibrium, Energy and Momentum Methods - Work of a Force , Kinetic Energy of a Particle, Principle of Work and Energy, Principle of Impulse and Momentum, Impact, Method of Virtual Work - Work of a Force, Potential Energy, Potential Energy and Equilibrium.

TOTAL (L: 45 + T: 15)=60 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:

1. Apply the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
2. Apply the concept of reaction forces (non-concurrent coplanar and noncoplanar forces) and moment of various support systems with rigid bodies in 2D and 3D in equilibrium. Reducing the force, moment, and couple to an equivalent force - couple system acting on rigid bodies in 2D and 3D.
3. Apply the concepts of locating centroids / center of gravity of various sections / volumes and to find out area moments of inertia for the sections and mass moment of inertia of solids.
4. Apply the concepts of frictional forces at the contact surfaces of various engineering systems.
5. Apply the various methods of evaluating kinetic and kinematic parameters of the rigid bodies subjected to concurrent coplanar forces.

TEXT BOOKS:

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education., 11thEdition, 2017.
2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.

REFERENCES:

1. Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
2. Hibbeller, R.C., Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.
3. Irving H. Shames, Krishna Mohana Rao G, Engineering Mechanics – Statics and Dynamics, 4thEdition, Pearson Education Asia Pvt. Ltd., 2005.
4. Meriam J L and Kraige L G, Engineering Mechanics: Statics and Engineering Mechanics: Dynamics, 7th edition, Wiley student edition, 2013.
5. Timoshenko S, Young D H, Rao J V and Sukumar Pati, Engineering Mechanics, 5thEdition, McGraw Hill Higher Education, 2013.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.9	0.6	0.6	0.3								0.6	0.9	0.3	0.3
2	0.9	0.6	0.6	0.3								0.6	0.9	0.3	0.3
3	0.9	0.6	0.9	0.3								0.6	0.9	0.3	0.6
4	0.9	0.6	0.9	0.3								0.6	0.9	0.3	0.6
5	0.9	0.6	0.9	0.3								0.6	0.9	0.3	0.6

H5201	PHYSICS FOR GEOINFORMATICS ENGINEERING	L	T	P	C
		3	0	0	3

OBJECTIVE:

To explore the physics in space weather and its impacts on satellites.

- To understand the principles of heat transfer.
- To know about fundamental optical principles in remote sensing.
- To understand the foundation of gravitation.
- To understand the different types of electro-optic sensors and its detection mechanism

UNITI INTRODUCTION TO SPACE WEATHER 9

Sun – Heliosphere : corona and the solar wind, interplanetary magnetic field, coronal mass ejections, cosmic rays - Earth's Space environment: dipole magnetic field, structure of inner magnetosphere, interaction of solar wind and magnetosphere, magnetic reconnection, magnetotail, plasma sheet convection - Earth's upper atmosphere: thermosphere, ionsophere, structure and variation, aurora -Radiation impacts on satellites - Radio communication and navigation impacts

UNITII HEAT TRANSFER 9

Modes of heat transfer- Conduction, Convection and Radiation –Importance of material properties in heat transfer – Thermal conductivity - Specific heat capacity - Steady state conduction through constant area - Principle of convection- Free & forced convective heat transfer- Radiation heat transfer-black and grey body radiation.

.UNIT III OPTICS FOR REMOTE SENSING 9

Lenses, mirrors, prisms - Defects in lens: chromatic aberration, longitudinal chromatic aberration, achromatism of lenses - achromatism for two lenses in contact and separated by a distance - spherical aberration - minimization of Spherical aberration - coma astigmatism - Radiative Transfer Functions - Lamella Pack - Volume scattering.

UNIT IV GRAVITATION 9

Newton's law of gravitation - Gravitational field and potential - Determination of gravity - Variation of acceleration due to gravity of the earth with depth, altitude and rotation of the earth – Refraction - Diffraction - Fresnel theory, Circular diffraction gravity, Polarisation double dittraction - Escape velocity - Kepler's law of planetary motion - Doppler effect.

UNIT V ELECTRO-OPTIC SENSORS 9

Photomultipliers, photo resistors, photodiodes, nonselective detectors - Optical receivers, PIN and APD, optical preamplifiers - Detectors: basic detector mechanisms, noise in detectors. thermal and photo emissive detectors, photoconductive and photovoltaic detectors, performance limits, photographic sensitivity, time and frequency response - hybrid photo detectors - Imaging detectors - eye and vision - photographic film - Camera tubes - Solid state arrays – video detector electronics, detector interfacing.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	acquire knowledge in specialty physics by further exploring space weather and effect of those environments on satellites.
CO2	Implement the heat transfer principles in remote sensing.
CO3	understand the basic optical principles
CO4	understand the fundamentals of gravitation.
CO5	gain knowledge about different types of electro-optic sensors and its detection mechanism

TEXT BOOKS:

1. Mark Moldwin, "Introduction to Space weather , Cambridge University Press, 2008
2. Frank Kreith, Raj M. Manglik, Mark S. Bohn, 'Principles of Heat Transfer', Cengage Learning; 8th edition, June 2016.
3. Gupta, S.K. " Engineering Physics – Volume III,' Krishna Prakasan Media Pvt Ltd. 1st Edition, 2001.
4. H.C. Verma, Concepts of Physics-Volume I,Bharati Bhavan Publishers, 2011 Edition

REFERENCES:

1. John Keith Hargreaves, "The Solar-Terrestrial Environment: An Introduction to Geospace - the Science of the Terrestrial Upper Atmosphere, Ionosphere, and Magnetosphere", Cambridge University Press, 1992
2. Holman, J.P.,"Heat Tansfer", 10th edn. The McGraw-Hill Companies, 2008
3. Graham Smith, F., Terry A. King and Dan Wllklns , " Optics and Phtonics: An Introduction', John Wiley & Sons, 2007.
4. David Halliday , Robert Resnick Jearl Walker, Fundamentals of Physics, 10th Edition 10th Edition, Wiley Publisher, 2015.
5. Ian S. McLean, Electronic Imaging in Astronomy: Detectors and Instrumentation", Springer Science and Business Media, 2nd Edition, 2008.

CO – PO Mapping –PHYSICS FOR GEOINFORMATICS ENGINEERING

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	3	3		2	2	3
PO2	Problem analysis	2	2		2	2	2
PO3	Design / development of solutions			2		2	2
PO4	Investigations			2			2
PO5	Usage of Modern Technology			2			2
PO6	Individual and Team work			2			2
PO7	Communication			2		2	2
PO8	Engineer and Society		2	2		2	2
PO9	Ethics			2			2
PO10	Environment and Sustainability	2	2	2			2
PO11	Project Management and Finance					2	2
PO12	Life Long Learning			2			2

PSO1	Knowledge of Geoinformatics discipline	2	2	2			2
PSO2	Critical analysis of Geoinformatics Engineering problems and innovations		2	2			2
PSO3	Conceptualization and evaluation of engineering solutions to Geoinformatics engineering issues.	2	2				2

GE5252	தமிழரும் தொழில்நுட்பமும்	L T P C 1 0 0 1

அலகு I **நெசவு மற்றும் பானைத் தொழில்நுட்பம்**: 3

சங்க காலத்தில் நெசவுத் தொழில் – பானைத் தொழில்நுட்பம் - கருப்பு சிவப்பு பாண்டங்கள் – பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II **வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்**: 3

சங்க காலத்தில் வடிவமைப்பு மற்றும் கட்டுமானங்கள் & சங்க காலத்தில் வீட்டுப் பொருட்களில் வடிவமைப்பு- சங்க காலத்தில் கட்டுமான பொருட்களும் நடுகல்லும் – சிலப்பதிகாரத்தில் மேடை அமைப்பு பற்றிய விவரங்கள் - மாமல்லபுரச் சிற்பங்களும், கோவில்களும் – சோழர் காலத்துப் பெருங்கோயில்கள் மற்றும் பிற வழிபாட்டுத் தலங்கள் – நாயக்கர் காலக் கோயில்கள் - மாதிரி கட்டமைப்புகள் பற்றி அறிதல், மதுரை மீனாட்சி அம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர் மஹால் – செட்டிநாட்டு வீடுகள் – பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ-சாரோசெனிக் கட்டிடக் கலை.

அலகு III **உற்பத்தித் தொழில் நுட்பம்**: 3

கப்பல் கட்டும் கலை – உலோகவியல் – இரும்புத் தொழிற்சாலை – இரும்பை உருக்குதல், எஃகு – வரலாற்றுச் சான்றுகளாக செம்பு மற்றும் தங்க நாணயங்கள் – நாணயங்கள் அச்சடித்தல் – மணி உருவாக்கும் தொழிற்சாலைகள் – கல்மணிகள், கண்ணாடி மணிகள் – சுடுமண் மணிகள் – சங்கு மணிகள் – எலும்புத்துண்டுகள் – தொல்லியல் சான்றுகள் – சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV **வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில் நுட்பம்**: 3

அணை, ஏரி, குளங்கள், மதகு – சோழர்காலக் குமுழித் தூம்பின் முக்கியத்துவம் – கால்நடை பராமரிப்பு – கால்நடைகளுக்காக வடிவமைக்கப்பட்ட கிணறுகள் – வேளாண்மை மற்றும் வேளாண்மைச் சார்ந்த செயல்பாடுகள் – கடல்சார் அறிவு – மீன்வளம் – முத்து மற்றும் முத்துக்குளித்தல் – பெருங்கடல் குறித்த பண்டைய அறிவு – அறிவுசார் சமூகம்.

அலகு V **அறிவியல் தமிழ் மற்றும் கணித்தமிழ்**: 3

அறிவியல் தமிழின் வளர்ச்சி –கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் – தமிழ் மென்பொருட்கள் உருவாக்கம் – தமிழ் இணையக் கல்விக்கழகம் – தமிழ் மின் நூலகம் – இணையத்தில் தமிழ் அகராதிகள் – சொற்குவைத் திட்டம்.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

GE5252 **TAMILS AND TECHNOLOGY** **L T P C**
1 0 0 1

UNIT I WEAVING AND CERAMIC TECHNOLOGY 3

Weaving Industry during Sangam Age - Ceramic technology - Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY 3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT III MANUFACTURING TECHNOLOGY 3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold- Coins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY 3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING 3

Development of Scientific Tamil - Tamil computing - Digitalization of Tamil Books - Development of Tamil Software - Tamil Virtual Academy - Tamil Digital Library - Online Tamil Dictionaries - Sorkuvai Project.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Boo

GE5162 WORKSHOP PRACTICES LABORATORY L T P C
(Common to all Branches of B.E. / B. Tech. Programmes) 0 0 4 2

COURSE OBJECTIVES: The main learning objective of this course is to provide hands on training to the students in:

1. Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work; Sawing; planing; making joints in wood materials used in common household wood work.
2. Wiring various electrical joints in common household electrical wire work.
3. Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments; Making a tray out of metal sheet using sheet metal work.
4. Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & ELECTRICAL)

PART I CIVIL ENGINEERING PRACTICES 15

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

a) Sawing,

b) Planning and

c) Making joints like T-Joint, Mortise joint and Tenon joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture

b) Studying common industrial trusses using models.

PART II ELECTRICAL ENGINEERING PRACTICES 15

WIRING WORK:

a) Wiring Switches, Fuse, Indicator and Lamp etc. such as in basic household,

b) Wiring Stair case light.

c) Wiring tube – light.

d) Preparing wiring diagrams for a given situation.

Wiring Study:

a) Studying an Iron-Box wiring.

b) Studying a Fan Regulator wiring.

c) Studying an Emergency Lamp wiring.

GROUP – B (MECHANICAL AND ELECTRONICS)

PART III MECHANICAL ENGINEERING PRACTICES 15

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Practicing gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.

b) (simple)Drilling.

c) (simple)Tapping.

ASSEMBLY WORK:

a) Assembling a centrifugal pump.

b) Assembling a household mixer.

c) Assembling an air conditioner.

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations.

PART IV ELECTRONIC ENGINEERING PRACTICES 15

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Studying a FM radio.

b) Studying an electronic telephone.

TOTAL (P: 60) = 60 PERIODS

COURSE OUTCOMES: Upon completion of this course, the students will be able to:

1. Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.
2. Wire various electrical joints in common household electrical wire work.
3. Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
4. Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	0.6	0.3											0.3	0.3	
2		0.6	0.6											0.6	
3		0.6	0.3										0.6	0.6	
4		0.6	0.6	0.3										0.6	

EE5261 ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY

L	T	P	C
0	0	4	2

OBJECTIVES

1. To impart hands on experience in verification of circuit laws and measurement of circuit parameters
2. To train the students in performing various tests on electrical motors.
3. It also gives practical exposure to the usage of CRO, power sources & function generators

List of Experiments

1. Verification of Kirchhoff's Law.
2. Steady state response of AC and DC circuits (Mesh, Node Analysis)
3. Frequency response of RLC circuits.
4. Measurement power in three phase circuits by two-watt meter method.
5. Regulation of single phase transformer.
6. Performance characteristics of DC shunt generator.
7. Performance characteristics of single phase induction motor.
8. Characteristics of PN diode and Zener diode
9. Characteristics of Zener diode
10. Half wave and full wave Rectifiers
11. Application of Zener diode as shunt regulator.
12. Characteristics of BJT and JFET

TOTAL: 60 PERIODS

OUTCOMES:

1. To become familiar with the basic circuit components and know how to connect them to make a real electrical circuit;
2. Ability to perform speed characteristic of different electrical machines
3. Ability to use logic gates and Flip flops

GE5262 **COMMUNICATION LABORATORY** **L T P C**
0 0 4 2

OBJECTIVES

- To identify varied group discussion skills and apply them to take part in effective discussions in a professional context.
- To be able to communicate effectively through writing.

UNIT I **12**

Speaking-Role Play Exercises Based on Workplace Contexts, - talking about competition-discussing progress toward goals-talking about experiences- talking about events in life-discussing past events-Writing: writing emails (formal & semi-formal).

UNIT II **12**

Speaking: discussing news stories-talking about frequency-talking about travel problems-discussing travel procedures- talking about travel problems- making arrangements-describing arrangements-discussing plans and decisions- discussing purposes and reasons- understanding common technology terms-Writing: - writing different types of emails.

UNIT III **12**

Speaking: discussing predictions-describing the climate-discussing forecasts and scenarios-talking about purchasing-discussing advantages and disadvantages- making comparisons-discussing likes and dislikes- discussing feelings about experiences-discussing imaginary scenarios Writing: short essays and reports-formal/semi-formal letters.

UNIT IV **12**

Speaking: discussing the natural environment-describing systems-describing position and movement- explaining rules-(example- discussing rental arrangements)- understanding technical instructions-Writing: writing instructions-writing a short article.

UNIT V **12**

Speaking: describing things relatively-describing clothing-discussing safety issues(making recommendations) talking about electrical devices-describing controlling actions- Writing: job application(Cover letter + Curriculum vitae)-writing recommendations.

TOTAL: 60 PERIODS

LEARNING OUTCOMES

- Speak effectively in group discussions held in a formal/semi formal contexts.
- Write emails and effective job applications.

Assessment Pattern

- One online / app based assessment to test speaking and writing skills

Proficiency certification is given on successful completion of speaking and writing

MA5301 TRANSFORM TECHNIQUES AND STATISTICS L T P C
3 1 0 4

OBJECTIVES:

- To introduce the concept of Fourier series which is used in applied mathematics to represent a periodic signal in terms of cosine and sine waves.
- To expose the concept of Fourier transforms that take a signal and express it in terms of the frequencies of the waves that make up that signal.
- To impart knowledge of random variables (both discrete and continuous) and their associated probability distributions with examples relating to real time situations.
- To extend the concept and analysis of one dimensional random variables to bivariate random variables with thrust on the importance of Central Limit Theorem.
- To given an idea of testing the statistical hypothesis claimed based on a set of data points using standard sampling distributions.

UNIT I FOURIER SERIES 12

Dirichlet's conditions – General Fourier series – Odd and even functions – Half-range Sine and cosine series – Complex form of Fourier series – Parseval's identity – Harmonic Analysis.

UNIT II FOURIER TRANSFORM 12

Fourier integral theorem – Fourier transform pair - Sine and cosine transforms – Properties – Transform of elementary functions – Convolution theorem – Parseval's identity.

UNIT III RANDOM VARIABLE 12

Discrete and continuous random variables – Moments – Moment generating functions – Binomial, Poisson, Geometric, Uniform, Exponential and Normal distributions – Functions of a random variable.

UNIT IV TWO-DIMENSIONAL RANDOM VARIABLES 12

Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Linear regression – Transformation of random variables – Central limit theorem (for independent and identically distributed random variables).

UNIT V TESTING OF HYPOTHESIS 12

Sampling distributions - Tests for single mean, proportion, Difference of means (large and small samples) – Tests for single variance and equality of variances – χ^2- test for goodness of fit – Independence of attributes – Non-parametric tests: Test for Randomness and Rank – sum test (Wilcoxon test).

TOTAL : 60 PERIODS

OUTCOMES :

- It enables the students to represent any periodic function as a sum of trignometric sines and cosines.
- It enables the students to calculate the frequency spectrum of a signal that changes over time using Fourier transforms.
- It familiarizes the students with probability distributions that are apt for various real time situations.
- It equips the students to determine the correlation and regression for bivariate random variables with given probability distributions.
- It imparts the knowledge of various test statistics used in hypothesis testing for mean and variances of large and small samples.

TEXTBOOKS:

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, New Delhi, 2017.
2. Johnson, R.A, Irwin Miller and John Freund., "Miller and Freund's Probability and Statistics for Engineers", Pearson Education, 8th Edition, New York, 2015.
3. Kreyszig, E. "Advanced Engineering Mathematics", John Wiley & Sons, 10th Edition, New Delhi, 2015.

REFERENCES:

1. Devore, J.L., "Probability and Statistics for Engineering and the Sciences", , Cengage Learning, 9th Edition, Boston, 2017.
2. Milton, J. S. and Arnold, J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 3rd Reprint, New Delhi, 2008.
3. Ross, S.M., "Introduction to Probability and Statistics for Engineers and Scientists", Elsevier, 5th Edition, New Delhi, 2014.
4. Spiegel, M.R., Schiller, J. and Srinivasan, R.A., "Schaum's Outline of Theory and Problems of Probability and Statistics", Tata McGraw Hill, 3rd Edition, Reprint, New Delhi, 2017.
5. Walpole, R.E., Myers, R.H., Myers, S.L. and Ye, K., "Probability and Statistics for Engineers and Scientists", Pearson Education, 9th Edition, New Delhi, 2011.

GI5301 SPATIAL DATABASE MANAGEMENT SYSTEM L T P C
3 0 0 3

COURSE OBJECTIVE :

- To introduce the foundational concepts of data, database systems, and their architectural components.
- To provide insights into Spatial Database Management Systems (SDBMS), spatial data types, operations on spatial objects.
- To explain various data models such as relational, object-oriented and entity-relationship models.
- To expose concepts for implementing server-client operations, database recovery, concurrency, indexing, and implementing security measures for effective database management.
- To describe spatial data relationships and perform spatial analyses using geometrical functions for practical application.

UNIT I INTRODUCTION 9

Data – Information - File system vs DBMS – Database Management Systems – Database Architectures, users and administrators – Classification of Database Management Systems - Spatial Data- Points, Lines, Polygons- definition of SDBMS -user classes of SDBMS - Multi layer architecture of SDBMS - GIS and SDBMS

UNIT II SPATIAL CONCEPTS AND DATA MODELS 9

Field based model – object based model – spatial data types – operations on spatial objects - Entity Relationship Model (ER Model) – Relational Model – Constraints and Normal forms of Relational Model - mapping ER model to Relational model – ER model with spatial concepts – Object-oriented data modeling with Unified Modeling Language (UML)

UNIT III QUERY LANGUAGE 9

SQL - Data Definition - Data Manipulation - Basic structure of SQL - Set operations - Aggregate Functions –Simple queries –spatial Vs non spatial- Nested sub queries – Complex queries – Views – Trigger - OGIS standard for extending SQL - example spatial SQL queries – Object relational SQL.

UNIT IV SPATIAL STORAGE AND INDEXING 9

Disk geometry - Buffer manager –Field-Record - File System - File Structure - Clustering -Basic concepts of file organizations, indexing – Spatial Indexing – Grid files – R Tree - Concurrency support - Spatial Join index - Database recovery techniques - Database Security.

UNIT V DESIGN AND DEVELOPMENT 9

Exploring Spatial Geometry, Organizing spatial data, Spatial data relationships and functionalities of any one commercial and one FOSS DBMS each – Application program and user Interfaces.

(L:45) TOTAL: 45 PERIODS

COURSE OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Describe the components, architectures, and classifications of DBMS and differentiate between file systems and database management systems.

CO2 Demonstrate the ability to model spatial data using points, lines, and polygons and integrate them into spatial databases.

CO3 Design relational and spatial databases using entity-relationship (ER) models, relational models, and object-oriented modeling techniques with tools like UML.

CO4 Construct complex SQL queries, including spatial queries, to define, manipulate, and analyze database information effectively.

CO5 Assess indexing techniques, spatial join methods, and concurrency mechanisms while ensuring database security and recovery strategies.

TEXTBOOKS:

1. Shashi Shekhar, Sanjay Chawla,||Spatial Databases a Tour|| Prentice Hall, 2003.
2. Philippe Rigaux, Michel Scholl, Agnès Voisard ¯ Spatial Databases with application to GIS || Morgan Kaufmann,ISBN13: 9781558605886, ISBN10: 1558605886,2002

REFERENCES:

1. Abraham Silberschatz, Henry F. Korth and S.Sudharshan, ¯Database Syste Concepts||, seventh edition, McGraw Hill, 2019.
2. Ravi Kothuri, Albert Godfrind, Euro Beinat ¯Pro Oracle Spatial for Oracle Database 11g||, Apress , ISBN13 : 9788181288882, 2007.
3. Regina, Leo Hsu ¯PostGIS in Action||, Oreilly & Associates Inc., ISBN-13: 9781935182269, ISBN-10: 1935182269, 2011.
4. Elamasri | Navathe – Fundamentals of Database Systems, Pearson Education,3rd Edition,2001, ISBN: 81-7808-137-7
5. Hussein Nasser, Learning ArcGIS Geodatabases,Packt Publishing Limited, 2014,ISBN-978-1-78398-864-8.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2		3								3	2	2
2	1	1			1							1	3	1	
3	2		3		3								3	3	
4					3							1	3	1	1
5	2							1					3	3	1
Avg.	2	2	3		3			1				1	3	2	1

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5302 **SURVEYING I** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce fundamental principles and techniques of surveying for accurate measurement and mapping.
- To provide knowledge on various surveying methods such as chain surveying, compass surveying, plane table surveying, and levelling.
- To develop skills in analyzing and solving surveying-related challenges by applying theoretical and practical approaches.
- To explore the concepts of large-scale mapping and cadastral surveying for applications in land administration and real-world problem-solving.
- To enable the integration of advanced tools and ethical practices in surveying, fostering teamwork and professional development

UNIT I FUNDAMENTALS AND CHAIN SURVEYING 9

Definition- Classifications - Plane and Geodetic Surveying - Basic principles – Equipment and accessories for ranging and chaining – Methods of ranging - well conditioned triangles – Problems in Obstacles - Chain traversing and plotting – Conventional Symbols- applications.

UNIT II COMPASS AND PLANE TABLE SURVEYING 9

Compass – Basic principles - Types - Bearing - System and conversions- Sources of errors and Local attraction - Magnetic declination-Dip-Compass traversing and plotting – Closing error adjustment - Plane table and its accessories - Merits and demerits - Radiation – Intersection - Resection – Plane table traversing – Source of errors - applications.

UNIT III LEVELLING 9

Level line - Horizontal line - Datum - Bench marks -Levels and staves - temporary and permanent adjustments – Methods of levelling - Fly levelling - Check levelling - Procedure in levelling - Booking -Reduction - Curvature and refraction - Reciprocal levelling - Precise levelling - Source of errors - applications.

UNIT IV CONTOURING, AREA AND VOLUME CALCULATION 9

Contouring – Methods – Longitudinal and Cross Section – Plotting –Methods of interpolating Contours - Characteristics and uses of Contours – Areas enclosed by straight lines – Irregular figures – Planimeters - Volumes – Earthwork calculations – Capacity of Reservoirs – Mass Haul Diagrams.

UNIT V CADASTRAL SURVEYING 9

History of cadastral survey – Future of Land Records - FMB Sketch -Tax – Real Property- Legal Cadastral – Graphical and Numerical Cadastre, Legal Characteristics of Records, Torrens System. Cadastral map reproduction – Map projection for cadastral maps - Automated Cadastral map – Creation of Land Information System – Integrating LIS – Land Administration – Recent Trends.

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand and apply surveying principles to conduct and analyze chain, compass, levelling, and cadastral surveys effectively.

CO2 Demonstrate proficiency in surveying techniques and tools for solving problems related to land measurement and mapping.

CO3 Collaborate in teams to design and execute surveying projects, showcasing leadership, communication, and professional ethics.

CO4 Develop analytical skills to interpret data and create robust solutions, ensuring accuracy in contouring, area, and volume calculations.

CO5 Implement modern cadastral surveying techniques to contribute to land management and administration with advanced mapping tools.

TEXTBOOKS :

1. T.P.Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint,2015.
2. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I & II, Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition,2016.

REFERENCES:

1. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001
3. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004
4. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice‘ Hall of India 2004
5. K.R. Arora, Surveying Vol I & II, Standard Book house , Eleventh Edition. 2013

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1				1							3	2	
2	3	2	2	1	3	1							3	3	1
3				2	2	3		2		2				3	3
4	2	2	3	2	2	3			1	1				3	3
5	2				3		3					3		2	3
AVg.	3	2	3	2	3	2	3	2	1	2		3	3	3	3

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5303	REMOTE SENSING I	L T P C
		3 0 0 3

Course Objectives

- To introduce basic concepts and principles of Electromagnetic radiation and laws.
- To provide an insight into interaction EMR with earth atmosphere and earth surface features.
- To provide knowledge on planetary motion and Remote Sensing Platforms, sensors and data products.
- To develop the skill on preprocessing and error correction methods of remote sensing data products.
- To enable to read and interpret the earth features and resources from the remote sensing products

UNIT I REMOTE SENSING AND ELECTROMAGNETIC RADIATION 9

Definition – components of RS – History of Remote Sensing – Merits and demerits of data collation between conventional and remote sensing methods - Electromagnetic Spectrum – Radiation principles - Wave theory, Planck's law, Wien's Displacement Law, Stefan's Boltzmann law, Kirchoff's law – Radiation sources: active & passive - Radiation Quantities

UNIT II EMR INTERACTION WITH ATMOSPHERE AND EARTH MATERIAL 9

Standard atmospheric profile - main atmospheric regions and its characteristics - interaction of radiation with atmosphere - Scattering, absorption and refraction - Atmospheric windows - Energy balance equation – Specular and diffuse reflectors – Spectral reflectance & emittance – Spectroradiometer – Spectral Signature concepts – Typical spectral reflectance curves for vegetation, soil and water – solid surface scattering in microwave region.

UNIT III ORBITS AND PLATFORMS 9

Motions of planets and satellites - Newton's law of gravitation - Gravitational field and potential - Escape velocity - Kepler's law of planetary motion - Orbit elements and types – Orbital perturbations and maneuvers – Types of remote sensing platforms - Ground based, Airborne platforms and Space borne platforms – Classification of satellites – Sun synchronous and Geosynchronous satellites – Legrange Orbit.

UNIT IV SENSING TECHNIQUES 9

Classification of remote sensors - Resolution concept : spatial, spectral, radiometric and temporal resolutions - Scanners - Along and across track scanners - Optical-infrared sensors - Thermal sensors - microwave sensors - Calibration of sensors - High Resolution Sensors - LIDAR , UAV - Orbital and sensor characteristics of live Indian earth observation satellites

UNIT V DATA PRODUCTS AND INTERPRETATION 9

Photographic and digital products – Types, levels and open source satellite data products –- selection and procurement of data- Visual interpretation: basic elements and interpretation keys – Digital interpretation – Concepts of Image rectification, Image enhancement and Image classification

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 State the concepts and laws related to Planetary motion, Electromagnetic radiation.

CO2 Express the principle and mechanism of EMR-Earth interaction, Sensing system.

CO3 Demonstrate the concept of earth response to EMR, data selection procedures.

CO4 Examine the satellite image quality with error sources and rectification and interpret the earth features from the satellite images.

CO5 Develop the integrated framework for feature identification and mapping from the satellite images.

TEXTBOOKS:

1. Thomas M.Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, Remote Sensing and Image interpretation, John Wiley and Sons, Inc, New York,2015.
2. George Joseph and C Jeganathan, Fundamentals of Remote Sensing,Third Edition Universities Press (India) Private limited, Hyderabad, 2018

REFERENCES:

- Janza, F.Z., Blue H.M. and Johnson,J.E. Manual of Remote Sensing. Vol.I, American Society of Photogrametry, Virginia, USA, 2002.
- Verbyla, David, Satellite Remote Sensing of Natural Resources. CRC Press, 1995
- Paul Curran P.J. Principles of Remote Sensing. Longman, RLBS, 1988.
- Introduction to Physics and Techniques of Remote Sensing , Charles Elachi and Jacob Van Zyl, 2006 Edition II, Wiley Publication.
- Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3	3	
2	2			1						2	2		3	2	
3	2	2		1				2				2	3		3
4				3										3	
5			1	2		1				3				3	3
AVg.	2	2	1	2		1		2		3	2	2	3	3	3

1' = Low; '2' = Medium; '3' = High

GI5304	PHOTOGRAMMETRY	L T P C 3 0 0 3

COURSE OBJECTIVES

CO1: Understand and appreciate the importance of photography as means of mapping, functional and physical elements of photography.
CO2: Understand the need of the photogrammetric mapping and the relevance of accuracy standards and means to achieve them for precise large scale maps with scientific methods.
CO3: Evaluate the standards of map based on the state of the art tool and techniques and assessthe production standards for photogrammetric map making.
CO4: Acquire knowledge on the current development, issues methods and solutions in map makingand evaluate methods of production.
CO5: Analyze critically and evaluate methods by applying the knowledge gained and to be a part ofinnovation and integration of mapping technology

UNIT I PRINCIPLES AND PROPERTIES OF PHOTOGRAPHY 9

History - Definition, Applications - Types of Photographs, Classification - Photographic overlaps – Film-based Aerial Cameras – Construction - Camera accessories - Camera calibration - Digital Aerial cameras- CCD – Multiple frame and Line cameras - Linear array scanner - Flight Planning – Crab and Drift - Basic horizontal and vertical control - Pre pointing and Post pointing.

UNIT II GEOMETRIC PROPERTIES OF AERIAL PHOTOGRAPHS 9

Photo coordinate measurement - Refinement of photo coordinates - Vertical photographs - geometry, scale – Stereoscopes - parallax concept - parallax equation - Tilted photograph - Geometry, Scale, Coordinate system – Relief displacement – - Photo Interpretation.

UNIT III STEREO PLOTTERS& ORIENTATION 9

Projection system, Viewing, Measuring and Tracing system - Stereo plotters – Classification – Analog, semi analytical, Analytical and Digital plotting concepts – cross ratio- Two dimensional coordinate transformations – ray tracing- Interior orientation - dependent and independent RO- – Collinearity condition and Coplanarity condition - Three dimensional conformal coordinate transformation - Absolute orientation – GPS/INS based orientation

UNIT IV AEROTRIANGULATION, TERRAIN MODELING, ORTHOPHOTO 9

Neat model - blocks of photographs- – Aerotriangulation: – strip adjustment – independent model triangulation - Bundle block Adjustment – precision, accuracy and reliability- DTM, DEM and DSM, Orthophoto – mono plotting – stereo plotting - feature collection

UNIT V DIGITAL PHOTOGRAMMETRY 9

Photogrammetric Scanner – Digital Photogrammetry Work Station - requirement of functionalities Stereoscopic Viewing and Measuring System - Photogrammetry project Planning image properties- image matching: template matching , feature based matching - satellite photogrammery principles- UAS technology- regulatory – technical challenges – tools.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Appreciate and qualify the terrestrial, aerial and satellite stereo images with respect to its stereometric capability and recommend for a particular application

CO2 Draw technical specification for the flight planning to acquire stereo data for a set of resource conditions and draw proposal for photogrammetric project

CO3 Design the control survey and intensive control networks through photogrammetric tric methods and document them

CO4 Perform ATM, analyse to the accuracy , detect and correct blunders and generate 3D models of terrain

CO5 Assess the technical viability, design project proposal for photogrammetric project and execute them with accuracy standards as guidelines integrate into GIS environment

TEXTBOOKS:

1. Paul. R Wolf., Bon A.DeWitt, Elements of Photogrammetry with Application in GIS McGraw Hill International Book Co., 4th Edition, 2014.
2. E.M.Mikhail, J.S.Bethel, J.C.McGlone, Introduction to Modern Photogrammetry, Wiley Publisher, 2001

REFERENCES:

1. GollfriedKonecny, Geoinformation: RemoteSensing, Photogrammetry and Geographical Information Systems, CRC Press, 1st Edition, 2002.
2. Karl Kraus, Photogrammetry: Geometry from Images and Laser Scans, Walter de Gruyter GmbH & Co. 2nd Edition, 2007
3. Manual of Photogrammetry – American society of Photogrammetry & R.S by Albert.D, 1952.
4. Digital Photogrammetry – A practical course by Wilfried Linder, 3rd edition, Springer, 2009.
5. Digital Photogrammetry by – Y. Egels & Michel Kasser, Taylor & Francis group, 2002.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	-	-	-	1	-	-	-	-	-	-	3	-	-
2	3	2	2	2	1	1	-	1	1	-	-	2	3	1	-
3	1	-	3	3	1	-	-	-	1	-	1	-	1	3	1
4	1	2	3	3	3	-	-	1	-	-	-	3	-	2	3
5	-	2	2	3	3	1	-	2	-	-	2	2	-	2	3
AVg.	2	2	3	3	2	1		1	1		2	2	2	2	2

1' = Low; '2' = Medium; '3' = High

GI5311	SURVEYING LABORATORY I	L T P C 0 0 4 2

OBJECTIVE:

- To introduce fundamental surveying techniques and tools for accurate measurement, mapping, and data collection.
- To develop hands-on skills in using various surveying instruments such as chains, compasses, plane tables, and levels.
- To train students in problem-solving techniques to overcome obstacles and errors in real-world surveying scenarios.
- To enhance practical knowledge in data adjustment, mapping, and volume computations, ensuring precision in results.
  To encourage teamwork, ethical practices, and professional proficiency in conducting and managing surveying projects.

EXCERCISES : 4 hours each

1. Finding Pace Value of Surveyor using Chaining and Ranging
2. Mapping of Building with cross staff and without cross staff
3. Overcoming Obstacles in Chaining
4. Computation of Included Angle after adjustment of Local Attraction
5. Determination of Inaccessible Distance using compass
6. Mapping of Building with Compass including traverse adjustment
7. Planimetric Mapping of an Area using Plane Table Surveying (Radiation, Intersection)
8. Map updation using Plane Table Surveying through Resection(Graphical Method)
9. Map updation using Plane Table Surveying through Resection (Trial & Error Method)
10. Plane table surveying – Two point problem
11. Fly leveling using dumpy level
12. Fly leveling using tilting level
13. Transfer of Bench Mark using Check Levelling
14. Cut and fill volume calculation using profile levelling
15. Contour Mapping using Grid Levelling

TOTAL: 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Demonstrate proficiency in using surveying instruments and methods for precise measurement, ranging, and mapping.
CO2	Apply systematic approaches to solve practical surveying challenges, including obstacles, local attraction, and inaccessible distances.
CO3	Collaborate effectively in fieldwork to collect, analyze, and interpret surveying data for diverse applications.
CO4	Generate accurate maps and perform advanced computations, such as contour mapping, traverse adjustments, and volume calculations.
CO5	Integrate practical and theoretical knowledge of surveying to develop professional skills essential for real-world engineering applications.

REFERENCES:

1. T.P.Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint,2015.

2. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I & II, Lakshmi Publications Pvt Ltd, New Delhi, 17th Edition,2016.
3. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, Mc Graw Hill 2001
4. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004
5. David Clark, Plane and Geodetic Surveying for Engineers, Volume I, Constable and Company Ltd, London, CBS,6th Edition,2004.
6. David Clark and James Clendinning, Plane and Geodetic Surveying for Engineers, Volume II, Constable and Company Ltd, London, CBS,6thEdition,2004.
7. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice' Hall of India 2004
8. K.R. Arora, Surveying Vol I& II, Standard Book house, Eleventh Edition,2013.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3		
2		2	2	2										3	2
3		2	3											2	3
4			3		2										3
5				3	3										3
AVg.	3	2	3	3	3								3	3	3

1' = Low; '2' = Medium; '3' = High

GI5312 REMOTE SENSING AND PHOTOGRAMMETRY LABORATORY L T P C
0 0 2 1

OBJECTIVE:

- To introduce the concepts of map elements and layout.
- To explain the fundamentals of image interpretation and keys.
- To provide the knowledge on spectroradiometer observation and orientation process.
- To develop the skill on feature extraction using satellite and Aerial photographs
- To develop the knowledge on terrain mapping and landuse/landcover classification

REMOTE SENSING EXERCISES

1. Preparation of Base Map from Survey of India Topo sheets 2
2. Introduction to various satellite data products and image interpretation keys 2
3. Preparation of Land use/land cover map using Satellite Data. 2
4. Preparation and analysis of spectral signatures using handheld spectro radiometer for
   (a) Vegetation 2
   (b) Soil 2
   (c) Water 2

PHOTOGRAMMETRY EXERCISES

1. Testing stereovision with test card 2
2. Mirror stereoscope- base lining and orientation of aerial photographs and photo interpretation. 2
3. Scale of vertical photographs. 2
4. To find the height of point using Parallax concept. 2
5. Aerial Triangulation using digital photogrammetry 2
6. Bundle Block adjustment 2
7. Generation and editing of DTM and Contour 2
8. Preparation of Planimetric map and Orthophoto generation 2
9. Preparation of planimetric map using drone images 2

TOTAL: 30 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Express the basic concepts of Topographic Map, Thematic Maps and Aerial Phots.
CO2	Explain the concepts behind the interpretation of satellite and aerial photographs and orientation procedure.
CO3	Implement the spectral observation of common earth features and orientation procedure in aerial photographs.
CO4	Implement the interpretation process to identify the features from the satellite images and implement the process of DTM and contour generation.
CO5	Create and analyze the Landuse/Landcover maps, Planimetric maps and Orthophotographs.

REFERENCES:

1. Lillesand T.M., and Kiefer,R.W. Remote Sensing and Image interpretation, VI edition of John Wiley & Sons-2015.
2. John R. Jensen, Introductory Digital Image Processing: A Remote Sensing Perspective, 4th Edition, 2015.
3. Paul R.Wolf, Elements of Photogrammetry, McGraw-Hill Science, 2013, ISBN 0070713464, 9780070713468
4. Karl Kraus, Photogrammetry, Fundamentals and standard processes, Dümmler, 2000, ISBN 978 3 110190076
5. Mikhail Kasser and Yves Egels, “Digital Photogrammetry”, Taylor and Francis, 2003, ISBN 0 748 40944 0

6. Francis h. Moffitt, Edward M. Mikhail, Photogrammetry, TBS The Book Service Ltd, 1980, ISBN 13: 9780700221370
7. Edward M. Mikhail, James S.Bethel, J.Chris McGlone, Introduction on "Modern Photogrammetry", John Wiley & Sons, Inc., 2012, ISBN 0-471-30924-9
8. Wilfried Linder, "Digital Photogrammetry"-Theory and Applications, Springer-Verlag Berlin Heidelberg New York, 3rd Edition, 2014, ISBN 3-540-00810-1
9. Digital Photogrammetry – A practical course by Wilfried Linder, 3rd edition, Springer, 2009

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3								2						3
2	1			2					3				3		
3				3									3	3	
4				3	2	2								3	
5			2		1	2			2						3
AVg.	2		2	3	2	2			2				3	3	3

1' = Low; '2' = Medium; '3' = High

GE5361 **PROFESSIONAL DEVELOPMENT** **L T P C**
0 0 2 1

OBJECTIVES:

- To be proficient in important Microsoft Office tools: MS WORD, EXCEL, POWERPOINT.
- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize,interlink, and utilizing many more critical features offered
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

MS WORD: **10 Hours**

Create and format a document
Working with tables
Working with Bullets and Lists
Working with styles, shapes, smart art, charts
Inserting objects, charts and importing objects from other office tools
Creating and Using document templates
Inserting equations, symbols and special characters
Working with Table of contents and References, citations
Insert and review comments
Create bookmarks, hyperlinks, endnotes footnote
Viewing document in different modes
Working with document protection and security
Inspect document for accessibility

MS EXCEL: **10 Hours**

Create worksheets, insert and format data
Work with different types of data: text, currency, date, numeric etc.
Split, validate, consolidate, Convert data
Sort and filter data

Perform calculations and use functions: (Statistical, Logical, Mathematical, date, Time etc.,)
Work with Lookup and reference formulae
Create and Work with different types of charts
Use pivot tables to summarize and analyse data
Perform data analysis using own formulae and functions
Combine data from multiple worksheets using own formulae and built-in functions to generate results
Export data and sheets to other file formats
Working with macros
Protecting data and Securing the workbook

MS POWERPOINT: **10 Hours**

Select slide templates, layout and themes
Formatting slide content and using bullets and numbering
Insert and format images, smart art, tables, charts
Using Slide master, notes and handout master
Working with animation and transitions
Organize and Group slides
Import or create and use media objects: audio, video, animation
Perform slideshow recording and Record narration and create presentable videos

TOTAL: 30 PERIODS

OUTCOMES:

On successful completion the students will be able to

- Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
- Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
- Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects.

GE5451 **TOTAL QUALITY MANAGEMENT** **L T P C**
3 0 0 3

OBJECTIVES:

- Teach the need for quality, its evolution, basic concepts, contribution of quality gurus, TQM To Understand the need for quality, definitions, and the evolution of Total Quality Management (TQM), including its basic concepts and frameworks.
- To Examine about quality tools, Six Sigma processes, benchmarking, and continuous improvement methodologies like PDSA, 5S, Kaizen, and the Juran Trilogy.
- To Focus on customer satisfaction, Kano model, service quality, employee involvement, motivation, empowerment, and supplier partnerships.
- To Study ISO standards (9000, 14000 series), sector-specific standards, Environmental Management Systems (EMS), and their implementation and benefits.
- To Investigate quality frameworks like Deming's philosophy, QFD, FMEA, TPM, and Cost of Quality to improve processes and organizational performance.

UNIT I INTRODUCTION **9**

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of product and service quality –Definition of TQM-- Basic concepts of TQM –-Gurus of TQM (Brief introduction) -- TQM Framework- Barriers to TQM –Benefits of TQM.

UNIT II TQM PRINCIPLES **9**

Leadership - Deming Philosophy, Quality Council, Quality statements and Strategic planning- Customer Satisfaction –Customer Perception of Quality, Feedback, Customer complaints, Service Quality, Kano Model and Customer retention – Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition & Reward and Performance Appraisal--

Continuous process improvement –Juran Trilogy, PDSA cycle, 5S and Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating and Relationship development.

UNIT III TQM TOOLS & TECHNIQUES I **9**

The seven traditional tools of quality - New management tools - Six-sigma Process Capability- Bench marking - Reasons to benchmark, Benchmarking process, What to Bench Mark, Understanding Current Performance, Planning, Studying Others, Learning from the data, Using the findings, Pitfalls and Criticisms of Benchmarking - FMEA - Intent , Documentation, Stages: Design FMEA and Process FMEA.

UNIT IV TQM TOOLS & TECHNIQUES II **9**

Quality circles – Quality Function Deployment (QFD) - Taguchi quality loss function – TPM – Concepts, improvement needs – Performance measures- Cost of Quality - BPR.

UNIT V QUALITY MANAGEMENT SYSTEM **9**

Introduction-Benefits of ISO Registration-ISO 9000 Series of Standards-Sector-Specific Standards - AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements-Implementation-Documentation-Internal Audits-Registration-ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction–ISO 14000 Series Standards–Concepts of ISO 14001–Requirements of ISO 14001-Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOMES:

CO1: To understand the need, evolution, and definitions of quality, TQM concepts, and contributions of quality gurus.
CO2: To Utilize tools like the PDSA cycle, 5S, Kaizen, benchmarking, FMEA, and Six Sigma for process and performance improvement.
CO3: To Assess customer satisfaction, perception of quality, service quality models, employee motivation, and empowerment strategies.
CO4: To Interpret ISO 9000/14000 series standards, sector-specific standards, and EMS for improving organizational quality systems.
CO5: To Apply philosophies like Deming's, Juran's Trilogy, TPM, QFD, and other quality measures to enhance productivity and reduce costs.

TEXT BOOK:

1. Dale H.Besterfiled, Carol B.Michna,Glen H. Bester field,Mary B.Sacre,Hemant Urdhware she and RashmiUrdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression,2013.

REFERENCES:

1. Joel.E. Ross, "Total Quality Management – Text and Cases",Routledge.,2017.
2. Kiran.D.R, "Total Quality Management: Key concepts and case studies, Butterworth – Heinemann Ltd, 2016.
3. Oakland, J.S. "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, Third Edition, 2003.
4. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006 .

CO's-PO's & PSO's MAPPING:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1	1									3	2	1
2				1		1	1	1	1	1	2			2	3
3				1	1	3		2						3	3
4												3			3
5										3	2	1			3
Avg	3	1	1	1	1	2	1	2	1	2	2	2	3	2	3

1' = Low; '2' = Medium; '3' = High

GI5401	REMOTE SENSING II	L T P C
		3 0 0 3

OBJECTIVES:

- To gain knowledge about the basic physical principles of Thermal RS, Hyperspectral RS, Microwave RS and Lidar RS.
- To comprehend the unique features & methods to extract features from Thermal RS, Hyperspectral, Microwave & Lidar RS
- To apply the knowledge of Thermal, hyperspectral, Microwave and Lidar principles for selecting the suitable methods to extract information
- To evaluate various RS methodologies for verifying the applicabilkity of the particular methodology for particular problem.
- To develop the solution from the various Rs learning for various applications

UNIT I THERMAL REMOTE SENSING AND ANALYSIS 9

Thermal radiation principles – Thermal interaction sensors and characters – thermal image characters - image degradation sources & correction - Land surface temperature measurement - Application: LST, emissivity mapping, SST, ET distribution, Urban heat islands, existing models

UNIT II HYPERSPECTRAL REMOTE SENSING 9

Diffraction principles - field spectrum – BDRF and spectral reflectance & imaging spectrometry- sensors - virtual dimensionality – Hughe's phenomenon - Data reduction, Calibration and normalization -Binary encoding- thresholding - library matching.

UNIT III HYPERSPECTRAL DATA ANALYSIS 9

Spectral library – response functions – MNF transformation – Kalman filters- library matching, spectral angle mapper, BBMLC-spectral mixture analysis – end member extraction – spectral unmixing- MIA analysis concepts - PCF, PCA, WPCA spectral transformation - band detection, reduction and selection principles -data compression- Applications

UNIT IV MICROWAVE REMOTE SENSING 9

Radiometry - RADAR Equation - SLAR - Resolution concepts - Synthetic Aperture RADAR - SAR image Characteristics - Topographic effect - SAR Missions - ERS, JERS, RADARSAT, ENVISAT, TerraSAR X, RISAT - Scatterometry, Altimetry, Polarimetry and Interferometry.

UNIT V LIDAR 9

LIDAR - Principles and Properties- different LiDAR System- Space Borne and airborne LiDAR missions - Typical parameters of LiDAR system. Data Processing - geometric correction-data quality enhancement - filtering - LiDAR mapping applications: Hydrology, Disaster mitigation and management, etc

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand the basic physical principles of Thermal RS, Hyperspectral RS, Microwave RS and Lidar RS.

CO2 Comprehend the unique features & methods to extract features from Thermal RS, Hyperspectral, Microwave & Lidar RS.

CO3 Apply the knowledge of Thermal, hyperspectral, Microwave and Lidar principles for selecting the suitable methods to extract information.

CO4 Evaluate various RS methodologies for verifying the applicability of the particular methodology for particular problem

CO5 Develop the solution from the various Rs learning for various applications

TEXTBOOKS

1. Richards, Remote sensing digital Image Analysis-An Introduction Springer - Verlag,2012.
2. Thomas M.Lillesand, Ralph W. Kiefer and Jonathan W. Chipman, Remote Sensing and Image interpretation, John Wiley and Sons, Inc, New York, 2015.
3. Ulaby, F.T., Moore, R.K, Fung, A.K, Microwave Remote Sensing; active and passive, Vol. 1,2 and 3, Addison - Wesley publication company 2001

REFERENCES

1. Janza, F.Z., Blue H.M. and Johnson,J.E. Manual of Remote Sensing. Vol.I, American Society of Photogrametry, Virginia, USA, 2002.
2. Verbyla, David, Satellite Remote Sensing of Natural Resources. CRC Press, 1995
3. Paul Curran P.J. Principles of Remote Sensing. Longman, RLBS, 1988.
4. Woodhouse lain.H, Introduction to Microwave Remote Sensing Taylor & Francis 2006.
5. George Joseph and C Jeganathan, Fundamentals of Remote Sensing,Third Edition, Universities Press (India) Private limited, Hyderabad, 2018

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3	3	3
2	3	3											3	3	2
3	3	3											1	3	1
4	2	2	3										1	2	3
5	-	3		3										3	3
Avg	3	3	3	3									2	3	2

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5402 **CARTOGRAPHY AND GIS** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the concepts of cartography and their applications in representing spatial data.
- To understand the principles in designing and producing maps by applying principles of map layout, symbolization, color theory, and geometric transformations.
- To explain the core components of GIS, the types of spatial and attribute data, and the different data models.
- To train in techniques for input of raster and vector data, georeferencing, and performing coordinate transformations.
- To describe the quality of GIS data, including aspects of accuracy and completeness, and learn methods for data output and GIS standards.

UNIT I ELEMENTS OF CARTOGRAPHY 9

Definition of Cartography - Maps - functions - uses – Types of Maps – Map Scales and Contents – Map projections – shape, distance, area and direction properties – perspective and mathematical projections – Indian maps and projections – Map co-ordinate systems - geometric transformations – bilinear and affine transformations – UTM and UPS references

UNIT II MAP DESIGN AND PRODUCTION 9

Elements of a map - Map generalization - Map Layout principles – Map Design fundamentals – symbols and conventional signs - graded and ungraded symbols - color theory - colours and patterns in symbolization – map lettering - map production – map printing- colours and visualization.

UNIT III FUNDAMENTALS OF GIS 9

Introduction to GIS - Definitions – History of GIS - Components of a GIS – Hardware, Software, Data, People, Methods – Types of data – Spatial, Attribute data- types of attributes – scales/ levels of measurements - spatial data models – Raster Data Structures – Raster Data Compression - Vector Data Structures - Raster vs Vector Models- TIN ,GRID and Network Data Models.

UNIT IV DATA INPUT AND TOPOLOGY 9

Scanner - Raster Data Input – Raster Data File Formats – Georeferencing – Vector Data Input- Digitiser – Datum Projection and reprojection -Coordinate Transformation – Topology - Adjacency, connectivity and containment – Topological Consistency – Non topological file formats - Attribute Data linking – Linking External Databases – GPS Data Integration - Raster to Vector and Vector to Raster Conversion – File Formats in Open/Proprietary Softwares.

UNIT V DATA QUALITY AND OUTPUT 9

Data quality - Basic aspects - completeness, logical consistency, positional accuracy, temporal accuracy, thematic accuracy and lineage – Metadata – GIS Standards – Interoperability – OGC Concepts and FOS (Free and Open Source Software) - Spatial Data Infrastructure - Data Output - Map Compilation – Multimedia Products – Visualization of Geographical Information Data.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 identify and describe various types of maps, map projections, and coordinate systems used in cartography

CO2 apply map design principles and produce maps with appropriate symbolization, color theory, and geometric transformations

CO3 explain the components and data models of GIS and classify different types of spatial and attribute data

CO4 demonstrate data input techniques, coordinate transformation, and the application of topology in GIS

CO5 evaluate the quality of GIS data and create accurate data outputs, including maps, charts, and graphs

TEXTBOOKS:

1. Arthur, H. Robinson, Elements of Cartography, Seventh Edition, John Wiley and Sons, 2004.
2. Kang-Tsung Chang, " Introduction to Geographic Information Systems", McGraw Hill Publishing, 9th Edition, 2018.

REFERENCES:

1. John Campbell, " introductory Cartography", Wm.C. Brown Publishers, 3rd Edition, 2004
2. C.P. Lo Albert K.W. Yeung, Concepts and Techniques of Geographic Information Systems, Pearson Publishers, 2016.
3. Ian Heywood, Sarah Cornelius, Steve Carver, ~~Srinivasa Raju,~~ "An Introduction to Geographical Information Systems, Pearson Education, 4th Edition, 2012.
4. R.P.Misra, A.Ramesh, Fundamentals of Cartography, Concept publishing company,1989,ISBN-81-7022-222-2
5. W.Cartwright,G.Gartner,A.Lehn, Cartography and Art,Springer,2009,ISBN: 978-3-540-68567-8.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	1	2									3		2
2			1			2							3	1	1
3	1	2	1	2	1								2	3	
4					3	1							3	3	1
5				3										3	
Avg.	2	2	1	2	2	2							3	3	1

1' = Low; '2' = Medium; '3' = High

GI5403 OBJECT ORIENTED PROGRAMMING USING C++ L T P C
2 0 2 3

OBJECTIVES :

- To understand the fundamental concepts of object-oriented programming and C++ programming fundamentals.
- To learn the design, development, and implementation of object-oriented systems using C++.
- To apply object-oriented concepts and C++ programming skills to solve real-world problems.
- To analyze the performance and limitations of object-oriented systems and C++ programs.
- To develop creative solutions using object-oriented concepts and C++ programming skills.

UNIT I CONCEPTS OF OBJECT ORIENTED PROGRAMMING 6+6

Principles - Abstract Data types - Inheritance - Polymorphism - Object Identity - Object Modeling - Object Oriented Programming Languages - Object Oriented Databases - Object Oriented user Interfaces - Object Oriented GIS - Object Oriented Analysis - Object Oriented Design -Examples.

UNIT II C++ PROGRAMMING FUNDAMENTALS 6+6

Introduction to C++- Keywords, Identifiers- Data types- Variables – Operators`-Manipulators- Operator Overloading- Operator Precedence- Control Statements-Functions - Call by Reference - Arguments - Function Overloading – Exercises

UNIT III CLASSES AND OBJECTS 6+6

Classesand Objects -MemberFunctions – Nesting of Member Functions - Constructors Destructors -Type Conversions - Inheritance - Base class - Derived Class - Visibility modes - Single Inheritance - Multilevel Inheritance - Multiple Inheritance - Nesting - Polymorphism- Exercises

UNIT IV FILE HANDLING 6+6

Streams and Formatted I/O – I/O Manipulators – File Handling – Random Access – Object Serialization – Namespaces – STD Namespace – ANSI String Objects – Standard Template Library.

UNIT V TEMPLATES AND EXCEPTION HANDLING 6+6

Function and Class Templates- Overloading of template functions-Member function templates - Exception Handling – Try-Catch-Throw Paradigm – Exception Specification – Terminate and Unexpected Functions - Uncaught Exception- Rethrowing an Exception.

TOTAL : 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand the basic concepts of object-oriented programming, including abstrac types, inheritance, polymorphism, and object identity.

CO2 Learn the C++ programming fundamentals, including data types, variables, opera control statements, functions, and object-oriented programming concepts.

CO3 Apply object-oriented concepts and C++ programming skills to solve real-world pr including file handling, exception handling, and template metaprogramming.

CO4 Analyze the performance and limitations of object-oriented systems and C++ prog

CO5 Develop creative solutions using object-oriented concepts and C++ programming including designing and implementing new data structures, algorithms, and softw systems.

TEXTBOOKS:

1. Balagurusamy. E., Object Oriented Programming with C++, Tata McGraw Hill Publications, Fourth edition, 2017
2. Daniel Liang, Introduction to Java Programming, Pearson, Sixth Edition, 2012

REFERENCES:

1. Bjarne Stroustrup, Programming: Principles and Practice using C++, Addison Wesley Publications, First Edition, 2014
2. Ponnambalam. P and Tiuley Alguindigue, "A C++ Primer for Engineers: An ObjectOriented approach" , McGraw Hill, 1997.
3. Kris Hadlock, Ajax for Web applications developers, Sams Publishing, First edition,2006
4. Bhushan Trivedi : " Programming with ANSI C ++ . A Step by step approach " Oxford University Press,2010
5. http://docs.oracle.com/javaee/5/tutorial/doc
6. www.cplusplus.com/doc/tutorial

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	2										3	2	2
2	3	2											3		
3	1	1	1	1	2	1						2	2	3	2
4	1	3	2	3	1								1	3	3
5			3									2		3	3
Avg	2	2	2	2	2	1						2	2	3	3

1' = Low; '2' = Medium; '3' = High

GI5404 **GEODESY** **L T P C**
3 0 0 3

OBJECTIVE:

- Understand the fundamentals of Geodesy, history, applications and reference surfaces used in geodetic measurements.
- Explore the geometric principles of the Earth's ellipsoid with focus on latitudes, ellipsoidal coordinates and curvature along with properties of geodesics
- Study the physical aspects of Geodesy and gravity measurements, geopotential surfaces
- Learn about different coordinate systems in Geodesy, their relationships and the computation of orthometric, ellipsoidal, and geoidal heights.
- Apply Geodetic Astronomy principles to determine azimuth, latitude, and longitude using celestial coordinates and time systems.

UNIT I FUNDAMENTALS **9**

Definitions- Classifications, Applications, Problem and purpose of Geodesy - Historical development and Organization of Geodesy. Reference Surfaces and their relationship. Engineering, Lunar, Planetary and interferometric Synthetic aperture radar Geodesy – Local and International Spheroid.

UNIT II GEOMETRIC GEODESY **9**

Geometry of ellipsoid, fundamental mathematical relationship of ellipsoid, Geodetic, Geocentric and Reduced latitudes and their relationship. Ellipsoidal Co-ordinates in terms of Reduced, Geodetic and geocentric latitude. Radius of curvature in the meridian & prime vertical and their relationship. Mean Radius of curvature in any azimuth, Length of the meridian arcs and arcs of parallel and Area of trapezium on the ellipsoid. Curves on the ellipsoid, properties of Geodesic. Deflection of Vertical, Spherical excess.

UNIT III PHYSICAL GEODESY **9**

Basics - INGN -the significance of gravity measurements, Gravity field of earth, Concept of equipotential, Geopotential and Spheropotential Surface - Normal gravity and its computations, Methods of measuring Absolute and Relative gravity- Gravimeters-Reduction of gravity measurements, terrain and Isostasy corrections. Gravity networks. Gravity anomaly and Gravity disturbance-Fundamental equation of Physical Geodesy. Gravimetric determination of Geoid and Deflection of Vertical.

UNIT IV CO-ORDINATE SYSTEM AND GEODETIC CONTROL **9**

Natural or Astronomical co-ordinate System, Geodetic or Geographical co-ordinate System, Rectangular or Cartesian Co-ordinate System and relationship between them. Curvilinear Co-ordinate System. Astro-Geodetic method of determining the reference Spheroid. Geodetic Control (Horizontal and Vertical) – Standards. Methods and Computations. Geo potential number - Orthometric height, Normal height, Dynamic height and their corrections – computation of orthometric height, Ellipsoidal height and its determination with a single and reciprocal observation of vertical angle - geoidal height – methods and computation.

UNIT V GEODETIC ASTRONOMY **9**

Celestial Sphere – Astronomical triangle – celestial coordinates systems and its relationship with Cartesian Co-ordinates and Transformation between them -Special star positions, Major constellations- Time systems (sidereal, Universal , atomic and standard) rising and setting of Stars with respect to Declination, hour angle and Azimuth, Culmination, Prime Vertical Crossing and Elongation. Determination of Astronomical Azimuth- stars altitude and hour angle methods, astronomical latitude and longitude determination

TOTAL: 45 PERIODS

COURSE OUTCOMES (COS)

CO1: Define Geodesy, its history, applications, and reference surfaces.
CO2: Analyze ellipsoidal geometry, latitudes, and radii of curvature for geodetic computations.
CO3: Understand gravity measurements and their role in geoid determination and deflection of vertical.
CO4: Apply coordinate systems in Geodesy and compute various heights and geodetic control parameters.
CO5: Use Geodetic Astronomy methods for determining azimuth, latitude, and longitude.

TEXTBOOKS:

1. Wolfgang Torge, Geodesy, Walter De Gruyter Inc., Berlin, 4th Edition, 2014.
2. Guy Bomford||Geodesy|| Nabu Press,2010,ISBN 1172029091

REFERENCES:

1. Petr Vanicek and Edward J. Krakiwsky, Geodesy: The concepts, North-Holland Publications Co., Amsterdam, 1991.
2. Tom Herring, ¯Geodesy _ Elsevier,2009,ISBN : 0444534601
3. Schwarze, V.S. Geodesy: The challenge of the 3rd millennium, Springer verlag, and 1st Edition,2002.
4. James R.Smith, Introduction to Geodesy, John wiley & Sons Inc. 1997.
5. George I. Hosmer, Geodesy, Kessinger publishing 2007.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1		1							2		3		
2	3	3	3	3									3	3	1
3	2	3	2	3	2	2	1				2		2	2	
4	3	3	3	3	2							1	3	3	2
5	3	3	2	3	3		1						3	2	1
Avg	3	3	3	3	2	2	1				2	1	3	3	1

1' = Low; '2' = Medium; '3' = High

GI5405 **SURVEYING II** **L T P C**
3 0 0 3

OBJECTIVE

- Develop a deep understanding of fundamental surveying principles, tools, and techniques used in diverse surveying applications.
- Enhance the ability to perform and adjust various types of surveying measurements using advanced instruments.
- Equip students with the skills to analyze and adjust survey data through error propagation techniques, ensuring the accuracy of survey results.
- Foster the ability to apply advanced techniques for conducting surveys in various real-world scenarios, including infrastructure development and environmental monitoring.
- Build competence in applying both traditional and modern surveying methods to produce accurate and reliable geospatial data for decision-making in engineering projects.

UNIT I THEODOLITE SURVEYING 9

Theodolite – Types – Description - Horizontal and vertical angle measurements - Temporary and permanent adjustments – Trigonometric Levelling - Heights and distances – Geodectic observation - Tacheometric surveying – Stadia Tacheometry – Subtense method - Tangential Tacheometry

UNIT II CONTROL SURVEYING AND ADJUSTMENT 9

Horizontal and vertical control- Methods - Triangulation- Base line - Instruments and accessories – Corrections - Satellite station - Traversing – Coordinate computation - Gale‘s table – Omitted measurement – Trilateration - Concepts of measurements and errors – weight of an observation – law of weight - error propagation and linearization – adjustment methods – angles, lengths and levelling network – simple problems.

UNIT III ASTRONOMICAL SURVEYING 9

Astronomical terms and definitions - Celestial coordinate systems – Nautical mile – Spherical excess - Astronomical triangle - different time systems - Nautical Almanac - Apparent altitude and corrections - Field observations and determination of and azimuth by altitude and hour angle method – Determination of time, longitude, latitude.

UNIT IV ROUTE SURVEYING 9

Route Surveying for Highways, Railways, Power line and Canal – Reconnaissance survey, Preliminary survey and Location survey by Conventional method and Geomatics techniques - Setting Out Simple curves, Compound curves, Reverse Curve, Transition and Vertical curves – Sight distance.

UNIT V HYDROGRAPHIC AND MINE SURVEYING 9

Introduction to Hydrographic surveying – Vertical depth measurements – Soundings – Horizontal position fixing – Methods of locating soundings – Three point problem – Tides – MSL – Chart datum – River survey – Measurement of current and discharge – Mine surveying equipment – Weisbach triangle method – Tunnel alignment and setting out – Gyro Theodolite - Shafts and Adits

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Demonstrate proficiency in using surveying instruments and techniques to measure angles, distances, and heights with accuracy.

CO2 Apply appropriate methods for data adjustment, error analysis, and corrections to ensure the reliability and precision of survey results.

CO3 Utilize advanced surveying and geospatial techniques to solve complex surveying problems and improve the efficiency of data collection.

CO4 Interpret and analyze geospatial data from various surveying methods to support planning, design, and management of infrastructure projects.

CO5 Conduct surveys for different applications using modern tools and technologies, ensuring high-quality data for decision-making.

TEXTBOOKS:

1. J. Uren and W.F. Price, Surveying for Engineers, Palgrave macmillan, Fifth Edition, 2010.
2. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I & II, Lakshmi Publications Pvt Ltd, New Delhi,17th Edition,2016.

REFERENCES:

1. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001
2. W. Schofield and M. Breach, Elesevier, Engineering Surveying, Sixth Edition, 2007.
3. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
4. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004
5. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice‘ Hall of India 2004
6. K.R. Arora, Surveying Vol I & II, Standard Book house , Eleventh Edition. 2013
7. T.P.Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint,2015.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3				3								3		
2	2	3	2	2	2								3	3	2
3		3	3	3	2							2	3	3	2
4		3	3	3	3								3	3	3
5	3	2		2	3							2	3	2	3
AVg.	3	3	3	3	3							2	3	3	3

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5411	SURVEYING LABORATORY II	L T P C 0 0 4 2

OBJECTIVE:

- To understand the principles and practical applications of theodolite, angle observations, and various surveying methods.
- To apply surveying techniques to determine the coordinates of inaccessible points and compute areas and volumes using theodolite and tacheometry methods.
- To conduct planimetric and topographic mapping, including preparation of maps and establishment of control points.
- To perform leveling and contouring surveys, including the establishment of baseline measurements and preparation of contour maps.
- To use astronomical observations and apply them for specific surveying tasks such as sun rise/sun set estimation, magnetic declination determination, and setting out road and railway curves.

EXERCISES

1.	Study of Theodolite and Angle Observations by Repetition (study of various components, their functions, temporary adjustments, observation of horizontal angle, vertical angle, different observation principles and care of instruments)	4
2.	Observation of Angles and Station Adjustment (observations horizontal and vertical angles to defined objects by method of reiteration, calculation of closing error and error adjustment)	4
3.	Determination of Coordinates of Inaccessible Point(s) (calculation of x,y,z coordinates of inaccessible point using single plane method with bearing observations by compass, known/assumed station coordinates)	4
4.	Computation of Area of a Triangle with one inaccessible point and Reduced Level of Inaccessible point using Double Plane Method (formation of triangle with one inaccessible point and two ground station)	4
5.	Computation of Filling Volume for a Triangular Land using Tangential Tacheometry (calculation of length, height difference of points and computation of filling volume between triangular plane and horizontal plane)	4
6.	Preparation of Planimetric Map using Stadia Tacheometry (determination of distances using stadia tacheometry of selected points and preparation of planimetric map)	4
7.	Establishment of Baseline (establishment of new baseline using angle measurements to existing baseline)	4
8.	Establishment of Horizontal Control Points by Traversing (calculation of planimetric coordinates of control points using reference station coordinates, magnetic bearing after adjustment using Gales Traverse Table)	4
9.	Mapping of Topographic Features including a complete building using control points (using control points established, various topographic features are to be mapped)	
10.	Preparation of Contour Map (measurement of level along radial lines using vertical angles and interpolation of contour)	4
11.	Estimation of Sun Rise/ Sun Set using Sun Observations and understanding of Nautical Almanac (observation of sun elevation and plotting best fit curve for sun's motion to estimate sun rise/ sun set)	4
12.	Computation of Coordinates of selected stations using True Bearing of Reference Line (calculation of azimuth of reference line by extra-meridian observations and computation of coordinates for selected stations using distance, angle measurements)	4

13. Determination of Magnetic Declination at a Station using True Bearing from Hour Angle Method (comparison of magnetic and true bearing of line determined using Hour Angle Method) 4
14. Setting out simple road curve by linear method (Degree of Curve : 1 - 20 degrees) 4
15. Setting out simple Railway curve by Instrument method (Degree of Curve : 1 – 5 degrees) 4

TOTAL : 60 PERIODS

OUTCOMES:

Upon completing this course, students will be able to:

CO1 Operate and adjust theodolites, observe horizontal and vertical angles accurately, and understand different observation principles and methods, such as reiteration and station adjustments.

CO2 Calculate the coordinates of inaccessible points using single-plane and double-plane methods, compute the area of a triangle with an inaccessible point, and determine the volume of a triangular land area using tangential tacheometry.

CO3 Prepare planimetric maps using stadia tacheometry, establish horizontal control points by traversing, and map topographic features using control points for accurate survey documentation.

CO4 Establish baselines, perform radial leveling, and prepare accurate contour maps by measuring vertical angles and interpolating contour lines.

CO5 Estimate sunrise and sunset times using sun elevation data, determine magnetic declination using the Hour Angle method, and apply curve-setting techniques for roads and railways.

REFERENCES:

1. J. Uren and W.F. Price, Surveying for Engineers, Palgrave macmillan, Fifth Edition, 2010.
2. Dr.B.C.Punmia, Ashok K.Jain and Arun K Jain, Surveying Vol.I & II, Lakshmi Publications Pvt Ltd, New Delhi,17th Edition,2016.
3. James M. Anderson and Edward M. Mikhail, Surveying, Theory and Practice, Seventh Edition, McGraw Hill 2001
4. W. Schofield and M. Breach, Elesevier, Engineering Surveying, Sixth Edition, 2007.
5. R. Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
6. Bannister and S. Raymond, Surveying, Seventh Edition, Longman 2004
7. S.K. Roy, Fundamentals of Surveying, Second Edition, Prentice‘ Hall of India 2004
8. K.R. Arora, Surveying Vol I & II, Standard Book house , Eleventh Edition. 2013
9. T.P.Kanetkar and S.V.Kulkarni, Surveying and Levelling, Parts1 & 2, Pune Vidyarthi Griha Prakashan, Pune, 24th Reprint,2015.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3				2								3		2
2	2	3	3	2	3								3	3	2
3	3	3	3	3	3				2				2	2	3
4	2	3	2		2				2				3	2	3
5	3	2	2	2	2				3				1	3	2
AVg.	3	3	3	2	2				2				2	3	2

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5412 **CARTOGRAPHY AND GIS LABORATORY** **L T P C**
0 0 2 1

OBJECTIVES :

- To understand how to create and demonstrate simple conical, cylindrical, and planar projections for a reduced earth, including the concepts of aspect and secant.
- To gain the skills to design and interpret maps using graded symbolization, isopleths, and choropleth maps for representing spatial data.
- To compile and design maps, understanding the principles of map creation, design aesthetics, and the practical aspects of map layout.
- To input spatial data through onscreen digitization, create point, line, and polygon layers, and conduct projection, reprojection, and coordinate transformations on maps.
- To develop skills to link external databases, perform SQL queries for data analysis, generate graphs and charts, and convert data between vector and raster formats.

EXERCISES:

1. Simple conical, cylindrical and planner projection for a reduced earth (2 to 4cm reduced earth) – aspect and secant demo.
2. Graded symbolization and isopleth / choropleth map
3. Map compilation and Design
4. Data Input – Onscreen Digitisation – Creation of Point, Line and Polygon layers
5. Projection, Reprojection and Coordinate Transformation of Maps
6. Attribute data input and Measurement of Distance, Area
7. Linking External Database and Tabular Data Analysis using SQL commands
8. Generating Graphs, Charts and Diagrams from Tabular data
9. Data Conversion – Vector to Raster and Raster to Vector
10. Map Joining, Edge Matching and Layout Design

TOTAL: 30 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Apply and understand simple conical, cylindrical, and planar projections for a reduced earth, including the concepts of aspect and secant, to create accurate spatial representations.

CO2 Design and interpret maps using graded symbolization, isopleths, and choropleth techniques, enhancing their ability to represent and analyze spatial data effectively.

CO3 Gain the ability to compile spatial data and design maps, focusing on the layout, organization, and visual appeal of the final map product.

CO4 Demonstrate competency in onscreen digitization, creating point, line, and polygon layers, and applying projection, reprojection, and coordinate transformations for spatial data.

CO5 Link external databases, perform SQL queries for data analysis, generate graphs and charts, and convert spatial data between vector and raster formats for diverse GIS applications.

REFERENCES:

1. Arthur, H. Robinson et al, Elements of Cartography, 7th Edition, John Wiley and Sons, 2004.
2. C.P. Lo Albert K.W. Yeung, "Concepts and Techniques of Geographic Information Systems", Prentice Hall of India Publishers, 2nd Edition,2006.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3		
2		3												3	
3		3												3	
4			3										2		3
5				3	2									3	2

Avg	3	3	3	3	2								3	3	3

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5501 **SPATIAL DATA ADJUSTMENT** **L T P C**
3 0 0 3

OBJECTIVE:

- To recall key concepts of measurement, errors, probability, sampling, and geodetic principles such as coordinate systems.
- To explain statistical methods and transformations for geospatial analysis, including distributions, stochastic models, and correlations.
- To apply techniques like weights, cofactor matrices, GIS modeling, and point determination methods to solve geospatial problems.
- To apply GIS tools for database creation, map layouts, and modeling in geospatial data analysis and visualization.
- To analyze adjustments, pre-analysis procedures, and propagation methods to ensure precision in geospatial workflows and surveys.

UNIT I MEASUREMENT AND ERROR 9

Concepts of measurement and Error - Types of errors - Elementary concepts in probability - Reliability of measurement - significant figures - Error Propagation - linearization - Multivariate distribution - Error ellipse- Weights of an observation - Stochastic model and Functional model.

UNIT II LEAST SQUARES ADJUSTMENT 9

Introduction - simple adjustment methods - Least squares method - Examples of least squares Problems – Techniques of least squares- concept of weight - least squares adjustment of indirect Observations - least squared adjustment of observations only.

UNIT III VARIANCE COVARIANCE PROPAGATION 9

Random events and probability - Random variables - continuous probability distributions – normal distribution - Expectation - measures of precision and accuracy - covariance and correlation - covariance, cofactor and weight matrices - Introduction to sampling - Derivation of the propagation laws - Examples - stepwise propagation.

UNIT IV PRE ANALYSIS OF SURVEY MEASUREMENTS 9

Pre analysis procedure- Horizontal angle measurement, Distance measurement and elevation difference – Survey tolerances – Database creation using GIS: Modeling- Map layout.

UNIT V GEODETIC COMPUTATIONS 9

Rectangular and Polar Co - ordinates - First and Second geodetic problem – Similarity andHelmert's transformation- methods of point determinations – problems on intersection, resection, arc section and also with over determinations, polar method and its extension.

TEXTBOOKS:

1. Mikhail, E.M. and Gracie G., Analysis and adjustment of Survey measurements, Van Nostrand Reinhold, New York, 2005
2. Paul.R.Wolf and Charles. D.Ghilani, Adjustment Computations -Statistics and least squares in surveying and GIS, John Wiley and sons inc.,6th Edition,2017.

TOTAL: 45 PERIODS

REFERENCES:

1. P.J.G.Teunissen, Adjustment theory an introduction, VSSD. 2006.
2. OSCAR S.ADAMS, GEODESY:Application of the Theory of Least Squares to The Adjustment of Triangulation, Japnese Edition,Nabu Press, 2012.
3. Brinker Russell C Minnick Roy, The Surveying Hand Book, Volume-II,Springer,2nd Edition,1995.
4. Edward L. Ingram, Geodetic Surveying and the adjustment of observations(Method of Least Squares),Forgotten Books,2018.

5. Dr.B.C. Punmia,Ashok K.Jain and Arun K.Jain, Surveying Vol-III,Laxmi Publications Pvt Ltd.,17th Revised Edition,2005.

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Recall the fundamentals of measurement, errors, probability, sampling, and adjustment methods, geodetic concepts like rectangular and polar coordinates

CO2 Explain statistical methods such as multivariate distributions, normal distribution, stochastic models, covariance, correlation, and transformations like Helmert's and similarity for geospatial analysis.

CO3 Apply concepts of weights, cofactor matrices, GIS modeling, and point determination methods to solve surveying and geospatial problems

CO4 Apply GIS-based tools for creating databases, map layouts, and models to address practical geospatial challenges in data analysis and visualization.

CO5 Analyze least squares adjustments, pre-analysis procedures, and step-wise propagation for evaluating horizontal and vertical measurements, ensuring accuracy in geospatial workflows and survey methodologies.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	-	-	-	-	-	-	-	-	-	-	3	-	-
2	2	3	1	1	-	-	-	-	-	-	-	-	1	-	-
3	-	3	-	3	-	-	-	-	-	-	-	-	-	3	-
4	-	-	-	-	3	-	-	-	-	-	-	-	1	3	3
5	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
Avg	3	2	1	2	3	-	-	-	-	-	-	-	2	3	3

1' = Low; '2' = Medium; '3' = High

GI5502 **DIGITAL IMAGE PROCESSING** **L T P C**
3 0 0 3

OBJECTIVE

To study the image formation, original and derivable properties of the image for use in case of applications

To understand the effect of the acquisition instrument, methods, medium and the earth's object on the images for various earth objects

To learn and apply various image handling methods for improving the geometry and radiomentry of image and to extract information from the images

To analyse the applicability and appropriateness of image handling methods for information extraction from satellite images and evaluate the accuracy of the information so extracted

To synthesis themodern and hybrid image analysis methods for information extraction and value addition to the images

UNIT I FUNDAMENTALS OF IMAGE PROCESSING 9

Information Systems - Encoding and decoding - acquisition, storage and retrieval –data products - satellite data formats - Digital Image Processing Systems - Hardware and software design consideration Scanner, digitizer - photo write systems

UNIT II SENSORS MODEL AND PRE PROCESSING 9

Image Characteristics - Histograms - Scattergrams – Univariate and multi variate statistics enhancement in spatial domain – global, local & colour Transformations – PC analysis, edge detections, merging - filters - convolution – LPF, HPF , HBF, directional box, cascade – Morphological and adaptive filters – Zero crossing filters – scale space transforms – power spectrum – texture analysis – frequency transformations - Fourier, wavelet and curvelet transformations.

UNIT III IMAGE ENHANCEMENT 9

Motions of planets and satellites - Kepler's laws, Escape velocity and Orbit maneuvers – Lagrange Orbit - Ground based, Airborne and Space borne platforms - Sun synchronous and Geosynchronous satellites

UNIT IV IMAGE CLASSIFICATION 9

Active and Passive – Along and across track scanners: Optical and Thermal – Sensor Calibration - Microwave sensors - High Resolution Sensors - LIDAR, UAV - Orbital and sensor characteristics of live Indian earth observation satellites; image acquisition – storage and retrieval – resolution concept.

UNIT V ADVANCED CLASSIFIERS 9

Photographic and digital products - Types, levels - Selection and procurement of data - Visual interpretation: elements and keys - Digital Interpretation: - Sources of Image degradation – preprocessing – Geometry and Radiometry

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand image properties, formation and remote sensing data products.

CO2 Understand the effect of the sensor and object on image properties.

CO3 To apply suitable geometric and radiometric correction methods for information extraction.

CO4 To choose appropriate analysis methods on the given image and to assess the correctness of results.

CO5 To synthesis innovative and hybrid image quality methods for value added information.

TEXTBOOKS :

1. John, R. Jensen, Introductory Digital Image Processing, Prentice Hall, New Jersey, 4th Edition,2015.
2. Robert, A. Schowengergt, Techniques for Image Processing and classification in Remote Sensing,Academic Press, 2012.

REFERENCES:

1. Robert, G. Reeves,- Manual of Remote Sensing Vol. I & II - American Society of Photogrammetry, Falls, Church, USA, 1983.
2. Richards, Remote sensing digital Image Analysis - An Introduction 5th E
3. Digital Image Processing by Rafael C. Gonzalez,Richard Eugene Woods- Pearson/ Prentice Hall,2008
4. Fundamentals of Digital Image Processing by Annadurai Pearson Education (2006)
5. Digital Image Processing: PIKS Scientific Inside by William K. Pratt 4th Edition,Wiley Interscience,2007.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	1	2	3	-	-	-	-	-	-	1	3	-	-
2	3	2	-	2	-	-	-	-	-	-	1	-	3	2	-
3	1	3	2	3	2	1	-	-	-	-	1	-	1	3	2
4	1	3	3	3	2	1	-	-	-	-	-	-	1	2	3
5	3	2	3	2	3	-	-	2	-	-	-	-	2	3	2
Avg.	2	2	2	2	3	1		2			1	1	2	3	2

1' = Low; '2' = Medium; '3' = High

GI5551 TOTAL STATION AND GPS SURVEYING L T P C
3 0 0 3

OBJECTIVE :

- Provide foundational knowledge of advanced surveying techniques and tools.
- Develop the ability to analyze and correct measurement errors in geospatial data collection.
- Familiarize students with modern technologies, including satellite-based systems and their applications.
- Equip students with practical skills in handling and maintaining advanced surveying instruments.
- Enable proficiency in processing and interpreting geospatial data using industry-standard methods and software.

UNIT I FUNDAMENTALS OF TOTAL STATION AND ELECTROMAGNETIC WAVES 9

Methods of Measuring Distance, Basic Principles of Total Station, Historical Development, Classifications, applications and comparison with conventional surveying. Classification - applications of Electromagnetic waves, Propagation properties, wave propagation at lower and higher frequencies

UNIT II DISTANCE AND ATMOSPHERIC CORRECTION 9

Refractive index (RI) - factors affecting RI-Computation of group for light and near infrared waves at standard and ambient conditions-Computation of RI for microwaves at ambient condition - Reference refractive index- Real time application of first velocity correction. Measurement of atmospheric parameters- Mean refractive index- Second velocity correction -Total atmospheric correction- Use of temperature and pressure transducers.

UNIT III ELECTRO OPTICAL AND MICRO WAVE SYSTEM 9

Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser Total Station instruments. Microwave system: Measuring principle, working principle, Sources of Error, Microwave Total Station instruments. Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments – Traversing and Trilateration-COGO functions, offsets and stake out-land survey applications.

UNIT IV GPS SATELLITE SYSTEM 9

Basic concepts of GPS - Historical perspective and development - applications - Geoid and Ellipsoid- satellite orbital motion - Keplerian motion – Kepler's Law - Perturbing forces - Geodetic satellite - Doppler effect - Positioning concept -GNSS, IRNSS and GAGAN - Different segments - space, control and user segments - satellite configuration – GPS signal structure - Orbit determination and representation - Anti Spoofing and Selective Availability - Task of control segment - GPS receivers.

UNIT V GPS DATA PROCESSING 9

GPS observables - code and carrier phase observation - linear combination and derived observables - concept of parameter estimation – downloading the data RINEX Format – Differential data processing - software modules -solutions of cycle slips, ambiguities, Concepts of rapid, static methods with GPS - semi Kinematic and pure Kinematic methods -satellite geometry & accuracy measures - applications- long baseline processing- use of different softwares.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Demonstrate advanced surveying concepts and tools.
CO2 Apply techniques to enhance accuracy and reliability in geospatial measurements.
CO3 Utilize modern instruments and technologies for effective data acquisition.

CO4 Process and interpret geospatial data for real-world applications.
CO5 Exhibit proficiency in solving practical surveying problems using advanced methods and tools.

TEXTBOOKS:

1. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 4th Edition,1996.
2. Satheesh Gopi, rasathishkumar, N.madhu, ¯ Advanced Surveying , Total Station GPS and Remote Sensing ¯ Pearson education , 2nd Edition,2017. isbn: 978-81317 00679

REFERENCES :

1. R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
2. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1983.
3. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin,3rd Edition,2016.
4. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 4th Edition, 2015.
5. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin,2nd Edition,2003

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1	1	1								3		
2	2			1	1								3		
3	2			2	1								3		
4		1	2	2	2									3	3
5	3		2		2								3		
Avg.	3	1	2	2	1								3	3	3

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5511 DIGITAL IMAGE PROCESSING LABORATORY L T P C
0 0 4 2

OBJECTIVE :

- To understand the physical and interactive behavior of earth objects with EMR and response of various remote sensing sensors
- To study the atmospheric effect on the data captured by the remote sensing instruments and qualify use of data for various applications
- To apply the type and sources remote sensing data products available across various platforms so as to justify their use for specific application
- To evaluate the use of certain data for specific application based on the mode, type and nature of data acquisition
- To make decision on the selection, qualification and utilization of satellite data products for any given application

EXERCISES:

1. Image reading, writing and creating FCC
2. Study of image file formats and organization
3. Preprocessing techniques : radiometric correction
4. Preprocessing techniques : Ground control and Geometric rectification
5. Enhancenments – histogram, Convolution filters
6. Band ratioing and normalization – NDVI,SAVI & NDWI
7. PCA and Fourier Transform
8. Image fusion
9. Classification – supervised & unsupervised
10. Accuracy assessment – correlation, RMSE & kappa
11. Knowledge based classification
12. Classification using Artificial Neural Network
13. Sub pixel classification
14. Noise removal, Vectorisation, & map compilation

TOTAL: 60 P = 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 To import, read remote sensing images from various sources using open source and Commercial software environment.

CO2 To apply suitable preprocessing algorithm to correct atmospheric, geometric, radiometric errors in both open source and Commercial software.

CO3 To understand and apply image enhancement techniques to improve the image quality.

CO4 To employ various thematic classifiers on image and assess the accuracy.

CO5 To synergize modern classification method along with traditional classifier for value added information extraction.

REFERENCES:

1. Richards, Remote sensing digital Image Analysis - An Introduction , 5th Edition 2012 Springer -Verlag .
2. Robert, G. Reeves,- Manual of Remote Sensing Vol. I & II - American Society of Photogrammetry, Falls, Church, USA, 1983.
3. Richards, Remote sensing digital Image Analysis - An Introduction 5th Edition ,2012, Springer -Verlag 1993.
4. Digital Image Processing by Rafael C. Gonzalez,Richard Eugene Woods- Pearson/ Prentice Hall,2008
5. Fundamentals of Digital Image Processing by Annadurai Pearson Education (2006)

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	-	2	3	-	-	2	2	2	-	-	3	-	-
2	-	2	1	2	-	-	-	-	2	-	-	2	2	1	1
3	2	3	3	3	3	-	-	1	1	-	2	-	2	3	1
4	-	3	1	3	-	1	-	2	2	-	2	3	1	3	2
5	3	2	3	3	3	1	-	2	2	2	2	3	2	3	3
AVg.	2	2	2	3	3	1		2	2	2	2	3	2	3	2

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5512 TOTAL STATION AND GPS SURVEYING LABORATORY L T P C
0 0 2 1

OBJECTIVE :

- To exhibit the foundational knowledge of Total Station and GPS, including their components, functionalities, and applications in geospatial measurements.
- To Explain methodologies for measuring distances, elevations, coordinates, and positional data.
- To utilize advanced survey techniques to address real-world tasks like mapping, construction layouts, and geospatial positioning.
- To evaluate survey data to identify errors, discrepancies, or anomalies and apply appropriate corrective measures to ensure the accuracy and reliability of geospatial measurements.
- To design comprehensive and efficient surveying workflows tailored to specific projects, leveraging the integration of Total Station and GPS technologies for optimal precision and efficiency.
- To create innovative and reliable solutions for complex geospatial challenges in engineering and construction projects.

EXERCISES:

1. Study of Total Station
2. Distance and Coordinate Measurement
3. Missing Line Measurement
4. Remote Elevation Measurement
5. Resection
6. Setting out : Point and Line
7. Taking Offsets
8. Area Measurement
9. Total Station Traversing
10. Study of Hand held GPS
11. Study of Geodetic GPS
12. Static and semi kinematics survey
13. Differential Positioning
14. Precise Positioning
15. GPS Traversing

TOTAL : 30 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand the components, functionalities of Total Station and GPS.

CO2 Explain the methodologies behind distance, elevation, coordinate measurement, and positional techniques, fostering a deeper understanding of geodetic principles.

CO3 Apply survey techniques, such as Total Station traversing, missing line measurement, and GPS traversing, for practical tasks like mapping, construction layout, and precise geospatial positioning.

CO4 Analyze survey data, identify errors or discrepancies, and apply corrective measures to ensure accuracy and reliability in measurements

CO5 Evaluate comprehensive survey workflows tailored to specific projects, ensuring optimal precision and efficiency in geospatial applications

REFERENCE:

1. Satheesh Gopi, rasathishkumar, N.madhu, ¯ Advanced Surveying , Total Station GPS and Remote Sensing ¯ Pearson education , 2nd Edition,2017. isbn: 978-81317 00679.
2. Rueger, J.M. Electronic Distance Measurement, Springer-Verlag, Berlin, 4th Edition,1996.
3. R.Subramanian, Surveying and Levelling, Oxford University Press, Second Edition, 2012.
4. Laurila, S.H. Electronic Surveying in Practice, John Wiley and Sons Inc, 1983.
5. Guocheng Xu, GPS Theory, Algorithms and Applications, Springer - Verlag, Berlin,3rd Edition,2016.
6. Alfred Leick, GPS satellite surveying, John Wiley & Sons Inc., 4th Edition, 2015.
7. Seeber G, Satellite Geodesy, Walter De Gruyter, Berlin, 2nd Edition,2003.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3				3								3		
2			2		2				2				3		
3	1	2	2	1	2				2				3	3	
4	1	3	2		2				2				2	3	
5	1	2		2	3				2					2	3
AVg.	2	2	2	2	2				2				3	3	3

1' = Low; '2' = Medium; '3' = High

GI5513 **SUMMER INTERNSHIP (2 WEEKS)** **LT P C**
0 0 0 1

OBJECTIVES:

- To enable students to identify and connect with organizations involved in geoinformatics activities for practical exposure and skill enhancement.
- To provide hands-on training in geoinformatics tools, techniques, and methodologies under the guidance of industry experts
- To develop the ability to document and analyze daily geoinformatics tasks systematically through a day-wise work diary
- To foster critical thinking and problem-solving skills in real-world geoinformatics scenarios through direct industry engagement.
- To prepare students for professional readiness by evaluating their training experiences through a comprehensive assessment process, including report writing and viva-voce

STRATEGY:

a) The Student individually contact the organizations involved in Geoinformatics Activities with the help of the Coordinator for fixing the training period andType of Training.
b) The Students shall be evaluate donthe basis of1) Dairy2)TrainingReport3)Viva-Voce Examination. The evaluation committee consists of(1)Coordinator and (2)Expert Member
c) The Student maintain the day wisework diary while undergoing the training and get it endorsed by the supervising officer : it shall be submitted for evaluation

THE REPORT:

a) TheStudentpreparesthedocumentfortheindividualtrainingfollowingtheprinciplesof documentationstandardswithnecessaryflowcharts,diagrams,photographsand other details as the case may be.These documents will be partial fulfillment of the evaluation.
b) The Student shall enclose a certificate duly signed from the Supervising Officer of the Place ofTraining and Coordinating Faculty
c) The Viva-Voce Examination shall be part of evaluation

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Gain practical knowledge by engaging with geoinformatics organizations and participating in hands-on training activities.
CO2 Demonstrate the ability to systematically document and maintain a daily work diary endorsed by the supervising officer
CO3 Develop and present a detailed training report showcasing their understanding and application of geoinformatics tools and practices
CO4 Exhibit proficiency in articulating their learning experiences and insights during a viva-voce examination.
CO5 Build professional competencies and preparedness for solving geoinformatics-related engineering problems in real-world settings

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	-	1	1	1	-	-	-	1	3	1	-	3	1	-
2	-	-	3	-	2	-	-	1	1	3	-	1		2	1
3	3	3	3	3	3	1	2	1	2	2	1	1	3	3	3
4	2	-	-	-	2	-	-	1	-	3	-	1	2	-	
5	3	3	3	3	3	-	1	2	2	3	3	2	3	3	3
Avg	3	3	3	2	2	1	2	1	2	3	2	1	3	2	2
1' = Low; '2' = Medium; '3' = High															

GI5601 **SPATIAL ANALYSIS AND APPLICATIONS** **L T P C**
3 0 0 3

OBJECTIVE:

- understand the various data models of spatial data employed for different applications involving geospatial analysis
- To study the computations involved in performing operations and functions using the different data models for realizing various applications
- To study and appreciate the methods of operations to handle these data models to perform spatial analysis
- To appreciate and design geostatistical solutions for surface modelling and analysis
- To understand the elements and domains of portability in respect of spatial data to serve the data and output across the netlike scripts, architecture, etc.

UNIT I RASTER ANALYSIS **9**

Raster data exploration: Query analysis - Local operations: Map algebra, reclassification, logical and arithmetic overlay operations - Neighborhood operations: Aggregation, filtering - Extended neighborhood operations - Zonal operations - Statistical analysis - Cost - Distance analysis - Least cost path.

UNIT II VECTOR ANALYSIS **9**

Non-Topological analysis: Attribute database query, Structured Query Language, coordinate transformation, summary statistics, calculation of area, perimeter and distance - Topological Analysis: Reclassification, aggregation, overlay analysis: Point-in-Polygon, Line-in-Polygon, Polygon-on-Polygon: Clip, erase, identity, union, intersection - Proximity analysis: Buffering.

UNIT III NETWORK ANALYSIS **9**

Network - Introduction - Network data model - Elements of network - Building a network database -Geocoding - Address matching - Shortest path in a network - Time and distance based shortest path analysis - Driving directions - Closest facility analysis - Catchment/Service area analysis – Location -Allocation analysis

UNIT IV SURFACE AND GEOSTATISTICAL ANALYSIS **9**

Surface data - Sources of X, Y, Z data - DEM, TIN - Terrain analysis - Slope, aspect, viewshed, watershed analysis:: Watershed boundary, Flow direction, flow accumulation, drainage network, spatial interpolation: IDW, Spline, Kriging, Variogram. 3D analysis – intervisibility and line of sight analysis, 3D topology – buffer, difference, near and union, 3D interpolation – point, line and polygon, volume, area and cut and fill calculations, Volumetric 3D Mesh, vertical profiles across linear features, 3D Simulations and predictions. Integrating BIM and GIS

UNIT V CUSTOMISATION, WEBGIS, MOBILE MAPPING **9**

Customization of GIS: Need, uses, scripting languages - Embedded scripts - Use of Python script - WebGIS: WebGIS architecture, advantages of WebGIS, web applications - Location Based Services: Emergency and business solutions - Big data analytics.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand the data models and evaluate the applicability of raster, vector, network data models for a given application

CO2 Understand different functionalities and operations needed for solving a particular using one of the above data models and execute them

CO3 Apply geostatistical methods on spatial data to arrive at surface characteristic- related evaluation and analysis

CO4 Device geospatial solutions in respect of design the solution with respect to models, operations and functions based on the requirement of the user

CO5 Serve the geospatial data and solutions through customized geo portals using webGIS and mobile services with suitable architecture and tools

TEXTBOOKS:

1. Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems, Pearson, 2nd Edition,2016.
2. Ian Heywood, Sarah Cornelius, Steve Carver, An Introduction to Geographical Information Systems, Pearson,4th Edition,2012.

REFERENCES:

1. Michael N. DeMers, Fundamentals of geographic information systems, Wiley, 4th Edition,2012
2. Kang – tsung Chang, Introduction to Geographical Information System, Tata McGraw Hill,9th Edition,2019
3. John Peter Wilson, The handbook of geographic information science, Blackwell Pub.,2008.
4. Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind, Geographic Information Science and Systems, John Wiley & Sons Inc, 2015, ISBN- 978111867695.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	2	1	3	-	-	-	-	-	-	1	3	1	-
2	1	1	2	1	2	-	-	-	-	-	1	-	3	2	-
3	2	3	3	2	2	-	-	-	-	-	-	-	1	3	1
4	2	2	2	1	1	1	-	-	-	-	-	-	1	2	2
5	1	2	1	2	2	-	-	-	-	-	-	-	-	3	3
AVg.	2	2	2	1	2	1					1	1	2	2	2

1' = Low; '2' = Medium; '3' = High

GI5602 **SOFT COMPUTING TECHNIQUES** **L T P C**
3 0 0 3

OBJECTIVE :

- To Understand the fundamental concepts of soft computing techniques, including neural networks, fuzzy systems, and genetic algorithms.
- To Learn the theoretical foundations of artificial neural networks, fuzzy logic, and their integration in neuro-fuzzy systems.
- To Apply soft computing techniques to solve complex problems in geomatics and related fields.
- To Analyze the effectiveness and limitations of soft computing techniques in diverse real-world scenarios.
- To Develop innovative solutions by integrating soft computing techniques for applications like image processing, GIS, and urban planning.

UNIT I SOFT COMPUTING AND ARTIFICIAL NEURAL NETWORKS 9

Soft Computing : Introduction - soft computing vs. hard computing - soft computing techniques - applications of soft computing - ANN : Structure and Function of a single neuron: Biological neuron, artificial neuron, definition of ANN, Taxonomy of neural net, Difference between ANN and human brain, characteristics and applications of ANN, single layer network, Perceptron training algorithm, Linear separability, Widrow & Hebbian learning rule/Delta rule, ADALINE, MADALINE and BPN.

UNIT II FUZZY SYSTEMS 9

Fuzzy Logic: Fuzzy set theory, Fuzzy set versus crisp set, Crisp and fuzzy relations - introduction and features of membership functions, Fuzzy rule base system : fuzzy propositions, formation, decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making.

UNIT III NEURO-FUZZY MODELLING 9

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT IV GENETIC ALGORITHM 9

Genetic algorithm : Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction, Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA, Differences & similarities between GA & other traditional method

UNIT V APPLICATIONS OF SOFT COMPUTING IN GEOMATICS 9

image registration - Object recognition - Automated feature extraction - navigation – Integration of soft computing and GIS for flood forecasting and monitoring, Landslide susceptibility, Highway alignment, smart city planning, agriculture, solid waste disposal

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand the principles and applications of soft computing techniques, including ANN, fuzzy systems, and genetic algorithms.

CO2 Learn the structure and function of artificial neural networks, including single-layer networks and training algorithms.

CO3 Apply fuzzy systems and neuro-fuzzy models to design intelligent systems for decision-making processes.

CO4 Analyze the performance of genetic algorithms and their convergence properties in optimization problems.

CO5 Develop creative and integrated solutions using soft computing techniques for geomatics applications like flood forecasting and urban planning.

TEXTBOOKS:

1. Freeman J.A. and Skapura B.M., "Neural Networks, Algorithms Applications and Programming Techniques", Pearson , 2002.
2. Jang J.S.R.,Sun C.T and Mizutami E - Neuro Fuzzy and Soft computing ,Prentice hall New Jersey, Pearson, 2015.

REFERENCES:

1. Introduction to Artificial Neural Systems by Jacek.M Zurada, Jaico Publishing House,2004.
2. Timothy J.Ross:Fuzzy Logic Engineering Applications, 4th Edition, 2016, McGraw Hill,NewYork,1997.
3. Laurene Fauseett: Fundamentals of Neural Networks, Pearson 2004, Prentice Hall India, New Delhi,1994.
4. George J.Klir and Bo Yuan, Fuzzy Sets and Fuzzy Logic, Prentice Hall Inc., New Jersey,1995
5. Nih.J. Ndssen Artificial Intelligence, Harcourt Asia Ltd.,Singapore,1998

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1			2								2	2	3
2	3	1			3									3	
3					3									3	3
4		1		3										3	3
5			3												3
Avg	3	1	3	3	3								2	3	3

1' = Low; '2' = Medium; '3' = High

GE5251 ENVIRONMENTAL SCIENCES L T P C
3 0 0 3

OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.
- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.
- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.
- To familiarize the influence of societal use of resources on the environment and introduce the legal provisions, National and International laws and conventions for environmental protection.
- To inculcate the effect of population dynamics on human and environmental health and inform about human right, value education and role of technology in monitoring human and environmental issues.

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem - structure and function of an ecosystem - producers, consumers and decomposers - energy flow in the ecosystem - ecological succession - food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) - Introduction to biodiversity definition: genetic, species and ecosystem diversity – bio geographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts - endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds Field study of simple ecosystems - pond, river, hill slopes, etc.

UNIT II ENVIRONMENTAL POLLUTION 8

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III NATURAL RESOURCES 10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land 47 degradation, man induced landslides, soil erosion and desertification - role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management - resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions - climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. - wasteland reclamation - consumerism and waste products - environment protection act - Air (Prevention and Control of Pollution) act - Water (Prevention and control of Pollution) act - Wildlife protection act - Forest conservation act - enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6

Population growth, variation among nations - population explosion - family welfare programme - environment and human health - human rights - value education - HIV / AIDS - women and child welfare - role of information technology in environment and human health - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

- To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
- To identify the causes, effects and environmental pollution and natural disasters and contribute to the preventive measures in the immediate society.
- To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
- To recognize different forms of energy and apply them for suitable applications in for technological advancement and societal development.
- To demonstrate the knowledge of societal activity on the long and short term environmental issues and abide by the legal provisions, National and International laws and conventions in professional and personal activities and to identify and analyse effect of population dynamics on human value education, consumerism and role of technology in environmental issues.

TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 6th Edition, New Age International Publishers (2018).
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, (2016).
3. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education (2004).

REFERENCE BOOKS:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press (2005).
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. (2013).

GI5611 SPATIAL ANALYSIS AND APPLICATIONS LABORATORY L T P C
0 0 4 2

OBJECTIVE

- To learn various geospatial data models and their creation in the commercial and open software environment
- To understand functions available in commercial software and open environment and be able to choose appropriate function to perform chosen analysis
- To apply the various query and analysis functions on data models so created to arrive a solution for particular geospatial problem
- To evaluate the result obtained from the use of functions for their correctness of the approach and the solution
- To create specific geospatial applications using open development tools like geo portals with simple queries and display designs

UNIT I RASTER ANALYSIS 12P

Data exploration-statistics & query analysis
Map algebra, Reclassification, arithmetic & logical overlay
Focal and zonal operations
Distance and shortest path analysis

UNIT II VECTOR ANALYSIS 12P

Attribute analysis & Data extraction
Overlay and Cost weighted overlay
Proximity – Buffer analysis.

UNIT III NETWORK ANALYSIS 12P

Network Conflation, Geocoding
Short route analysis
Service area, Closest facility analysis

UNIT IV SURFACE ANALYSIS 12P

Slope and Aspect calculation
Interpolation techniques
Viewshed analysis
Watershed Delineation

UNIT V CUSTOMISATION 12P

Scripting/ embedded scripts
Batch Processing and WebGIS demo

TOTAL: 60 P = 60 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand various geospatial data models and their creation in the commercial and open software environment

CO2 Be aware of functions available in commercial software and open environment and be able to choose appropriate function to perform chosen analysis

CO3 Apply the various query and analysis functions on data models so created to arrive a solution for particular geospatial problem

CO4 Diagnose the result obtained from the use of functions and evaluate the correctness of the approach and the solution

CO5 Use the open development tools to create customised geo portals with simple queries and display designs

REFERENCES:

1. Michael N. DeMers, Fundamentals of geographic information systems, Wiley, 2009
2. Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems, Pearson, 2nd Edition, 2016.
3. Ian Heywood, Sarah Cornelius, Steve Carver, An Introduction to Geographical Information Systems, Pearson,4th Edition,2012.
4. Michael N. DeMers, Fundamentals of geographic information systems, Wiley, 4th Edition,2012
5. Kang – tsung Chang, Introduction to Geographical Information System, Tata McGraw Hill,9th Edition,2019
6. John Peter Wilson, The handbook of geographic information science, Blackwell Pub.,2008.
7. Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind, Geographic Information Science and Systems, John Wiley & Sons Inc, 2015, ISBN- 978111867695.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	2	-	2	3	-	-	2	2	2	-	-	3	-	-
2	-	2	1	2	-	-	-	-	2	-	-	2	2	1	1
3	2	3	3	3	3	-	-	1	1	-	2	-	2	3	1
4	-	3	1	3	-	1	-	2	2	-	2	3	1	3	2
5	3	2	3	3	3	1	-	2	2	2	2	3	2	3	3
AVg.	2	2	2	3	3	1		2	2	2	2	3	2	3	2

1' = Low; '2' = Medium; '3' = High

GI5612 **SURVEY CAMP** **L T P C**
0 0 0 2

Two weeks Survey Camp will be conducted in the following activities at CSTAR training site in the following activities during first two weeks from the commencement of the semester.

OBJECTIVE:

- To provide practical knowledge for implementation of different survey works.
- Familiarize students with advanced survey instruments like Auto Level, Total Station, and GNSS.
- Enable students to apply modern surveying techniques in the field to establish horizontal control using Total Station and GNSS equipment.
- Equip students with the skills to establish vertical control networks using Auto Level in field surveying.
- Provide exposure to different survey adjustment techniques, such as least square methods for weighted observations.
- Familiarize students with the mapping process, including topographic map preparation using CAD software and updating existing maps with GNSS data

EXERCISES

1. Preparation of Topographic Map using Total Station Survey
- Reconnaissance Survey for selection of Control Framework, Observation Stations
- Establishment of Horizontal Control Network using Total Station (Traversing, Triangulation and Trilateration methods)
- Establishment of Vertical Control Network using Level Net
- Adjustment of Weighted Observations (using least square method)
- Measurement of Coordinates (X,Y and Z) of Features using Total Station
- Preparation of Topographic Map using CAD software

2. Updation of Existing Topographic Map/ Satellite Image using GNSS
- Downloading of Satellite Image or Topographic Map
- Development Control Network using GNSS (leaf-frog/trilateration static method)
- Georeferencing of Satellite Image/ Topographic Map
- Updation of New topographic features using GNSS (radial fast-static/ semi-kinematic method)
- Preparation of Updated Topographic Map (using symbols, legend etc.)

COURSE OUTCOMES

CO1: Demonstrate practical knowledge and proficiency in using advanced survey instruments like Auto Level, Total Station, and GNSS for field surveys.
CO2: Use Total Station and GNSS equipment to establish both horizontal and vertical control networks
CO3: Gain hands-on experience in establishing vertical control networks using Auto Level
CO4: Perform necessary adjustments using least square methods on field measurements
CO5: Prepare and update existing topographic maps using GIS software and GNSS/ satellite imagery

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	1	1	3				2	2	2	1	3	2	
2	3	3	3	2	3				3	3	3	2	3	3	2
3	1	2	3	2	3			2	2	3	2	1	3	2	2
4	3	2	3	3	3			2	3	2	2	1	3	3	2
5	2	3	2	2	3				3	3	3	3	3	2	3
AVg.	2	2	2	2	3			2	3	3	2	2	3	2	2

1' = Low; '2' = Medium; '3' = High

GI5701 DECISION SUPPORT SYSTEM FOR RESOURCE MANAGEMENT L T P C
3 0 0 3

OBJECTIVE:

- To understand the fundamental concepts and techniques of expert systems, knowledge engineering, and decision support systems.
- To learn the design, development, and implementation of expert systems and decision support systems.
- To apply expert systems and decision support systems to solve real-world problems in geomatics and other fields.
- To analyze the performance and limitations of expert systems and decision support systems.
- To develop creative solutions using expert systems and decision support systems.

UNIT I STRUCTURE OF EXPERT SYSTEMS 9

Definition - Features, needs, components - characteristics - players - Structure and phases of building ES - Human vs Artificial Expertise, Conventional programming vs Expert system-Types - Rule based, Frame based & Hybrid - Activities - Design, Planning, monitoring, Controlling-Expert system - examples in geomatics.

UNIT II RULE BASED EXPERT SYSTEMS 9

Levels and sources of Knowledge-Knowledge Engineering - process - Knowledge Acquisition Methods- RGA analysis - Machine learning - Validation, Representation schemes, Rule, Semantic network, frames and logic – Types of Reasoning deductive, inductive, adductive, analogical and non-monotonic – Rule based Expert system - Evolution – Architecture - conflict resolution - types of inference: forward and backward chaining - search techniques- Examples in geomatics

UNIT III INEXACT REASONING 9

Bayesian theory, examples - Certainty theory: overview, uncertain evidence, rule inferencing - certainty factors - Fuzzy sets - Representation, hedges inference & fuzzy logic - Classification of RS data using Fuzzy logic.

UNIT IV OPERATION RESEARCH 9

Origin - Nature and significance - Models and Modeling – Applications and Scope – Linear programming - Problem formulation – structure and assumptions - standard form – Graphical solution – solution by simplex method – Sensitivity Analysis - Duality – Formulations of Dual problem - Geoinformatics problems & solutions- use of AHP.

UNIT V NETWORK AND INVENTORY MODELS 9

Shortest route - minimal spanning tree - maximum flow models - project network- CPM and PERT network-critical path scheduling - Types of Inventory- The classical EOQ model -Deterministic inventory problems - Price breaks - Stochastic inventory problems- selective inventory control techniques

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand the basic concepts of expert systems, knowledge engineering, and decision support systems, including their components, characteristics, and applications in geomatics.

CO2 Earn the design, development, and implementation of expert systems and decision support systems, including knowledge acquisition, representation, and inference techniques, and apply them to solve problems

CO3 Apply expert systems and decision support systems to solve real-world problems in geomatics, such as spatial analysis, decision-making, and optimization, using techniques such as linear programming, fuzzy logic, and Bayesian theory.

CO4 Analyze the performance and limitations of expert systems and decision support systems, including their accuracy, efficiency, and scalability, and evaluate their applications in geomatics.

CO5 Develop creative solutions using expert systems and decision support systems, including integrating multiple techniques, developing new applications, and improving existing systems, to address complex problems in geomatics.

TEXTBOOKS:

1. Peter Jackson, ¯Introduction to Expert systems||, Pearson Education, 1999.
2. Turban E., ¯Expert Systems and Applied Artificial Intelligence||, Macmillan, 2004.'

REFERENCES:

1. Donald A.Waterman., ¯A Guide to Expert systems||, Pearson Education, 2001.
2. Durkin.J., ¯Expert Systems Design and Development||, Prentice Hall, 1994
3. Dan.W.Patterson, ¯Introduction to Artificial Intelligence and Expert systems, Prentice Hall, 2009.
4. Ermine.J.I, ¯Expert Systems: Theory and Practice||, Prentice2004
5. Ramez Elmasri and Shamkant Navathe, "Fundamentals of Database Systems",7th Edition Addison Wesley Company,2015

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1	1	1	1								3	2	
2	1	2	1	2	1	1						2	3	3	1
3	2	1	2	2	1		1					1		3	1
4	2		2	3	2									3	3
5			1	3			1								3
Avg	2	1	1	2	1	1	1					2	3	3	2

1' = Low; '2' = Medium; '3' = High

GI5702 GEOSPATIAL ANALYSIS WITH R PROGRAMMING L T P C
3 0 0 3

OBJECTIVES

- Introduce the fundamental of R programming, variables, data types, functions, and control structures.
- Enable the use of R programming for effective data manipulation, sorting, and performing mathematical operations.
- Apply data visualization techniques in R for the creation and customization of various graphs and charts.
- Use statistical analysis methods like regression, correlation and other statistical tools in R
- Implement machine learning algorithms and advanced statistical models in R for data analysis and prediction

UNIT I INTRODUCTION TO R 9

Introduction, History and overview of R, elements and data structures, Sessions and Functions, Variables, Data Types, Vectors, Scalars, Conclusion, Data Frames, Lists, Matrices, Arrays, Classes, Data input/output, Data storage formats, Subsetting objects, Vectorization

UNIT II PROGRAMMING IN R 9

R Programming, Arithmetic and Boolean Operators and values, Structures, Control Statements, Loops, Pointers in R, Recursion, Scoping Rules, Loop functions, Array and Matrices

UNIT III DATA MANIPULATION 9

Math and Simulation in R, Functions, Math Function, Probability Calculation - Cumulative Sums and Products- Minima and Maxima- Data sorting, Linear Algebra Operation on Vectors and Matrices, Set Operation

UNIT IV DATA VISUALISATION AND PROBABILITY DISTRIBUTION 9

Graphics, Creating Graphs, Customizing Graphs, lattice library- Visualization, Box plot, Histogram, Pareto charts, Pie graph, Line chart, Scatterplot, Developing graphs, Probability Distributions: Normal, Binomial, Poisson and Other Distributions

UNIT V STATISTICAL DATA ANALYSIS 9

Basic Statistics, Outlier, regression Analysis: Linear, Multiple, Logistic, Poisson, Survival Analysis, Nonlinear Models: Splines, Decision Tree, Random Forests, Support Vector Machine, Clustering, Correlation, Covariance, Statistical simulation, T-Tests

TOTAL: 45 PERIODS

TEXT BOOKS:-

1. Norman Matloff, The Art of R Programming, Cengage Learning, ISBN: 9781593273842, No Starch Press, US-Publisher,2017
2. Larry Pace, Joshua Wiley, Beginning R -An Introduction to Statistical Programming, 2nd Edition, Apress, ISBN: 9781484203743, 2015

REFERENCES

1. Mark Gardener, Beginning R -The Statistical Programming Language, John Wiley & Sons, Inc., ISBN: 9781118164303, 2012.
2. Chris Brunsdon, Lex Comber, An Introduction to R for Spatial Analysis and Mapping, 2nd RevisedEdition, Sage Publications Ltd (UK), ISBN: 9781446272954, 2019
3. Jared P. Lander, R for Everyone Advanced Analytics and Graphics, 2nd Edition, Addison-Wesley Professional PTG, ISBN: 9780134546926, 2017
4. Hamid Reza Pourghasemi, Spatial Modeling in GIS and R for Earth and Environmental Sciences, Elsevier (S&T), ISBN: 9780128152263, 2019
5. Michael J. Crawley, The R Book, 2nd Edition, Wiley-Blackwell, ISBN: 9780470973929, 2012

COURSE OUTCOMES (COS)

CO1: Understand the principles of R programming and able to work with variables, data types, and functions.
CO2: Perform data manipulation tasks in R such as sorting, filtering to transform datasets.
CO3: Generate and customize various types of graphs, Plots to effectively visualize data using R tools
CO4: Apply statistical analysis techniques such as regression, correlation and other methods to analyze datasets.
CO5: Implement and evaluate machine learning algorithms and statistical models to analyze data for predictions

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	1			1	1						1	3	1	
2	3	3	2	2	2								3	3	2
3	3	2	2	1	3		1				2		3	3	2
4	3	3	3	3	3		1		1		1	1	3	3	3
5	3	3	3	3	3		1		1		1	2	3	3	3
Avg	3	2	3	2	2	1	1		1		1	1	3	3	3

1' = Low; '2' = Medium; '3' = High

GI5703	MATLAB PROGRAMMING AND APPLICATIONS	LT P C 3 0 2 4

Course Objectives

- Gain proficiency in using MATLAB programming for solving numerical problems, performing data manipulation, and applying mathematical techniques.
- Apply numerical methods for differentiation, integration, and solving linear/nonlinear equations, ensuring accuracy and error analysis.
- Utilize MATLAB for advanced mathematical operations, including solving differential equations and applying transforms for problem-solving
- Develop skills in solving real-world engineering problems using MATLAB, including model creation, analysis, and visualization.
- Demonstrate the ability to visualize and interpret data using various MATLAB tools, including 3D plotting, regression analysis, and geospatial analysis..

UNIT I INTRODUCTION TO MATLAB PROGRAMMING, APPROXIMATIONS AND ERRORS 9+6

Basics of MATLAB programming - Array operations in MATLAB - Loops and execution control - vector operation: Creation, dot product, work with vectors: create, topology, union and intersection, reselection, buffering, generate suitability map - Working with files:Scripts and Functions - Plotting and program output - Defining errors and precision in numerical methods - Truncation and round-off errors-Error propagation, Global and local truncation errors

UNIT II DIFFERENTIATION AND INTEGRATION 9+6

Numerical Differentiation in single variable - Numerical differentiation: Higher derivatives- Differentiation in multiple variables - Newton-Cotes integration formulae - Multi-step application of Trapezoidal rule - MATLAB functions for integration - Introduction to ODEs; Implicit and explicit Euler's methods - Second-Order Runge-Kutta Methods - MATLAB ode45 algorithm in single variable - Higher order Runge-Kutta methods - Error analysis of Runge-Kutta method

UNIT III LINEAR AND NON LINEAR EQUATIONS 9+6

Linear algebra in MATLAB - Gauss Elimination - LU decomposition and partial pivoting - Iterative methods: Gauss Siedel - Special Matrices: Tri-diagonal matrix algorithm - Nonlinear equations in single variable - MATLAB function fzero in single variable - Fixed-point iteration in single variable - Newton-Raphson in single variable - MATLAB function fsolve in single and multiple variables - Newton-Raphson in multiple variables

UNIT IV ALGEBRA AND TRANFORMS 9+6

Solving quadratic equation, factorization, calculus: exploring limits, use of octaves, Differential: solving DE, maxima and minima, exponential, logarithmic and trigonometric derivatives, Integral: finding indefinite and definite integral, Transform: Laplace and inverse Laplace transform , Fourier and inverse Fourier transform, working with lessons: derive slopemap, create watershed, find landslide vulnerability

UNIT V DATA VISUALIZATION AND MODELLING 9+6

Graph elements; color, theme, type, title and lable, drawing multiple functions, generating sub plots, drawing bar chart, contour, 3D plots, move elements, trace movement, work with plotting: regression analysis and presentation, contour map from DEM- Geospatial tool box implementation.

TOTAL: 75 PERIODS

OUTCOMES:

- On completion of the course, the student isexpected to be able to

CO1 Demonstrate the ability to write, debug, and execute MATLAB programs for solving a range of numerical and engineering problems.

CO2 Apply appropriate numerical techniques for differentiation, integration, and solving equations with a focus on error propagation and method evaluation.

CO3 Solve linear and nonlinear problems using MATLAB's built-in functions and algorithms with proper error handling and validation.

CO4 Effectively apply MATLAB for complex algebraic operations, differential equations, and mathematical transformations.

CO5 Create and interpret effective visualizations of data and models, including geospatial data, using MATLAB's plotting and modeling tools.

TEXTBOOKS:

1. Holly Moore, " MATLAB for Engineers" Third Edition – Pearson Publications
2. Stephen J. Chapman, "MATLAB Programming for Engineers" Fourth Edition –Thomson learning**.**

REFERENCES:

1. Fausett L.V.(2007) Applied NumericalAnalysis Using MATLAB, 2nd Ed.,Pearson Education.
2. MATLAB: An Introduction with Applications, by Amos Gilat, 2nd edition, Wiley, 2004
3. Hahn B., and D. Valentine, 2013. Essential Matlab for Engineers and Scientists: 5th Edition, Academic Press.
4. Getting Started with MATLAB 7: A Quick Introduction for Scientists and Engineers, by Rudra Pratap,OUP USA,2005.
5. Programming and Engineering Computing with MATLAB 2018 by Huei-Huang Lee , SDC Publications, 2018.

CO - PO Mapping

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2				3								3	1	2
2	1	3	1	2	1								2	3	1
3	3				3								3		
4	3	2			2								3	3	
5			3				3							3	3
AVg.	2	3	2	2	2		3						3	3	2

1' = Low; '2' = Medium; '3' = High

GI5711	CUSTOMIZATION LABORATORY	L T P C
		0 0 2 1

Course Objectives

- Introduce the fundamentals of Python scripting for spatial data handling and file management.
- Enable students to develop GUI-based applications for spatial data processing and visualization.
- Train students to read, display, and manipulate shape files, PostGIS data, and web map services (WMS/WFS).
- Familiarize students with spatial queries, attribute handling, and basic geo processing operations such as buffering and overlay.
- Equip students with skills to integrate GIS applications with statistical tools like R for advanced spatial analysis.

Basics of scripting Python, Open layers
File Handling (reading/writing)
GUI based application development
Spatial Data handling using the scripts
Reading of shape file (Point, Line and Poly)
Displaying shapefile
Reading of PostGIS data
Displaying of PostGIS data
Changing layer symbology
Attribute handling
Simple Query and spatial Query builder
Simple Geoprocessing (Buffer and Overlay)
Reading WMS WFS data
Displaying WMS WFS data with symbology
Building small application having the above facilities
Statistical software interface using the scripts
Linking to R-Stat to get statistical results

TOTAL: 30 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Learn scripting languages for customization.
CO2 Creating GIS Data structure
CO3 Publish the spatial data over web
CO4 Perform spatial queries, attribute handling, and geoprocessing operations.
CO5 Integrate GIS applications with statistical tools like R for spatial data analysis

REFERENCES:

1. https://pro.arcgis.com/en/pro-app/arcpy/get-started/what-is-arcpy-.htm
2. http://duspviz.mit.edu/tutorials/intro-postgis/
3. https://www.rstudio.com/online-learning/#r-programming
4. https://pro.arcgis.com/en/pro-app/

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3		
2			3										1		3
3			3		3										3
4			3		3									3	
5		3	2	2										3	3
Avg	3	3	3	2	3								2	3	3

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5712 **PROJECT I** **L T P C**
0 0 6 3

OBJECTIVE:

- To enable the students to apply their theoretical and technical knowledge to solve real-world engineering problems.
- To develop problem-solving and critical-thinking skills by working on practical projects or internships.
- To provide exposure to professional work environments through internships or industry-based projects.
- To enable the students to diagnose the problems and find the geospatial tools available to solve them effectively.
- To synthesis solutions based on appropriate technology for any given application

SYLLABUS:

The student works on a topic relevant to Geoinformatics under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

TOTAL: 90 PERIODS

OUTCOME:

At the end of the course, students are able to;

CO1 Apply technical and theoretical knowledge to solve real word problems effectively.

CO2 Analyze and design solutions to complex problems through projects and internships.

CO3 Gain practical experience and professional skills by working in Industry projects or academic settings.

CO4 Diagnose the problems and find the available geospatial tools to solve them effectively.

CO5 Synthesis solutions based on appropriate Geospatial technology for any given applications.

CO's-PO's & PSO's MAPPING:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	2	-	3	3	-	-	-	-	-	-	2	-	3	2
2	-	3	-	3	1	1	-	1	1	-	-	-	-	3	1
3	2	1	-	2	1	3	-	-	-	2	-	2	2	2	-
4	1	3	2	3	3	1	-	2	2	-	-	-	-	2	3
5	-	1	3	3	3	3	2	1	3	2	3	3	-	2	3
AVg.	2	2	3	3	2	2	2	1	2	2	3	2	2	2	2

1' = Low; '2' = Medium; '3' = High

GI5811 **PROJECT II** **L T P C**
0 0 16 3

OBJECTIVE:

- To enable the students to apply their theoretical and technical knowledge to solve real-world engineering problems.
- To develop problem-solving and critical-thinking skills by working on practical projects or internships.
- To provide exposure to professional work environments through internships or industry-based projects.
- To enable the students to diagnose the problems and find the geospatial tools available to solve them effectively.
- To synthesis solutions based on appropriate technology for any given application

SYLLABUS:

The student works on a topic relevant to Geoinformatics under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The student will be evaluated based on the report and the viva voce examination by a team of examiners including one external examiner.

TOTAL: 90 PERIODS

OUTCOME:

At the end of the course, students are able to;

CO1 Apply technical and theoretical knowledge to solve real word problems effectively.

CO2 Analyze and design solutions to complex problems through projects and internships.

CO3 Gain practical experience and professional skills by working in Industry projects or academic settings.

CO4 Diagnose the problems and find the available geospatial tools to solve them effectively.

CO5 Synthesis solutions based on appropriate Geospatial technology for any given applications.

CO's-PO's & PSO's MAPPING:

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	2	-	3	3	-	-	-	-	-	-	2	-	3	2
2	-	3	-	3	1	1	-	1	1	-	-	-	-	3	1
3	2	1	-	2	1	3	-	-	-	2	-	2	2	2	-
4	1	3	2	3	3	1	-	2	2	-	-	-	-	2	3
5	-	1	3	3	3	3	2	1	3	2	3	3	-	2	3
AVg.	2	2	3	3	2	2	2	1	2	2	3	2	2	2	2

1' = Low; '2' = Medium; '3' = High

GI5001 **CLIMATE CHANGE STUDIES** **L T P C**
3 0 0 3

OBJECTIVES:

- Understand and be sensitized on the natural and manmade systemic interventions on the earth and atmosphere and the potential effect on the system and on human lives living on earth
- Acquire knowledge on the various evidences and the scientific approaches to deduce paleo-climatologic evidences and its relevance to the present climate system
- be aware of the specific human actions causing the changes in the climate and environments and the understand the patterns of the effects caused
- deliberate on the various mitigation mechanisms employed for the various climate induced hazard and evaluate the prospects
- Analyze and evaluate national and international efforts and instruments being put place for climate resilience for proposing futuristic formulation of best practices for handling climate change effects

UNIT I BASICS OF CLIMATIC CHANGE **9**

Concepts of climatic cycles and long term changes – earth orbital variations – solar flares and outputs – magnetic and force fields – earth movements and energy release – ocean variability and periodic cycles – impacts of earthquakes and volcanoes.

UNIT II ANTHROPOGENIC IMPACTS **9**

Anthropogenic impacts- agriculture and impacts - industries and pollutions – urbanization – vehicles, transport and fossil fuels - chemicals, synthetics, solid wastes and gas outputs – municipal wastes.

UNIT III CHANGE ASSESSMENT **9**

Historical evidences – archeological evidences – indicators of vegetation: species limits, pollens, tree rings and fossils – temperature and precipitation trends – evidences from terrain evaluation – ice and glacier changes – sea- level assessments – under water assessments – sediment analysis

UNIT IV CLIMATE CHANGE HAZARDS **9**

Global warming and impacts – carbon gas build up – possible land use changes – land productivity and livelihood changes – forest fires and wild life – impacts on water bodies – floods and droughts – human health impacts-Change Management: Use of renewable energy – land use adaptation - planning disaster mitigation

UNIT V CLIMATE CHANGE MODELS **9**

Climate change Models – RCM – GCM-Ozone depletion – greenhouse gas carbon-sequestration-IPCC and Indian scenario.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Discuss about the natural and manmade causes of climate change on earth system and their effects

CO2 Corroborate various evidences found on earth objects to the paleo-climatology for a meaningful debate related to present climate conditions

CO3 Debate on the specific human actions causing the changes in the climate and

environmental conditions with knowledge so gained

CO4 deliberate on the various types of natural hazards due to climate changes and mitigation mechanisms employed presently

CO5 compose prospective proposals for climate adoption with knowledge on national and international efforts and instruments for climate resilient living

TEXTBOOKS:

1. William James Burroughs , Climate change : A multi disciplinary Approach,2nd Edition,2007
2. Jane Mc Adam ,|| Climate change and Displacement Multi disciplinary Perspectines||2010

REFERENCES:

1. Richard Somerville'|| the forgiving Air: understanding Environmental change, 2nd revised Edition,2008.
2. Heidi cullen, The weather of the future; heat waves, extreme storms, and other scenes from a climate changed planet, Reprint Edition,2011.
3. Stephen H Schneider, ¯Science as a contact sport inside the battle to save earth's climate,National Geographic,1st Edition, 2009
4. James Hoggan Climate cover up; the crusade to Deny global warming,1st Edition,2009.
5. PK Joshi, TP Singh, Geoinformatics for climate change studies, TERI Press, 2011.
6. John.L.Brooke, Climate Change and the course of global History, A Rough Journey, Cambridge University Press,2014

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	-	-	-	1	-	-	-	-	-	-	3	-	-
2	3	2	2	2	1	1	-	1	1	-	-	2	3	1	-
3	1	-	3	3	1	-	-	-	1	-	1	-	1	3	1
4	1	2	3	3	3	-	-	1	-	-	-	3	-	2	3
5	-	2	2	3	3	1	-	2	-	-	2	2	-	2	3
AVg.	2	2	3	3	2	1		1	1		2	2	2	2	2

1' = Low; '2' = Medium; '3' = High

GI5002 **BIG DATA ANALYTICS** **LT P C**
3 0 0 3

OBJECTIVES

- characteristics, value, and best practices for analytics.
- To explore and review NoSQL databases, schema-less models, and advanced data storage techniques, including key-value stores, document stores, and graph databases, for effective Big Data management.
- To apply advanced analytical methods and recommendation systems to solve real-world Big Data challenges.
- To Apply Big Data technologies and algorithms to practical scenarios, such as social media analytics, sentiment analysis, and e-commerce.
- To use the stream data models and analyze real-time data streams efficiently.
- To evaluate the performance of Big Data methodologies and synthesize innovative solutions by integrating clustering, classification, recommendation, and visualization techniques.

UNIT I INTRODUCTION TO BIG DATA **9**

Evolution of Big data - Best Practices for Big data Analytics - Big data characteristics - Validating - The Promotion of the Value of Big Data - Big Data Use Cases- Characteristics of Big Data Applications - Perception and Quantification of Value -Understanding Big Data Storage - A General Overview of High-Performance Architecture - HDFS - MapReduce and YARN - Map Reduce Programming Model

UNIT II CLUSTERING AND CLASSIFICATION **9**

Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions .- Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes‘ Theorem - Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM **9**

Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation- Content Based Recommendation - Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV STREAM MEMORY **9**

Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics

UNIT V NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION **9**

NoSQL Databases : Schema-less Models||: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores - Tabular Stores - Object Data Stores - Graph Databases Hive - Sharding –- Hbase – Analyzing big data with twitter - Big data for E-Commerce Big data for blogs - Review of Basic Data Analytic Methods using R.

TOTAL: 45 PERIODS

OUTCOMES:

CO1 Define the characteristics, value, perception, storage, High performance architecturesof Big Data.

CO2 Apply their knowledge of NoSQL databases, schema-less models, and data storage techniques (key-value stores, document stores, graph databases) to manage Big Data effectively.

CO3 Analyse advanced analytical methods and recommendation systems, to solve real-world Big Data challenges.

CO4 Implement real-time data processing techniques to analyze data streams efficiently for applications such as stock market predictions and sentiment analysis.

CO5 Evaluate the performance of Big Data methodologies, to address complex Big Data problems.

TEXTBOOKS:

1. Anand Rajaraman and Jeffrey David Ullman, "Mir,iina of Massive Datasets", Cambridge . University Press, 2012.
2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

REFERENCES:

1. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley publishers, 2015.
2. Bart Baesens, "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications", Wiley Publishers, 2015.
3. Dietmar Jannach and Markus Zanker, "Recommender Systems: An Introduction", Cambridge University Press, 2010.
4. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.
5. Jimmy Lin and Chris Dyer, "Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers, 2010.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	1	1		2								3	3	
2	3	1	1		2								3	2	
3	1	3	1											3	
4	2	2		1	1									3	2
5		2	3		1									3	2
AVg.	2	2	2	1	2								3	3	2

1' = Low; '2' = Medium; '3' = High

GI5003 **URBAN GEOINFORMATICS** **L T P C**
3 0 0 3

OBJECTIVES:

- Introduce students to the relevance and applications of Geoinformatics in urban planning and management.
- Expose to the Remote Sensing data and technique that help in characterising Urban Landuse and structure
- Provide knowledge on the applications of Geoinformatics for urban planning, including land use, property assessment, and utility management.
- Equip with tools for urban analysis like geodemographic analysis, land value assessment and optimal use of urban infrastructure.
- Introduce to urban modelling and simulation techniques for analysis of urban growth, air quality, noise pollution.

UNIT I INTRODUCTION **9**

Remote Sensing – Developments - Relevance inUrban Planning - Scope and Limitations –Scale and Resolution requirements – Spectral characteristics of Urban Features– High Resolution, Thermal, Hyperspectral and Microwave Remote Sensing for Urban Analysis – Stereo Data Products – Aerial and Ground based Sensors – UAVs – Laser Scanners

UNIT II REMOTE SENSING FOR URBAN MAPPING **9**

Urban Area Definition and Characterization–Base Map Preparation – Urban Landuse Classification – Visual and Digital Techniques for Landuse Mapping - Urban Structure and Patterns– Urban LandCover Classification –Feature Extraction techniques –Change Detection – Sprawl Detection and Characterization - Mapping of Urban Morphology - Urban Heat Island –Building Typology

UNIT III GEOINFORMATICS FOR URBAN PLANNING **9**

UrbanInformation System– Master and Detailed Development Plans - Objectives and Contents of Plans – Role of Geoinformatics in Plan Formulation and Review - PopulationEstimation– Property Tax Assessment and Management - Urban Solid Waste Management Planning –Urban Renewal Planning – Utility Network Planning and Management – case studies

UNIT IV GEOINFORMATICS FOR URBAN ANALYSIS **9**

Geodemographic Analysis – Land Value Analysis -Optimisation of Facility Locations - Site suitability Analysis for Infrastructure – Optimal Route Analysis - Accident Analysis –Road Alignment Planning - Traffic and Parking Studies - case studies.

UNIT V VISUALIZATION, SIMULATION AND MODELING OF URBAN AREAS **9**

Urban Growth Modelling - Air quality indexing and mapping - Noise pollution modelling - 3D City Modelling –Flood Modeling in Urban Areas - Geoinformatics for Smart Cities –Recent Advancements - Case Studies

TOTAL: 45 PERIODS

Course Outcomes (COs)

CO1: Understand the principles of Remote Sensing its relevance to urban planning, and the different types of remote sensing methods used in urban management.

CO2: Apply Remote Sensing techniques for urban mapping, change detection, urban heat island mapping.

CO3: Use Geoinformatics tools to assess population, property tax and in urban waste management planning.

CO4: Conduct urban analysis using Geoinformatics like geodemographic analysis, land value and facility location optimisation.

CO5: Implement visualization, simulation and modeling techniques for urban areas for analysis of urban growth, pollution studies and disaster management.

TEXTBOOKS:

1. Netzband, Maik; Stefanov, William L.; Redman, Charles (Eds.), Applied Remote Sensing for Urban Planning, Governance and Sustainability, Springer, 1st Edition, 2007
2. Rashed, Tarek; Jürgens, Carsten (Eds.), Remote Sensing of Urban and Suburban Areas, Springer, 1st Edition. 2010

REFERENCES:

1. Jean-Paul Donnay, Michael John Barnsley, Remote sensing and urban analysis, 1st Edition, Taylor & Francis e-Library, 2005
2. QihaoWeng, Dale A. Quattrochi (Eds), Urban Remote Sensing, 2nd edition, CRC Press, 2018
3. Soergel, Uwe (Eds.), Radar Remote Sensing of Urban Areas, Remote Sensing and Digital Image Processing, Vol. 15, 1st Edition, Springer, 2010
4. BasudebBhatta, Analysis of Urban Growth and Sprawl from Remote Sensing Data, 1st Edition, Springer-Verlag, 2010
5. Paolo Gamba, Martin Herold, Global Mapping of Human Settlement, Experiences, datasets & Prospects, CRC Press, 1st Edition, 2009,ISBN 978-1-4200-8339-2.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2	1	2	2								3	3	1
2	2	3	2	2	3	2	1					2	3	3	2
3	2	3	3	2	3	2	1			2	2	1	3	3	3
4	3	3	3	3	3	2	1			2		2	3	3	3
5	2	3	3	3	3	2	1			1	2	1	3	3	3
AVg.	2	3	2	2	3	2	1			2	2	2	3	3	2

1' = Low; '2' = Medium; '3' = High

GI5004 HYDROLOGY AND WATER RESOURCES ENIGINEERING FOR GEOINFORMATICS

L T P C
3 0 0 3

OBJECTIVE :

- Understand the components of the hydrologic cycle and the spectral properties of water in hydrological processes.
- Understand surface water modeling techniques, including rainfall-runoff models, urban hydrology, and the impact of climate change.
- Analyze risk and damage from hydrological hazards like floods, droughts, and desertification, and explore mitigation strategies.
- Explore groundwater modeling, including aquifer properties, mathematical models, and GIS-based analysis.
- Examine irrigation and watershed management practices for sustainable development, including erosion estimation and reservoir studies.

UNIT I HYDROLOGIC COMPONENTS 9

Hydrologiccycle-estimationofvariouscomponents-clouds-rainfall-runoff-evaporation -transpiration-evapo-transpiration-interception-depressionstorage-Spectralproperties of water.

UNIT II SURFACE WATER MODELLING 9

Drainage basin - Delineation and codification of watershed - Morphometric analysis - Hydrological Modelling – Rainfall – runoff modelling – USDA-SCS-CN Method – Urban Hydrology – LiDAR Mapping for Urban area – Impact of Climate change on Hydrological modeling - Water quality mapping and monitoring - Correlation model for pollution detection.

UNIT III RISKAND DAMAGEASSESSMENT 9

Mapping of snow covered area- Snow melt runoff- glacier runoff modelling- flood forecasting – Flood Risk Zoning - Flood damage assessment- Flood Modelling- Early warning system for floodmitigation-drought-types-assessmentofdroughtsandmitigation-waterharvesting structures

UNIT IV GROUND WATER MODELLING 9

Origin-classificationandpropertiesofaquifer-groundwaterpotentialidentification-surface indicators - aquifer parameters – hydrologic budgeting – different types of ground water models-mathematicalmodellingofgroundwatersystem-seawaterintrusion-interfacing GIS with ground water model - artificial recharge of ground water.

UNIT V IRRIGATIONAND WATERSHED MANAGEMENT 9

Project investigation, implementation, maintenance stage - location of storage/diversion works - capacity curve generation - hydro-economic conjunctive use model - impact of climate and land use change on drainage basin – sediment yield - modelling of reservoir siltation – prioritization of watersheds - watershed modelling for sustainable development.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 understand the hydrologic components in the earth and atmosphere and their relationship between them

CO2 understand the computational perspective of the hydrologic systems on order to relater them with various model approaches, remote sensing tools and proxies to address the hydrologic elements..

CO3 Interpret the computational models and the applicability of the remoter sensing proxy parameters to represent and analyse the hydrologic behaviour of the earth system

CO4 develop models to represent and mechanisms and dynamics of hydrologic system and to assess the status and extreme conditions of the same.

CO5 synthesise remote sensing based modelling and monitoring of the various hydrologic applications by selecting appropriate data, Geospatial tools and techniques

TEXT BOOKS

1. Gert A. Schultz, Edwin T. Engman, Remote Sensing in Hydrology and Water Management, Springer Berlin Heidelberg -2011.
2. S. K. Gupta, Modern Hydrology and Sustainable Water Development, John Wiley & Sons - 2010.
3. K. Ramamohan Reddy, B. Venkateswara Rao, C. Sarala, HYDROLOGY AND WATERSHED MANAGEMENT, Allied Publishers – 2014.

REFERENCES:

1. Andrew Skidmore, Environmental Modelling with GIS and Remote Sensing, CRC Press-2017
2. Dorota Swiatek, Stefan Ignar, Modelling of Hydrological Processes in the Narew Catchment, Springer Berlin Heidelberg - 2013
3. Tim Davie, FUNDAMENTALS OF HYDROLOGY Second edition, Taylor & Francis -2018
4. Prof. Dawei Han, Concise Hydrology, Createspace Independent Pub - 2010
5. 5.L. Asawa, Irrigation and Water Resources Engineering, New Age International-2008.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	-	-	1	2	1	-	1	-	-	-	1	3	-	-
2	3	2	-	2	3	-	1	1	-	-	-	2	2	3	-
3	-	3	2	3	2	-	-	-	-	-	2	-	-	2	1
4	-	2	3	3	2	-	-	-	-	-	-	3	-	3	2
5	-	-	1	3	3	1	2	2	-	-	2	2	-	1	3
AVg.	3	2	2	2	2	1	2	1			2	2	3	2	2

1' = Low; '2' = Medium; '3' = High

GI5005 TRANSPORTATION GEOINFORMATICS L T P C
3 0 0 3

OBJECTIVES :

- To provide an understanding of engineering surveys, geometric design principles, and the classification and alignment of roads and railways
- To explore urban transportation systems, policies, planning processes, and their environmental impacts
- To apply remote sensing and GIS techniques for transportation analysis
- To analyze transportation systems using GIS for network flow, shortest path algorithms, facility location, vehicle routing, and highway maintenance through practical case studies.
- To design and develop integrated transport models that incorporate land-use interactions, environmental impacts, and intelligent transportation systems, integrating GIS, GPS, and IoT for innovative solutions

UNIT I ENGINEERING SURVEYS AND GEOMETRIC DESIGN 9

Road ways and railways – development - necessity for planning – classification of roadsand railways – Alignment surveys and investigations using conventional and remote sensing techniques (preliminary, reconnaissance and final location surveys) – Design principles of highway geometric elements

UNIT II URBAN TRANSPORTATION SYSTEMS AND PLANNING 9

Urban transportation: policy alternatives - Transportation and the environment -Urban transport planning processes - Socio-demographic data and travel surveys - Transportation modeling - Traffic congestion - Plan evaluation and implementation - Planning and financing –Critiques of transportation modeling and forecasting

UNIT III REMOTE SENSING IN TRANSPORTATION 9

Study of geographic pattern of urban development using remote sensing data products - urban sprawl – parking studies using aerial photos – traffic analysis - accident analysis - site suitability analysis for transport infrastructure – population distribution studies - improvisation of rural road network – regional road network connectivity - vehicle tracking
– incident identification and management.

UNIT IV GIS AND TRANSPORTATION ANALYSIS 9

Transportation analysis in GIS: Introduction - network flows - shortest path algorithms -Transportation databases: creation and maintenance - facility location - vehicle routing – highway and railway alignment –highway maintenance

UNIT V MODELLING AND INTELLIGENT TRANSPORTATION SYSTEMS (ITS) 9

Modelling land use transport interaction - ITS development –architecture –integration with GIS - applications – case studies.

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to
  - **CO1** Demonstrate knowledge of transportation infrastructure by classifying roads and railways, understanding alignment surveys, and applying geometric design principles for highways and pavements.
  - **CO2** Evaluate urban transportation systems and planning processes by integrating socio-demographic data, travel surveys, and environmental considerations to propose sustainable solutions.
  - **CO3** Apply remote sensing techniques to traffic and accident analysis, site suitability studies, and enhancing rural and regional road network connectivity for effective transportation planning.
  - **CO4** Analyze transportation systems using GIS for network flow optimization, facility location, vehicle routing, and maintenance planning, supported by the development and maintenance of transportation databases.
  - **CO5** Develop innovative solutions through integrated transport models by

leveraging land-use and environmental interaction, incorporating Intelligent Transportation Systems (ITS), GIS, GPS, IoT, and advanced monitoring techniques for sustainable transport systems.

TEXTBOOKS:

1. Harvey J. Miller, Shih-Lung Shah, Geographic Information Systems for Transportation – Principles and Applications, Oxford University Press, 2001.
2. John Stillwell, Graham Clarke, Applied GIS and Spatial Analysis, John Wiley & Sons Ltd, 2004.

REFERENCES:

1. C.S. Papacostas, P.D. Prevedouros, Transportation Engineering and Planning, Prentice-Hall India,2005.
2. Barry Boots, Atsuyuki Okabe and Richard Thomas, Modelling Geographical Systems - Statistical and computational applications, Kluwer Academic Publishers, 2014.
3. L.R.Kadiyali, Transportation Engineering, Khanna Book publishing Co (P) Ltd, New Delhi, 2016
4. C.Jotin Khisty and B.Kent Lall, Transportation Engineering-An Introduction, Prentice Hall of India Private Limited, New Delhi, 2002
5. Igor Ivan, Itzhak Benenson, Bin Jiang, Jiri Horak and James Haworth, Geoinformatics for Intelligent transportation System, Springer International Publishing AG, 2014

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
1	3	1		2			1						2	3	2
2	1	1	1	1		2					1		3	3	
3		3	1		2			1					2	1	3
4			2		3	1								3	2
5	1	1	1	1	1	1	1		1	1		1		3	2
Avg	2	2	1	1	2	1	1	1	1	1	1	1	2	3	2

1' = Low; '2' = Medium; '3' = High

GI5006 **ENVIRONMENTAL GEOINFORMATICS** **L T P C**
3 0 0 3

OBJECTIVE:

- To understand the principles and applications of geospatial techniques for monitoring and managing environmental resources.
- To analyze environmental data using advanced geospatial tools for decision-making and resource management.
- To evaluate environmental impacts using geospatial technologies for sustainable resource management.
- To apply geospatial methods and remote sensing technologies for monitoring and modeling environmental phenomena.
- To design geospatial models and systems for environmental planning and pollution management.

UNIT I WATER AND THE ENVIRONMENT 9

Sources and demands of water - Characteristics of water- Point and non-point sources of water pollution - Spectral responses of clear and contaminated water - chlorophyll- Remote Sensing of Water quality assessment - Classification of water quality for various purposes, Sampling procedure, quality analysis, Data base creation and quality modeling using GIS. Database Creation and designing water supply network, sewerage network using GIS. Runoff estimation flood prediction modeling.

UNIT II SOIL CONSERVATION AND MANAGEMENT 9

Formation of Soils- classification - land forms- soil erosion-factors influencing soil erosion, soil contamination- distribution and accumulation of contaminants such as toxic metals, synthetic chemicalsinsoil- mining pollution- methods of conservation- EMRresponseswithcontaminatedsoil - modeling soil characteristics using satellite data-soil degradation assessment using Remote Sensing and GIS- Land reclamation.

UNITIII SOILIDWASTEANDMANAGEMENT 9

Solid Waste management- sources and types of solid waste – waste generation rate- factors affecting waste generation- elements of solid waste management – storage- collection of solid waste-Design of collection network using GIS – disposal – site selection studies for solid waste using RS and GIS

UNITIV AIRPOLLUTION 9

Air Pollutants- classification of air pollution – sources of air pollution – sampling and analysis of air pollution -Dispersion modeling , photochemical modeling , receptor modeling – limitations in dispersion modeling - Introduction to commonly used software based models such as AERMOD, CALPUFF,ISCST3 and CALINE4 etc.- case studies

UNITV SENSORSANDDATAFORENVIRONMENTALMONITORING 9

Sensors for environmental monitoring - sensors - LIDAR- LASER Remote Sensing - EMR – absorption spectrometers - selection of ground truth sites-sea truth observation - Radar techniques for sensing oceansurface- thermalmeasurements- applicationofremotesensingforoilslicksmapping - Chlorophyll detection - Fisheries resources - Coastal marine studies - determination of temperature and sea state.

TOTAL:45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Explain fundamental concepts of remote sensing, GIS, and environmental sensors for environmental monitoring.

CO2 Apply GIS, remote sensing, and modeling techniques to manage environmental data.

CO3 Assess environmental impacts of pollution using geospatial tools and data modeling.

CO4 Demonstrate use of remote sensing, GIS, and sensor technologies for environmental monitoring.

CO5 Develop and implement models for applications like flood prediction, waste management, and soil reclamation.

TEXTBOOKS:

1. Andrew N. Rencz, Manual of Remote Sensing: Remote Sensing for Natural Resource Management and Environmental Monitoring, John Wiley & Sons Inc,3rd Edition, Vol 4, April 2004.
2. Baretl, E.C. and Culis I.F. Introduction to Environmental Remote Sensing, Second edition, Chapman and Hall, New York, 2013

REFERENCES:

1. Lintz, J.and Simonent, D.S.Remote sensing of environment Addision Wesley, Rading mars, 1976.
2. Modelling Environmental Dynamics: Advances in Geomatic Solutions) by Martin Paegelow and María Teresa Camacho Olmedo, Springer,2008.
3. Monitoring and Modeling of Global Changes: A Geomatics Perspective (Springer Remote Sensing/Photogrammetry)" by Jonathan Li and Xiaojun Yang,2015.
4. Robert Scally, "GIS for Environmental Management", ESRI Press, 2006.
5. Andrew Skidmore, Environmental Modelling with GIS and Remote Sensing, CRC Press), 2017

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3					2	3					3	3	1	
2	1	3	3	2	2		2		1				3	3	3
3		3	3	3	3		3					2	3		3
4		2	3	3	3	2	3						3	3	2
5		2	3	3	3	2	3	2	3				3		3
AVg.	2	3	3	3	3	2	3	2	2			3	3	2	3

1' = Low; '2' = Medium; '3' = High

GI5007 AIRBORNE AND TERRESTRIAL LASER MAPPING L T P C
3 0 0 3

OBJECTIVE:

- Introduce the concepts of Spaceborne, Airborne, Terrestrial, and Bathymetric Laser Scanners for topographic and bathymetric mapping.
- Familiarize students with the principles of LASER technology and various types of LiDAR systems.
- Provide knowledge on the operation and components of Airborne Laser Scanners (ALS), including their technical specifications.
- Train students on data acquisition, pre-processing and flight planning for Laser Scanning, focusing on synchronization of ALS data with GPS and IMU
- Expose tools for post-processing of LiDAR data to create Digital Surface Models (DSM) and Digital Elevation Models (DEM) and applications of Laser Scanning in various fields

UNIT I SPACE BORNE RADAR AND LIDAR ALTIMETER 9

Principle and Properties of LASER- Production of Laser – Components of LASER – LiDAR – Types of LiDAR :Range Finder, DIAL and Doppler LiDAR - Platforms: Terrestrial, Airborne and Space borne LiDAR – Space Borne LiDAR Missions – Space Borne Radar Altimeter for mapping Sea Surface Topography , Moon Topography - Merits of ALS in comparison to Levelling, echo sounding, GPS leveling, Photogrammetry and Interferometry

UNIT II AIRBORNE LASER SCANNERS 9

Airborne Topographic Laser Scanner - Ranging Principle - Pulse Laser and Continuous Wave Laser - First Return and Last Return - Ellipsoidal and Geoidal Height - Typical parameters of a Airborne Laser Scanner (ALS) – Specifications of Commercial ALS –- Components of ALS - GPS, IMU, LASER Scanner, Imaging Device, Hardware and Software.

UNIT III DATA ACQUISITION AND PRE PROCESSING 9

Various Scanning Mechanism – Synchronization of GPS, IMU and ALS Data - Reflectivity of terrain objects - Laser Classification - Class I to Class IV Laser - Eye Safety - Flight Planning - Determination of various data acquisition parameters - Swath Width, Point Density, No. of Strips, Area Covered, Point Spacing - Data Processing - Determination of flight trajectory

UNIT IV POST PROCESSING AND APPLICATIONS 9

Post Processing - Geo location of Laser Foot Prints - Various Co-ordinate Transformations involved - Filtering - Ground Point filtering - Digital Surface Model and Digital Elevation Model - LIDAR data formats – Post Processing Software - Overview of LIDAR Applications in various domains - 3D city models – Corridor Mapping Applications - Forestry Applications.

UNIT V TERRESTRIAL AND BATHYMETRIC LASER SCANNERS 9

Terrestrial Laser Scanners (TLS) - Working Principle - *Static TLS – Dynamic TLS – Vehicle Mounted TLS* –- Commercial TLS Specifications - Bathymetric Laser Scanners (BLS) - Working Principle of BLS - Depth of Penetration of BLS - Applications of TLS and BLS

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Understand the principles of Laser technology and the types of LiDAR systems used for topographic and bathymetric mapping.
CO2	Gain understanding of the components and their functions of Laser Scanners and compare the advantages of ALS over other topographic mapping methods.
CO3	Learn to operate Airborne Laser Scanners and understand their working principles
CO4	Design the data acquisition process and pre-processing for LiDAR observations
CO5	Perform post-processing on LiDAR data to generate DSM and DEM and understand the practical applications of LiDAR in various domains.

TEXTBOOKS:

1. Jie Shan and Charles K. Toth, Topographic Laser Ranging and Scanning – Principles and Processing,Second Edition, CRC Press, Taylor & Francis Group, 2018
2. Pinliang Dong, Qi Chen, LiDAR Remote Sensing and Applications**,** 1st Edition, CRC Press 2018

REFERNCES:

1. George Vosselman and Hans-Gerd Maas, Airborne and Terrestrial Laser Scanning, Whittles Publishing, 2010.
2. Matti Maltamo, Erik Næsset, Jari Vauhkonen, Forestry Applications of Airborne Laser Scanning-Concepts and Case Studies, Springer, Dordrecht , 2016,Reprint Edition. ISBN 978-94-017-8662-1
3. Michael Renslow, Manual of Airborne Topographic LiDAR, The American Society for Photogrammetry and Remote Sensing , 2013.
4. Zhilin Li, Qing Zhu, Chris Gold, Digital terrain modeling: principles and methodology, CRC Press, 2005
5 Roger Read and Ron Graham, Manual of Aerial Survey: Primary Data Acquisition, Whittles Publishing, 2002.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	2			3								3	2	
2	3	3			3								3	3	2
3	3	2	2	2	3							2	3	3	3
4	3	3	3	3	3						3	2	3	3	3
5	3	3	3	3	3	2					2	2	3	3	3
AVg.	3	3	3	3	3	2					3	2	3	3	3

1' = Low; '2' = Medium; '3' = High

GI5008 ADVANCED GEO DATA ANALYSIS L T P C
3 0 0 3

OBJECTIVE:

- To Understand spatial data distributions, geographic measurements, and methods for analyzing spatial orientation, compactness, and direction.
- To Identify spatial patterns, measure feature distributions, and analyze clusters using statistical parameters and case studies.
- To Examine geographic processes, analyze spatial relationships, and quantify change using mapping techniques and time-series analysis.
- To Design GIS models for suitability analysis, overlay techniques, and spatial path modeling for networks and overland flows.
- To Apply artificial intelligence, flow modeling, and interaction models for facility allocation, travel analysis, and spatial case studies.

UNIT I ANALYSIS OF SPATIAL DISTRIBUTIONS 9

Introduction spatial measurements and statistics - Geographic analysis with statistics Understanding spatial data distributions - Measuring geographic distributions - Finding the center - Measuring the compactness of the distribution - Measuring orientation and direction - Testing statistical significance – Case Studies

UNIT II ANALYSIS OF SPATIAL PATTERNS 9

Identifying spatial patterns - Statistical parameters to characterize patterns - Measuring the pattern of feature locations - Measuring the spatial pattern of feature values - Defining spatial neighborhoods and weights - Identifying clusters - Parameters for identification of clusters- Analysis of features clusters - clusters of similar values – Case Studies

UNIT III UNDERSTANDING SPATIAL AND TEMPORAL RELATIONSHIPS 9

Analyzing geographic relationships- statistics to analyze relationships- Identifying geographic relationships - Analyzing geographic processes – Mapping Change – Various measures for quantification of change – Time Series analysis – Track Maps -Case Studies

UNIT IV GIS MODELLING 9

Introduction – GIS Modelling Process - Suitability Analysis – Design of Boolean Suitability Model - Finding Suitable Locations by Selection, Overlay - Rating of Suitable Locations - Weighted Overlay, Fuzzy Overlay – Use of Artificial Intelligence – Case Studies.

UNIT V NETWORK MODELLING 9

Designing a Path Model – Modelling path in networks – Modelling overland path – Flow Modelling – Modelling accumulation over surface – Tracing Flow over Network – Designing Interaction Models – Allocation of Demand to facilities – Modelling Travel to facilities – Case Studies

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to
  - **CO1** Use statistical methods for geographic analysis and measure spatial distributions, compactness, orientation, and direction.
  - **CO2** Identify and analyze spatial patterns, clusters, and relationships within geographic data, using statistical significance tests and case studies.
  - **CO3** Develop the skills to analyze geographic relationships, processes, and changes using statistical methods and spatial analysis tool
  - **CO4** Design and implement GIS models for suitability analysis, using methods like Boolean, weighted, and fuzzy overlay, along with path and flow modeling.
  - **CO5** Model Path , Flow , Accumulation , Tracing and Travel to Facilties in some of the Case Studies

REFERENCES:

1. **Andy Mitchell (2001),** The ESRI Guide to GIS Analysis, Volume 1: Geographic Patterns and Relationships, ESRI Press
2. **Andy Mitchell (2005),** The ESRI Guide to GIS Analysis, Volume 2: Spatial Measurements and Statistics, ESRI Pres
3. **Andy Mitchell (2012),** T*he Esri Guide to GIS Analysis, Volume 3: Modeling Suitability, Movement, and Interaction,* ESRI Press.
4. **Christopher D.Lloyd, Spatial Data Analysis, Oxford University Press, 1st Edition, 2010, ISBN:** 978-0199596942.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3		
2		3												3	
3			3												3
4			3												3
5			3												3
Avg	3	3	3										3	3	3

1' = Low; '2' = Medium; '3' = High

GI5009 OCEANOGRAPHY AND COASTAL PROCESSES L T P C
3 0 0 3

OBJECTIVE:

- To introduce the basic concepts of large water body formation and its stricture.
- To provide knowledge on various sea water characteristics and processes.
- To provide exposure on historical and current operational Ocean observation system.
- To impart the models and methods to retrieve the sea water properties and processes using remote sensing data products.
- To inculcate the behavior of applying remote sensing data products and techniques to manage and monitor the Ocean and Coastal resources and critical scenarios

UNIT I FUNDAMENTAL OCEANOGRAPY 9

Origin and Ocean basins – bottom topography - Physical properties of sea water – chemistry of sea water – Biological parameters –tectonic history-Ocean dynamics - Heat budget, Waves kinematics, Tides – coastal land forms.

UNIT II OCEAN CIRCULATIONS AND INSTRUMENTS 9

Air-Sea Interactions – Surface and Deep Sea Currents, Thermohaline and wind driven circulations, Ekman Transport and Geostrophic balance, ElNino and ENSO- Collection of water samples – Current measuring devices – deep sea coring devices – Hydrographic survey – Bathymetry – LiDAR and Sonar processing.

UNIT III OCEAN COLOR REMOTE SENSING 9

Ocean color radiometers – Radiative transfer theory - atmospheric correction -SST measurement - Cloud detection algorithms, single channel and McSST approach, Bayesian approach -Ocean primary productivity estimation-Bio-optical algorithms –- Coastal Land Use/ Landcover –- Ocean color Sensors & data products

UNIT IV COASTAL HAZARD REMOTE SENSING 9

Shoreline change mapping - Erosion and accretion estimation - Transect based and polygon based shoreline change analysis –Oil spill studies - Use of MSS and SAR images,statistical and Neural network approaches- Sea level rise - Sea surface variability from Altimeters and Scatterometers.

UNIT V DISASTER MANAGEMENT 9

Cyclones- Radars, Synthetic procedures, Dvorak Intensity and forecasting technique - Tsunami propagation and run up - Flood and storm surges –Total water level elevation measurement, HIROBM-BOOS model -mitigation strategies- Early warning systems.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Certain about the formation and basic characteristics of large water bodies

CO2 Comprehend the physical, chemical and biological processes and conventional sampling methods and devices

CO3 Exhibit the suitable sensing system and develop the method of retrieval processes of sea water characteristics feature.

CO4 Formulate the methodology for detection and sustainable management of the ocean and coastal resources.

CO5 Evaluate the influence of anthropogenic activities and develop the framework for handling the critical issues and scenarios.

TEXTBOOKS:

1. Vasilis D. Valavanis, GIS in oceanography & Fisheries, Taylor & Francis London & New York, 2002

2. Alasdair J.Edward, Remote Sensing Handbook for Tropical Coastal Management, UNESCO publishing, 2000.

REFERENCES :

1. Grant Gross,M., Oceangraphy, Merrill Publishing company, Columbus, U.S.A., 2002.
2. Karsten Manager, Shoreline Management Guidelines, DHI Water & Environment, Denmark, 2004.
3. Dean, R.G. and Dalrymple, R.A., Coastal Process with Engineering Application, Cambridge University press, Cambridge, 2004.
4. Paul D.Komar, Beach process and sedimentation. 2nd Edition , 1997,Prentice - Hall Inc., New Jersey.
5. Remote Sensing of the Changing Oceans, Dan Ling Tang, Gad Levy, Malcolm Heron, James Gower, Kristina B. Katsaros and Ramesh Singh, Springer;2011.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3			1										3	
2		3		2	2				1						3
3			1	3									3		
4			3	3			1							3	
5		2	3			1				1		1			3
Avg	3	3	2	2	2	1	1		1	1		1	3	3	3

1' = Low; '2' = Medium; '3' = High

GI5010 **HEALTH GIS** **L T P C 3**
0 0 3

OBJECTIVES:

- To understand the foundational concepts of disease ecology and their distribution
- To analyze the relationship between spatial databases and public health
- To apply disease mapping techniques
- To develop location and allocation strategies for health services
- To synthesize and evaluate the role of Web-GIS in public health

UNIT I MAPPING DISEASE ECOLOGY 9

Disease types and causes – environmental and social factors – genetic and chronic aspects – gender and occupational bias — time and space factors in disease distribution — life cycle, statistical curves and modelling – hazards, disasters, accidents and health.

UNIT II SPATIAL DATABASES FOR PUBLIC HEALTH 9

Health Data – Birth data, Morbidity data, Disease Registries and Survey Data Health Care and Health Care Utilization Data – Health Care Provider and Health Care Facility – Geolocating Health Data and Data Security and Privacy Issues — historical records and reliability.

UNIT III DISEASE MAPPING 9

Spatial patterns of disease — mapping causal factors - endemic and epidemic zonation - tests for spatial clustering and fragmentation - applications of RS and GIS in disease mapping — deterministic stochastic and uncertainty models –Case Studies .

UNIT IV LOCATION AND ALLOCATION STRATEGIES 9

Location of health centres and service areas — P-median scenarios — Network analysis and services — emergency services and alternative locations - the allocation of health resources — allocation of service areas and optimality — services and marginal people - improving access to socioeconomic and geographical contexts.

UNIT V HEALTH AND WEB-GIS 9

Sharing disease data and web — ontology requirements and applications - open source service environments - methods of XML aid OGC services — web map context, services and processing (WMS. WMC and VVPS) — web service quality and SDI

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 To Understand the foundational concepts of disease ecology and their influence on health.

CO2 To Identify and describe various types of health data and apply spatial analysis techniques to evaluate health service distribution.

CO3 To analyze the accessibility of healthcare services using spatial data, and evaluate how socioeconomic and geographical factors impact service delivery.

CO4 To Evaluate the effectiveness of Web-GIS technologies in public health by comparing their utility in disease monitoring, data sharing, and decision-making across different contexts.

CO5 To Synthesize different spatial and statistical models (deterministic, stochastic, uncertainty) to improve the accuracy and reliability of disease mapping..

TEXTBOOKS :

1. Ellen K. Cromley, Sara L. McLafferty 2011 , GIS and Public Health, Second Edition, Guilford Press, ISBN 9781609187507 - CAT# Y124676, 2nd Edition
2. Massimo Craglia (Editor), Ravi Maheswaran (Editor) (2004) GIS in Public Health Practice, CRC Press, 1st Edition.

REFERENCES :

1. Anthony.C, Gatrell and Markku Loytonen, GIS & Health, Taylor & Francis, 1998, ISBN: 0-203-21281-9.
2. Omar Khan, GIS and Health Applications, Idea Group Publishing, 2003, ISBN: 1-5914-0-042-2.
3. Ricskinner, Gisp,GIS in Hospital and Health Care Emergency Management, CRC Press, 2010, ISBN- 13-978-1-4398-2131-2.
4. Juliana A. Mauntay, Sara Mchafferty, Geospatial Analysis of Environmental Health, Springer,2011, ISBN-978-94-007-0328-5.
5. Donald P. Albert, Spatial Analysis GIS and Remote Sensing Application in the Health Sciences, Taylor & Francis,2005, ISBN: 1-57504-101-4

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	1	3	1		1								3	3	
2	2	1	1		2	1							3	2	1
3		3	2	2	2								3	2	2
4	1	2	2	2	1								1	3	2
5		1	1	1	3	1							1	2	3
Avg	1	2	1	2	2	1							3	2	2

1' = Low; '2' = Medium; '3' = High

GI5011 GIS BASED DISASTER PREPAREDNESS AND MITIGATION L T P C
3 0 0 3

COURSE OUTCOMES:

- To provide a comprehensive understanding of various disasters, their classification, and consequences, and to equip with knowledge about disaster risk reduction (DRR) techniques and tools.
- To understand the hydrological disaster analysis using geomatics tools, such as flood mapping, monitoring, and early warning systems.
- To explore meteorological disaster mitigation, weather prediction models, and cyclone and storm surge analysis using data from weather stations, radars, and satellite products.
- To analyze geological disaster modeling, including landslide and earthquake susceptibility mapping, terrain stability analysis, and geospatial techniques for mitigation.
- Apply geospatial methods for drought and forest fire risk assessment, monitoring, and the development of early warning systems.

UNIT I INTRODUCTION TO DISASTERS 9

Disaster: Definition and Classification - Hydrological and geological disasters, characteristics crisis and consequences - Role of Government administration, University research organization and NGO's - International disaster assistance - Sharing technology and technical expertise.

UNIT II LONG TERM MITIGATION MEASURES 9

Needs and approach towards prevention - Principles and components of mitigation Disaster legislation and policy - Insurance - Cost effective analysis - Utilization of resources -Training - Education - Public awareness - Roles of media.

UNIT III SAFETY RATING OF STRUCTURES 9

Slope stability of Ghat roads -Structural safety of Dams, Bridges, Hospitals, Industrial structures, - Disaster resistant structures - Low cost housing for disaster prone areas - Cyclone shelter projects and their implications - Reconstruction after disasters: Issues of practices.

UNIT IV SPACE SCIENCE INPUT IN DISASTER MANAGEMENT 9

Remote sensing in Hazard evaluation - Zonation - Risk assessment - Damage assessment- Land use planning and regulation for sustainable development -Communication satellite application- Network- Use of Internet - Warning system - Post disaster review - Case studies.

UNIT V EMERGENCY PLANNING USING SPATIAL AND NON-SPATIAL DATA 9

Information systems management - Spatial and non-spatial data bank creation – Operational emergency management - Vulnerability analysis of infrastructure and settlements - Predisaster and post disaster planning for relief operations - Potential of GIS application in development planning - Disaster management plan - Case studies.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand the classifications, characteristics, and impacts of hydrological, meteorological, geological, and man-made disasters.

CO2 Explain the use of geospatial technologies in disaster risk reduction (DRR) and early warning systems for various disaster types.

CO3 Analyze meteorological disasters using numerical weather prediction models and spatial modeling for multi-hazard risk assessment.

CO4 Examine geospatial techniques for assessing geological disasters, including landslides and earthquakes, and their mitigation.

CO5 Apply geospatial data for drought monitoring, forest fire risk assessment, and develop early warning systems for disaster mitigation

TEXTBOOKS:

1. J. P. Singhal (2010), Disaster Management, Laxmi Publications, ISBN-10:9380386427, ISBN-13:978-9380386423.
2. Tushar Bhattacharya (2012), Disaster Science and Management, McGraw Hill India Education Pvt Ltd., ISBN-10: 1259007367, ISBN-13:978-1259007361.

REFERENCES:

1. Bell, F.G. Geological Hazards: Their assessment, avoidance and mitigation. E &F.N SPON Routledge, London. 2012.
2. George G. Penelis and Andreas J. Kappos - Earthquake Resistant concrete Structures. E & F.N SPON, London, 2010.
3. Mitigating Natural Disasters, Phenomena, Effects and options, A Manual for policy makers and planners, United Nations. New York, 1991.
4. Gupta Anil K, Sreeja S, Nair. 2013 Disaster Mangement and Risk reduction: Role of Environmental Knowledge, Narosa Publishing House, NIDM, New Delhi.

   Kapur Anu ,Vulnerable India: A Geographical study of Disasters, IIAS and sage Publishers, New Delhi,2010

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	3	2	2	3	2	3	-	1	1	-	2	3	2	2
2	3	3	3	3	3	3	3	2	2	2	2	-	3	3	3
3	3	3	3	3	3	2	3	-	2	2	2	-	3	3	3
4	3	3	3	3	3	3	3	-	2	2	2	-	3	3	3
5	3	3	3	3	3	3	3	2	3	2	-	3	3	3	3
AVg.	3	3	3	3	3	3	3	2	2	2	3	3	3	3	3

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5012 **PLANETARY REMOTE SENSING** **L T P C**
3 0 0 3

OBJECTIVES:

- introduce the fundamental concepts of Universe and Solar System.
- To provide an insight to the orbital and interior behavior solar system components
- To provide the knowledge on surface and atmospheric characteristics of terrestrial planets.
- To enable the students to know about the historic and operation sensing system and data products
- To give the exposure on models methods of planet characterization using remote sensing data products.

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UNIT I UNIVERSE AND SOLAR SYSTEM 9

Origin of Universe - Big Bang and Steady state theories, Solar System - planets, satellites asteroids, meteorites and comets and internal differentiation of the planets- Planetary exploration mission and sensors

UNIT II TERRESTRIAL PLANETS 9

Geology and geophysics of terrestrial planets: earth, mars, venus and mercury; physical properties, composition, mineralogy and petrology of the planets and the Moon.

UNIT III PLANETARY ATMOSPHERE 9

Exo- and Endogenic processes associated with origin and internal evolution of planets – planetary volcanism, craters, elemental composition; mineralogy and petrology; thermal, seismic and magnetic properties

UNIT IV REMOTE SENSING FOR PLANETARY GEOLOGY 9

Approaches to Remote Sensing analysis of the planetary surfaces; applications derived from interaction of electromagnetic radiation (X-ray, gamma-ray, visible, near-IR, mid-IR, radar).

UNIT V PLANETARY EXPLORATION MISSIONS 9

Laser Altimetry and its application in Planetary science - Past, present and future missions - Analyses and Interpretation of data gathered through various missions: identification of morphological features.

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Express the basic concepts and processes of Universe and its componetes
CO2	Explain the physical and functional characteristics and interior formation processes of terrestrial and non-terrestrial planets
CO3	Exhibit the surface forming processes of terrestrial planets, surface and atmospheric characteristics of Moon and Mars.
CO4	Analyze the suitability of remote sensing platforms and observation capacity of operational platforms
CO5	Devise the method of extracting the planet surface and atmospheric characteristics and its performance.

TEXTBOOKS:

1. Shuanggen Jin, Planetary Geodesy and Remote Sensing 1st Edition, CRC PRESS, 2014.
2. Bo Wu, Kaichang Di, Jürgen Oberst, Irina Karachevtseva, Planetary Remote Sensing and Mapping 1st Edition, CRC Press, 2018

REFERENCES:

1. Principles of Planetary Climate by Raymond T.Pierrehumbert, University of Chicago, Publication date: December 2011
2. Remote Sensing Apllications for Planetary Surfaces by Deepak Kumar, Lambert Academic Publishing,2014
3. Introduction to planetary remote sensing gamma ray spectroscopy, in Remote Geochemical Analysis: Elemental and Mineralogic Composition, C.M. Pieters and P.A.J. Englert, eds., Cambridge Univ. Press, pp. 167-198. Evans, L.G., R.C. Reedy, and J.I. Trombka, 1993
4. Remote Sensing for the Earth Sciences: Manual of Remote Sensing, Third Edition, Volume 3, pp. 509-564, A.N. Rencz, Editor, John Wiley & Sons, 1999.
5. Radar Remote Sensing of Planetary Surfaces Cambridge University Press 2011 by Bruce A. Campbell

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3												3		
2	3			2	2								2		
3	2			2	3								2	2	
4		2	2		2				1				3	2	
5	2			2	2								2		
Avg	3	2	2	2	2				1				2	2	

1' = Low; '2' = Medium; '3' = High

GI5013 **SATELLITE METEOROLOGY** **L T P C**
3 0 0 3

OBJECTIVES:

- To introduce the various atmospheric parameters and its conventional observation.
- To provide knowledge on weather and climatic processes and features.
- To provide exposure on historical and current operational meteorological sensing system.
- To inculcate the ability of atmospheric modelling and extraction of weather and climate parameters.
- To provide exposure on applicability of meteorological data products and methods to deal with weather and climatic influence.

UNIT I BASICS **9**

Basics – Concepts in Satellite Meteorology – Conventional Direct Measurements – Indirect Methods and Remote Sensing

UNIT II WEATHER SATELLITES AND SENSING SYSTEMS **9**

Weather Satellites and Sensing Systems – Orbit Types and Altitudes – View Angle and Implications – INSAT and KALPANA – TRMM and GPM and others – American and European Missions, availability of data and derived data sets.

UNIT III DATA RECORDS AND APPLICATIONS **9**

Data Records and Applications — Active and Passive Sensor Data — Microwave Sensors and Applications – Altitude. Wind.. Temperature and Wave Measurements and Sensors – AWS Global Network in Measurements

UNIT IV METEOROLOGICAL APPLICATIONS **9**

Meteorological Applications — Oceanographic Applications — Weather Forecasting — Aviation Meteorology — Agriculture and Irrigation Management — Meteorology in Transportation Industry — Business and Trade Application

UNIT V MANAGEMENT AND MONITORING **9**

Satellite Meteorology in Welfare Management – Cyclone Warning Systems – World Precipitation and Warming — Sea level Monitoring — Ice and Snow — Flood and Storm Surge Warning Systems — Storms — Wild Fires and Volcanic Ash

TOTAL: 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Express the characteristics of earth atmosphere, meteorological parameters and state the physical laws related to atmospheric science.

CO2 Describe the weather and climatic processes and discuss the conventional and surface level observation of weather and climatic parameters

CO3 Exhibit the suitable sensing system for weather and climate analysis and develop the weather and climate models.

CO4 Analyze the critical scenarios by discovering the real time weather and climatic parameters and processes.

CO5 establish the framework to handle and manage such risk scenarios and develop advisory for planners and policy makers.

TEXTBOOKS:

1. Kidder and VonderHarr, ¯ Satellite Meteorology: An introduction||, Academic Press, San Diego, CA, 1995
2. Cracknell, ¯The Advanced Very High Resolution Radiometer (AVHRR)||, Taylor and Francis Int. Ltd., Great Britain, 1997

REFERENCES:

1. Asnani, G.C ¯Tropical Meteorology||, Vol.I and II, 3rd Edition, 2016
2. Doviak and Zrnic, ¯ Doppler Radar and Weather observations||, Academic press, London,2014.
3. Sauvageot, ¯Radar Meteorology||, Artech House Publishers, Norwood, MA, 1992
4. S.R.Kalsi, ¯Use of Satellite Image in Tropical Cyclone Intensity Analysis and Forecasting||, India Meteorological Department, New Delhi, Meteorological Monograph, Cyclone warning Division No.1/2002.
5. . Kelkar R.R. Satellite Meteorology, B S Publications, Hyderabad,2007

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3													3	
2	3	2		2	1										3
3	2			3	1			1			1		3		
4		3	3	1	1									3	
5			2			3	2		1						3
Avg	3	3	3	2	1	3	3	1	1		1		3	3	3

1' = Low; '2' = Medium; '3' = High

GI5014 **WEB GIS** **L T P C**
3 0 0 3

OBJECTIVE:

- To recall key concepts of Internet, GIS, Web GIS architecture, OGC standards, protocols, basic file formats, and GeoServer.
- To explain Web GIS components, web services, programming basics, and GeoServer administration.
- To apply web technologies like HTML, CSS, JavaScript, PHP, and GeoServer data management techniques.
- To analyze DOM, event handling, form validation, and map rendering using GeoServer services.
- To create dynamic web applications with PHP, database connectivity, and real-time GeoServer-based applications

UNIT I INTRODUCTION TO WEBGIS AND MARKUP LANGUAGE 9

Internet and GIS – Web GIS Architecture and Components – OGC standards: Web Services- WMS, WFS, WCS, WPS - Open Server Standards - Protocols: HTTP, FTP, SMTP- Frontend & Backend programming –- Basic file formats (vector, raster) – JSON, GeoJSON- Real time applications.

UNIT II HTML AND CSS 9

HTML: Introduction -HTML, XML, MHTML - HTML Elements - Formatting and Fonts – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms – **CSS:** Introduction to CSS – Basic syntax and styles - Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Margins and Padding - Positioning using CSS.

UNIT III JAVA SCRIPT 9

Data types and Variables - Operators, Expressions, and Statements -Functions - Objects - Array, Date and Math related Objects - Document Object Model - Event Handling - Controlling Windows & Frames and Documents - Form handling and validations.

UNIT IV PHP 9

Introduction - Programming basics - Print/echo - Variables and constants – Strings and Arrays – Operators, Control structures and looping structures – Functions – Reading Data in Web Pages - Embedding PHP within HTML – Establishing connectivity with database.

UNIT V GEOSERVER 9

Introduction – Web Administration – Geo server data directory –loading and working with data – shape file – PostGIS file – other web format data - styling the layers – services: WMS, WFS, WCS – security – demos and case studies on Geo server.

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Recall fundamental concepts related to the Internet, GIS, Web GIS architecture, OGC standards, open server standards, protocols (HTTP, FTP, SMTP), and basic web technologies such as HTML, XML, and CSS.

CO2 Explain the components of Web GIS, web services (WMS, WFS, WCS, WPS), JSON, GeoJSON, frontend and backend programming, and real-time applications. Additionally, explain the structure of basic file formats (vector, raster) and PostGIS data management.

CO3 Apply web development techniques including HTML elements, CSS styles, JavaScript functions, objects, and arrays, as well as PHP programming basics for form handling, string manipulation, and control structures.

CO4 Analyze the Document Object Model (DOM), event handling, form validations, and data handling techniques in web development. Analyze GeoServer's functionality for loading data, styling layers, and integrating with WMS, WFS, and other web services.

CO5 Create interactive web pages using PHP embedded with HTML, establish database connectivity, implement security protocols, and develop real-time applications with GeoServer demonstrations and case studies.

REFERENCES:

1. Harvey & Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education, 2011. ISBN-13: 978-0132151009
2. Thomas Powell, "HTML & CSS: The Complete Reference" Fifth Edition, McGraw-Hill, 2010 ISBN-13: 978-0071496292
3. Thomas Powell, Fritz Schneider "JavaScript The Complete Reference" 3rd Edition, TATA McGraw Hill, 2013 ISBN-13: 9781259064685
4. Steven Holzner, "PHP: The Complete Reference" 1st Edition TATA McGraw Hill ,2008 ISBN: 9780070223622
5. Stefano Iacovella, Brian Youngblood "GeoServer Beginner's Guide" Packt Publishing 2013, ISBN-13: 978-1849516686, 2nd Revised Edition(2017)

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	-	-	1	-	3	-	-	-	-	-	-	1	2	1	-
2	-	-	1	-	3	-	-	-	1	-	-	1	1	3	1
3	-	-	-	-	3	-	-	-	1	-	-	3	1	1	-
4	-	-	-	-	3	-	-	-	2	-	-	-	1	-	-
5	-	-	-	-	-	-	-	-	3	-	-	2	-	3	-
Avg	-	-	1	-	3	-	-	-	2	-	-	2	1	2	1

1' = Low; '2' = Medium; '3' = High

GI5015	MOBILE APPLICATION DEVELOPMENT	L T P C
		3 0 0 3

Course Objectives:

- To understand the foundational concepts of Android development
- To develop practical skills in designing and implementing Android applications
- To apply advanced techniques for working with files and databases in Android
- To analyze and evaluate the various data handling techniques in Android
- To synthesize Android database design concepts and efficiently manage data storage
- To critically evaluate Android applications' performance across different devices.

UNIT I **9**

Android – versions – Android development environment- Eclipse Integrated Development Environment(IOS) – Android Virtual Device – Android Runtime: Dalvik Virtual Machine, Core Libraries, Android Libraries, Application frame work, Project: Configuration, Settings, Stopping and Running modification - Directory Structure - Java SE and Dalvik Virtual machine

UNIT II **9**

Android Frame work – Graphical user Interface – Android Applications components – Android Activities, services, User interface – Broad coast Receivers: Announcements & Notifications Content Providers: Messaging for components - Design for various devices - views - layouts - Graphical layout Tool - Display: Test, Test View - Retical of data: Builders, check boxes and ratio - Indicators for developing - Progress with Seek Bar.

UNIT III **9**

Files and database : Display of files: Gallery , Grid View, Image View, Image Switcher – Displaying Text with Text View, Retrieving data from Users, Using Buttons, Check Boxes and Radio- Times from Users, Using Indicators to display Data to Users, Adjusting Progress with Seek bar

UNIT IV **9**

Saving and Loading – SQ Lite Database – Android Database Design – Access data – Content Provider: Registration - Data Provider - Internet

UNIT V **9**

Location based services (LBS)-Introduction-Crowd sourcing-configuring Android Emulator for geocoding, Geotagging: location accuracy, Map-based activities- examples-case studies.

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Demonstrate a fundamental understanding of Android development environments,
CO2 Apply Android framework principles to design and develop interactive user interfaces,
CO3 Analyze and implement various Android user interface elements
CO4 Develop and manage data persistence in Android applications
CO5 Evaluate and integrate location-based services (LBS) in Android applications,

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	2	2	2		1				1				2	3	
2	1	2	2		2								1	3	
3	1	1	2		3								2	3	
4	2	2	1		1								1	3	
5	2	2	2											3	2
Avg	2	2	2		2				1				2	3	2

1’ = Low; ‘2’ = Medium; ‘3’ = High

GI5071 GEOINFORMATICS FOR AGRICULTURE AND FORESTRY L T P C
3 0 0 3

OBJECTIVE:

- To apply remote sensing technologies for crop inventorying, soil mapping, land use/land cover classification, and damage assessment in agricultural and forest ecosystems.
- To introduce the role of remote sensing in soil survey, classification, mapping, and soil erosion assessment.
- To provide knowledge on land evaluation, land use planning, and sustainable land management practices.
- To equip students to assess agricultural damage due to pests, diseases, floods, droughts, and crop stress using geospatial techniques.
- To develop the ability to use remote sensing and GIS for forest resource management, including inventory, biomass estimation, and forest degradation mapping.

UNIT I CROP INVENTORY AND REMOTE SENSING 9

Introduction - leaf optical properties - identification of crops and crop inventorying – crop acreage estimation - vegetation indices - yield estimation - crop production forecasting through digital analysis - microwave and hyper spectral sensing for crop inventory - crop monitoring and condition assessment in command areas - case studies.

UNIT II REMOTE SENSING FORSOIL 9

Introduction - soil survey, types of soil surveys - soil genesis and soil classification -soil taxonomy - soil reflectance properties - soil mapping using remote sensing – problem soils - saline, alkali soil characteristics - mapping of saline alkaline soils - soil erosion and sedimentation - assessment of soil erosion - estimation of reservoir capacity.

UNIT III LAND EVALUATION AND MANAGEMENT 9

Introduction - land use / land cover definition - land use / land cover classification-concepts and approaches of land evaluation – Change dynamics – Land capability assessments - decision support system for land use planning - optimum land use planning for sustainable agriculture.

UNIT IV DAMAGE ASSESSMENT 9

Introduction - damage by pests and diseases - crop loss assessment by floods - flood hazard zone mapping - remote sensing capabilities and contributions for drought management - land degradation due to water logging and salinity - crop stress - reflectance properties of stressed crops - identification of crop stress - Agricultural insurance in India – CCIS,ECIS, FIIS and NAIS

UNIT V FOREST MANAGEMENT 9

Introduction - forest taxonomy - inventory of forests - forest type and density mapping-biomass assessment - timber volume estimation - factors for forest degradation-mapping degraded forests - deforestation and afforestation - forest fire mapping and damage assessment – species mapping - sustainable development of forests.

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1 Understand the properties of crop, soil mapping, land use/land cover classification, and damage assessment in agricultural and forest ecosystems

CO2 Apply and Analyze the reflectance properties of vegetation and soil using remote sensing data, and assess land degradation, crop stress

CO3 Evaluate the effectiveness of remote sensing methods for estimating crop yield, assessing soil erosion, mapping forest biomass, and managing natural resources.

CO4 Synthesize land evaluation concepts, land capability assessments, and decision support systems for effective land use planning and sustainable agricultural practices.

CO5 Design and develop integrated remote sensing models for forest management, damage assessment, and the estimation of agricultural losses due to pests, diseases, and environmental stress

TEXTBOOKS:

1. Srinivas, M.G., Remote Sensing Applications, Narosa Publishing House, New Delhi, 2001.
2. Andrew Rencz, Manual of Remote Sensing. Vol.3. Edn.3. Remote Sensing for the Earth Sciences, American Society for Photogrammetry and Remote Sensing, John Wiley & Sons, New York, 1999

REFERENCES:

1. A.K.Singh &U.K. Chopra, Geoinformatics Applications in Agriculture, New India Publishing Company, 2007.
2. Peter James Eredics, Mapping Forestry, ESRI Press,2010.
3. Nicholas Baghdadi, Clement Mallet, Mehrez Zribi, QGIS & applications in Agriculture and forest, John wiley &Sons, 2018.
4. Ravi Shankar Dwivedi, Remote Sensing of Soils, Springer-Verlag GmBH Germany, 2017.
5. G.P.Obi Reddy, S.K.Singh, Geospatial Technologies in Land Resource Mapping, Monitoring and Management, Springer International Publishing,2018.

CO's-PO's & PSO's MAPPING

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1	3	-	-	1	-		1	1					3		
2	1	2	1	3	2		1						3	3	
3	-		3	3	-									3	
4	-	2	2	3	-										3
5	-		3	3	-						2	3	3		3
Avg	2	2	2	3	2		1	1			2	3	3	3	3

1' = Low; '2' = Medium; '3' = High

GE5076 PROFESSIONAL ETHICS IN ENGINEERING L T P C
3 0 0 3

OBJECTIVES

- Identify the core values that shape the ethical behavior of an engineer.
- Utilize opportunities to explore one's own values in ethical issues.
- Become aware of ethical concerns and conflicts.
- Enhance familiarity with codes of conduct.
- Increase the ability to recognize and resolve ethical dilemmas.

UNIT I ENGINEERING ETHICS 9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism - Professional Ideals and Virtues – Uses of Ethical Theories.

UNIT II ENGINEERING AS SOCIAL EXPERIMENTATION 9

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics - Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III ENGINEER'S RESPONSIBILITY FOR SAFETY 9

Safety and Risk – Assessment of Safety and Risk – Risk Analysis – Reducing Risk – The Government Regulator's Approach to Risk - I Case Studies Chernoby and Bhopal

UNIT IV RESPONSIBILITIES AND RIGHTS 9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) - Discrimination

UNIT V GLOBAL ISSUES 9

Multinational Corporations - Business Ethics - Environmental Ethics - Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers –Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct

TOTAL: 45 PERIODS

OUTCOMES:

At the end of this course, the students should be able to:

CO1: Use ethical theories in the professional life
CO2: Do social experimentation with engineering approaches
CO3: Follow safety norms in the engineering practices
CO4: Confidence in their approaches and claim their rights
CO5: Take moral leadership with the knowledge in global practices

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

TEXT BOOKS

1. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics Concepts and Cases", Cengage Learning., Belmont, 2009, ISBN-13: 978-0-495-50279-1 ISBN-10: 0-495-50279-0.
2. Mike Martin and Roland Schinzinger, "Introduction To Engineering Ethics", 2nd Edition McGraw Hill., New York, 2010, ISBN 978-0-07-248311-6–ISBN 0-07-248311-3.

REFERENCES

1. Charles D Fleddermann, "Engineering Ethics", 4th edition, Prentice Hall., New Mexico, Newjersey, 1999, ISBN-13: 978-0-13-214521-3 , ISBN-10: 0-13-214521-9
2. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press,United Kingdom , 2002, ISBN: 9780195143027.
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", 1st edition, Oxford University Press, United Kingdom 2000, ISBN-13: 978-0195134889, ISBN-10: 0195134885
4. John R Boatright, "Ethics and the Conduct of Business", 8th edition Pearson Education, Boston, 2017,ISBN-10:9789352862306, ISBN-13:978-9352862306
5. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Wiley, 2004, ISBN-10: 8177221671 ISBN -13: 9788177221671.

AG5027 GEOLOGY FOR GEOINFORMATICS L T P C
3 0 0 3

OBJECTIVES:

- To teach the students on importance of Geology in natural resource inventory.
- To introduce the rock forming minerals, ores and different rock types.
- To teach on Geophysical techniques and geological hazard mapping

UNIT I SOLID EARTH AND STRUCTURAL GEOLOGY 9

Scope and branches of Geology - Relevance to Geoinformatics - Geology for natural resources inventory - Interior of the Earth - Plate Tectonics - Introduction to geological structures.

UNIT II MINERALOGY AND PETROLOGY 9

Important rock forming minerals – physical properties and uses. Classification and description of rocks – Forms and mode of occurrence of rocks. Important ore forming minerals – physical properties and uses – Distribution of economic minerals in India. Geology of coal and hydrocarbons.

UNIT III GEOMORPHOLOGY 9

Geomorphic processes and Landforms – Classification and Description. Weathering; Drainage pattern and morphometry. Significance of Geomorphology in geo-resources exploration and natural hazard studies.

UNIT IV GEOLOGIC HAZARDS 9

Classification of natural hazards - Geologic hazards - Earthquakes - Landslides - Volcanism and Tsunami. Earthquake and volcanic belts of the world; Seismicity and landslides in India. Mitigation of Geologic hazards.

UNIT V GEOPHYSICS AND REMOTE SENSING FOR GEOLOGY 9

Introduction to geophysical methods for ground truth verification and resource exploration – Seismic, Electrical, Gravity, Magnetic and Radiometric methods – Spectra of Minerals and rocks-Remote Sensing for geologic mapping, ground water, minerals and hydrocarbon exploration-Remote Sensing for study of geologic Hazards-Introduction to planetary geology.

TOTAL : 45 PERIODS

OUTCOMES:

- On completion of the course, the student is expected to be able to

CO1	Understand the internal structure of earth, plate tectonics and various geological structures
CO2	Have better understanding on rocks and minerals and their distribution in India.
CO3	Appreciate the role of geomorphology in geo-resource exploration and hazard mapping
CO4	Gain knowledge on geological hazards such as earthquakes, landslides, volcanoes, and Tsunami and their mitigation measures.
CO5	Appreciate the role of geology in the interpretation of geophysical anomalies and in remote sensing studies for various geo-resources

TEXTBOOKS:

1. Parbin Singh. A Text book of Engineering and General Geology, S.K. Kataria & Sons, 2013.
2. Andrew Goudie and Heather Viles. Landscapes and Geomorphology: A Very Short Introduction, Oxford Publishers, 2010.
3. William Lowrie. Fundamentals of Geophysics, Cambridge University press, 2007.

REFERENCES:

1. George H. Davis, Stephen J. Reynolds and Charles F. Kluth, Structural Geology of Rocks

and Regions. John Wiley and Sons, Inc., 2012.
2. Ravi P. Gupta. Remote Sensing Geology, Springer Verlag, 2003.
3. Varghese, P.C., Engineering Geology for Civil Engineering PHI Learning Private Limited, New Delhi, 2012.
4. Edward A. Keller, DeVecchio. Natural Disasters: Earth's Processes as Hazards, Disasters and Catastophes, Routledge, 3rd Edition, 2011.
5. F.G.Bell. Fundamentals of Engineering Geology, B.S. Publications. Hyderabad 2011.

CO – PO Mapping – GEOLOGY FOR GEOINFORMATICS

PO/PSO		Course Outcome					Overall Correlation of CO s to POs
		CO1	CO2	CO3	CO4	CO5	
PO1	Knowledge of Engineering Sciences	2		2	2	3	2
PO2	Problem analysis			2	2	3	2
PO3	Design / development of solutions			2	2	3	2
PO4	Investigation		2	3	3	3	3
PO5	Modern Tool Usage		2		2	3	2
PO6	Individual and Team work		2	2		2	2
PO7	Communication					1	1
PO8	Engineer and Society	2			2	2	2
PO9	Ethics				2	2	2
PO10	Environment and Sustainability	2			2	2	2
PO11	Project Management and Finance				2	2	2
PO12	Life Long Learning				2	2	2
PSO1	Knowledge of Geoinformatics discipline	2		2	2	2	2
PSO2	Critical analysis of Geoinformatics Engineering problems and innovations			3	2	3	3
PSO3	Conceptualization and evaluation of engineering solutions to Geoinformatics	2	2	2	3	2	2

AUDIT COURSES

AD5091 CONSTITUTION OF INDIA L T P C
3 0 0 0

OBJECTIVES:

- Teach history and philosophy of Indian Constitution.
- Describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- Summarize powers and functions of Indian government.
- Explain emergency rule.
- Explain structure and functions of local administration.

UNIT I INTRODUCTION 9

History of Making of the Indian Constitution-Drafting Committee- (Composition & Working) - Philosophy of the Indian Constitution-Preamble-Salient Features

UNIT II CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES 9

Fundamental Rights-Right to Equality-Right to Freedom-Right against Exploitation Right to Freedom of Religion-Cultural and Educational Rights-Right to Constitutional Remedies Directive Principles of State Policy-Fundamental Duties

UNIT III ORGANS OF GOVERNANCE 9

Parliament-Composition-Qualifications and Disqualifications-Powers and Functions-Executive President-Governor-Council of Ministers-Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions

UNIT IV EMERGENCY PROVISIONS 9

Emergency Provisions - National Emergency, President Rule, Financial Emergency

UNIT V LOCAL ADMINISTRATION 9

District's Administration head- Role and Importance-Municipalities- Introduction- Mayor and role of Elected Representative-CEO of Municipal Corporation-Pachayati raj- Introduction- PRI- Zila Pachayat-Elected officials and their roles- CEO ZilaPachayat- Position and role-Block level-Organizational Hierarchy (Different departments)-Village level- Role of Elected and Appointed officials-Importance of grass root democracy

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Able to understand history and philosophy of Indian Constitution.
CO2: Able to understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
CO3: Able to understand powers and functions of Indian government.
CO4: Able to understand emergency rule.
CO5: Able to understand structure and functions of local administration.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9			PO12
CO1									□			□
CO2									□			□
CO3									□			□
CO4									□			□
CO5									□			□

TEXTBOOKS:

1. Basu D D, Introduction to the Constitution of India, Lexis Nexis, 2015.
2. Busi S N, Ambedkar B R framing of Indian Constitution, 1st Edition, 2015.
3. Jain M P, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
4. The Constitution of India (Bare Act), Government Publication,1950

AD5092 **VALUE EDUCATION**

L T P C
3 0 0 0

OBJECTIVES:

- Develop knowledge of self-development
- Explain the importance of Human values
- Develop the overall personality through value education
- Overcome the self-destructive habits with value education
- Interpret social empowerment with value education

UNIT I INTRODUCTION TO VALUE EDUCATION 9

Values and self-development -Social values and individual attitudes, Work ethics, Indian vision of humanism, Moral and non- moral valuation, Standards and principles, Value judgements

UNIT II IMPORTANCE OF VALUES 9

Importance of cultivation of values, Sense of duty, Devotion, Self-reliance, Confidence, Concentration, Truthfulness, Cleanliness. Honesty, Humanity, Power of faith, National Unity, Patriotism, Love for nature, Discipline

UNIT III INFLUENCE OF VALUE EDUCATION 9

Personality and Behaviour development - Soul and Scientific attitude. Positive Thinking, Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour, Universal brotherhood and religious tolerance, True friendship Happiness Vs suffering, love for truth.

UNIT IV REINCARNATION THROUGH VALUE EDUCATION 9

Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature Character and Competence -Holy books vs Blind faith, Self-management and Good health, Science of reincarnation

UNIT V VALUE EDUCATION IN SOCIAL EMPOWERMENT 9

Equality, Nonviolence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control, Honesty, Studying effectively

TOTAL: 45PERIODS

OUTCOMES:

CO1 – Gain knowledge of self-development
CO2 – Learn the importance of Human values
CO3 – Develop the overall personality through value education
CO4 – Overcome the self destructive habits with value education
CO5 – Interpret social empowerment with value education

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

REFERENCES:

1. Chakroborty , S.K. “Values and Ethics for organizations Theory and practice”, Oxford University Press ,New Delhi

AD5093 **PEDAGOGY STUDIES** **L T P C**
3 0 0 0

OBJECTIVES:

- Understand the methodology of pedagogy.
- Compare pedagogical practices used by teachers in formal and informal classrooms in developing countries.
- Infer how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.
- Illustrate the factors necessary for professional development.
- Identify the Research gaps in pedagogy.

UNIT I INTRODUCTION AND METHODOLOGY: 9

Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education - Conceptual framework, Research questions **-** Overview of methodology and Searching.

UNIT II THEMATIC OVERVIEW 9

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.

UNIT III EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES 9

Methodology for the in depth stage: quality assessment of included studies - How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? - Theory of change - Strength and nature of the body of evidence for effective pedagogical practices - Pedagogic theory and pedagogical approaches - Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT IV PROFESSIONAL DEVELOPMENT 9

Professional development: alignment with classroom practices and follow up support - Peer support - Support from the head teacher and the community - Curriculum and assessment - Barriers to learning: limited resources and large class sizes

UNIT V RESEARCH GAPS AND FUTURE DIRECTIONS 9

Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.

TOTAL: 45PERIODS

OUTCOMES:

- Understand the methodology of pedagogy.
- Understand Pedagogical practices used by teachers in formal and informal classrooms in developing countries.
- Find how can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy.
- Know the factors necessary for professional development.
- Identify the Research gaps in pedagogy.

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

REFERENCES:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272-282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.

AD5094 **STRESS MANAGEMENT BY YOGA** **L T P C**
3 0 0 0

OBJECTIVES:

- Develop healthy mind in a healthy body thus improving social health also improve efficiency
- Invent Do's and Don't's in life through Yam
- Categorize Do's and Don't's in life through Niyam
- Develop a healthy mind and body through Yog Asans
- Invent breathing techniques through Pranayam

UNIT I INTRODUCTION TO YOGA **9**

Definitions of Eight parts of yog. (Ashtanga)

UNIT II YAM **9**

Do`s and Don't's in life.
Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT III NIYAM **9**

Do`s and Don't's in life.
Ahinsa, satya, astheya, bramhacharya and aparigraha

UNIT IV ASAN **9**

Various yog poses and their benefits for mind & body

UNIT V PRANAYAM **9**

Regularization of breathing techniques and its effects-Types of pranayam

TOTAL: 45PERIODS

OUTCOMES:

CO1 – Develop healthy mind in a healthy body thus improving social health also improve efficiency
CO2 – Learn Do's and Don't's in life through Yam
CO3 – Learn Do's and Don't's in life through Niyam
CO4 – Develop a healthy mind and body through Yog Asans
CO5 – Learn breathing techniques through Pranayam

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

REFERENCES:

1. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata
2. 'Yogic Asanas for Group Tarining-Part-I" : Janardan Swami Yogabhyasi Mandal, Nagpur

AD5095 PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

L T P C
3 0 0 0

OBJECTIVES:

- Develop basic personality skills holistically
- Develop deep personality skills holistically to achieve happy goals
- Rewrite the responsibilities
- Reframe a person with stable mind, pleasing personality and determination
- Discover wisdom in students

UNIT I NEETISATAKAM-HOLISTIC DEVELOPMENT OF PERSONALITY - I 9

Verses- 19,20,21,22 (wisdom) - Verses- 29,31,32 (pride & heroism) – Verses- 26,28,63,65 (virtue)

UNIT II NEETISATAKAM-HOLISTIC DEVELOPMENT OF PERSONALITY - II 9

Verses- 52,53,59 (dont's) - Verses- 71,73,75,78 (do's)

UNIT III APPROACH TO DAY TO DAY WORK AND DUTIES 9

Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48 - Chapter 3-Verses 13, 21, 27, 35 Chapter 6-Verses 5,13,17,23, 35 - Chapter 18-Verses 45, 46, 48

UNIT IV STATEMENTS OF BASIC KNOWLEDGE – I 9

Statements of basic knowledge - Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18

UNIT V PERSONALITY OF ROLE MODEL - SHRIMAD BHAGWADGEETA 9

Chapter2-Verses 17, Chapter 3-Verses 36,37,42 - Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63

TOTAL: 45PERIODS

OUTCOMES:

CO1: To develop basic personality skills holistically
CO2: To develop deep personality skills holistically to achieve happy goals
CO3: To rewrite the responsibilities
CO4: To reframe a person with stable mind, pleasing personality and determination
CO5: To awaken wisdom in students

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

REFERENCES:

1. Gopinath,Rashtriya Sanskrit Sansthanam P, Bhartrihari's ThreeSatakam, Niti-sringar-vairagya, New Delhi,2010
2. Swami Swarupananda , Srimad Bhagavad Gita, Advaita Ashram,Publication Department, Kolkata,2016

AD5097 ESSENCE OF INDIAN KNOWLEDGE TRADITION L T P C
3 0 0 0

COURSE OBJECTIVES

The course will introduce the students to

- get a knowledge about Indian Culture
- Know Indian Languages and Literature religion and philosophy and the fine arts in India
- Explore the Science and Scientists of Ancient, Medieval and Modern India
- Understand education systems in India

UNIT I INTRODUCTION TO CULTURE 9

Culture, civilization, culture and heritage, general characteristics of culture, importance of culture in human literature, Indian Culture, Ancient India, Medieval India, Modern India.

UNIT II INDIAN LANGUAGES AND LITERATURE 9

Indian Languages and Literature – I: Languages and Literature of South India, – Indian Languages and Literature – II: Northern Indian Languages & Literature

UNIT III RELIGION AND PHILOSOPHY 9

Major religions practiced in India and Understanding their Philosophy – religious movements in Modern India (Selected movements only)

UNIT IV FINE ARTS IN INDIA (ART, TECHNOLOGY& ENGINEERING) 9

Indian Painting, Indian handicrafts, Music, divisions of Indian classic music, modern Indian music, Dance and Drama, Indian Architecture (ancient, medieval and modern), Science and Technology in India, development of science in ancient, medieval and modern India

UNIT V EDUCATION SYSTEM IN INDIA 9

Education in ancient, medieval and modern India, aims of education, subjects, languages, Science and Scientists of Ancient India, Science and Scientists of Medieval India, Scientists of Modern India

TOTAL: 45PERIODS

COURSE OUTCOMES

After successful completion of the course the students will be able to

- Understand philosophy of Indian culture.
- Distinguish the Indian languages and literature.
- Learn the philosophy of ancient, medieval and modern India.
- Acquire the information about the fine arts in India.
- Know the contribution of scientists of different eras.
- Understand education systems in India

REFERENCES:

1. Kapil Kapoor, “Text and Interpretation: The India Tradition”,ISBN: 81246033375, 2005
2. “Science in Samskrit”, Samskrita Bharti Publisher, ISBN 13: 978-8187276333, 2007
3. NCERT, “Position paper on Arts, Music, Dance and Theatre”, ISBN 81-7450 494-X, 200
4. Narain, “Examinations in ancient India”, Arya Book Depot, 1993
5. Satya Prakash, “Founders of Sciences in Ancient India”, Vijay Kumar Publisher, 1989
6. M. Hiriyanna, “Essentials of Indian Philosophy”, Motilal Banarsidass Publishers, ISBN 13: 978- 8120810990, 2014

AD5098 SANGATAMIL LITERATURE APPRECIATION LT P C
3 0 0 0

COURSE OBJECTIVES:
The main learning objective of this course is to make the students an appreciation for:
1. Introduction to Sanga Tamil Literature.
2. 'Agathinai' and 'Purathinai' in Sanga Tamil Literature.
3. 'Attruppadai' in Sanga Tamil Literature.
4. Puranaanuru' in Sanga Tamil Literature.
5. 'Pathitru paththu' in Sanga Tamil Literature.

UNIT I SANGA TAMIL LITERATURE AN INTRODUCTION 9
Introduction to Tamil Sangam-History of Tamil Three Sangams-Introduction to Tamil Sangam Literature-Special Branches in Tamil Sangam Literature- Tamil Sangam Literature's Grammar-Tamil Sangam Literature'sparables.

UNIT II 'AGATHINAI' AND 'PURATHINAI' 9
Tholkappiyar's Meaningful Verses-Three literature materials-Agathinai's message- History of Culture from Agathinai-Purathinai-Classification-Mesaage to Society from Purathinai.

UNITIII 'ATTRUPPADAI' 9
Attruppadai Literature-Attruppadai in'Puranaanuru'-Attruppadaiin 'Pathitru paththu'- Attruppadai in 'Paththu aattu'.

UNITIV 'PURANAANURU' 9
Puranaanuru on Good Administration,Ruler and Subjects-Emotion & its Effect in Puranaanuru.

UNITV 'PATHITRU PATHTHU' 9
Pathitrupaththu in'Ettuthogai'-Pathitru paththu's Parables-Tamil dynasty:Valor, Administration, Charity in Pathitru paththu- Mesaage to Society from Pathitru paththu.

Total (L:45) = 45 PERIODS

COURSE OUTCOMES:
Upon completion of this course, the students will be able to:
1. Appreciate and apply the messages in Sanga Tamil Literature in their life.
2. Differentiate 'Agathinai' and'Purathinai'in their personal and societal life.
3. Appreciate and apply the messages in 'Attruppadai' in their personal and societal life.
4. Appreciate and apply the messages in 'Puranaanuru' in their personal and societal life.
5. Appreciate and apply the messages in 'Pathitru paththu' in their personal and societal life.

REFERENCES:

1. Sivaraja Pillai,The Chronology of the Early Tamils,Sagwan Press,2018.
2. Hank Heifetz and George L. Hart, The Puranānuru, Penguin Books,2002.
3. Kamil Zvelebil,The Smile of Murugan:On Tamil Literature of South India, Brill Academic Pub,1997.
4. George L. Hart, Poets of the Tamil Anthologies: Ancient Poems of Love and War, Princeton University Press,2015.
5. Xavier S.Thani Nayagam, Land scape and poetry:a study of nature in classical Tamil poetry, sia Pub.House, 1967.

CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
1									0.9						0.6
2									0.9						0.6
3									0.9						0.6
4									0.9						0.6
5									0.9						0.6

HSMC– ELECTIVES – HUMANITIES I (ODD SEMESTER)

HU5171	LANGUAGE AND COMMUNICATION	LT P C 3 0 0 3

COURSE DESCRIPTION

This course offers an introduction to language and communication. The primary goal of this course is to familiarize students with key ideas related to communication using language as well as non verbal means. Ideas related to the use of language and the underlying power structures are also examined. The course also examines the role of media in communication and in the dissemination of ideas as well as opinions.

Objectives

- ✓ To familiarize students with the concept of communication using linguistic and non linguistic resources.
- ✓ To help students ask critical questions regarding facts and opinions.
- ✓ To provide students with the material to discuss issues such as language and power structures.
- ✓ To help students think critically about false propaganda and fake news.

Learning Outcomes

- ➢ Students will be able to use linguistic and non linguistic resources of language in an integrated manner for communication.
- ➢ Students will be able to analyse communication in terms of facts and opinions.
- ➢ Students will be able to discuss, analyse and argue about issues related to language and power.

UNIT I LINGUISTIC AND NON-LINGUISTIC RESOURCE OF COMMUNICATION: 9

a) Writing and Speech
b) Distinction between language structure and language use, form and function, acceptability and grammaticality
c) Gestures and Body language, pictures and symbols, cultural appropriacy
d) Communicative Competency, context and situation, combination of linguistic and non-linguistic elements of communication

UNIT II STRUCTURE OF WRITING/CONVERSATION: 9

a) Language skills and the communication cycle; speaking and listening, writing and reading
b) Initiating and closing conversations, intervention, turn taking
c) Writing for target reader, rhetorical devices and strategies
d) Coherence and Cohesion in speech and writing

UNIT III POWER STRUCTURE AND LANGUAGE USE: 9

a) Gender and language use
b) Politeness expressions and their use
c) Ethical dimensions of language use
d) Language rights as part of human rights

UNIT IV MEDIA COMMUNICATION: 9

a) Print media, electronic media, social media
b) Power of media
c) Manufacturing of opinion, fake news and hidden agendas

UNIT V PERSUASIVE COMMUNICATION AND MISCOMMUNICATION: 9

a) Fundamentals of persuasive communication
b) Persuasive strategies
c) Communication barriers

TOTAL : 45 PERIODS

TEXT BOOKS:

1. Austin, 1962, J.L. How to do things with words. Oxford: Clarendon Press. Grice, P.1989. Studies in the way of words. Cambridge, M.A: Harvard University Press.
2. Chomsky, N.1966. Aspects of the theory of syntax, The MIT press, Cambridge. Chomsky, N.2006. Language and Mind, Cambridge University Press.
3. Hymes. D.N. 1972, On communication competence in J.B. Pride and J.Holmes (ed), Sociolinguistics, pp 269-293, London Penguin.
4. Gilbert, H.Harman, 1976. Psychological aspect of the theory of syntax in Journal of Philosophy, page 75-87.
5. Stephen. C. Levenson, 1983, Pragmatics, Cambridge University press.
6. Stangley, J. 2007. Language in Context. Clarendon press, Oxford. 7. Shannon, 1942. A Mathematical Theory of Communication. 8. Searle, J.R. 1969. Speech acts: An essay in the philosophy of language. Cambridge: Cambridge University Press.

HU5172 **VALUES AND ETHICS** **L T P C**
3 0 0 3

OBJECTIVES:

- Teach definition and classification of values.
- Explain Purusartha.
- Describe Sarvodaya idea.
- Summarize sustenance of life.
- Conclude views of hierarchy of values.

UNIT I DEFINITION AND CLASSIFICATION OF VALUES 9

Extrinsic values- Universal and Situational values- Physical- Environmental-Sensuous- Economic-Social-Aesthetic-Moral and Religious values

UNIT II CONCEPTS RELATED TO VALUES 9

Purusartha-Virtue- Right- duty- justice- Equality- Love and Good

UNIT III IDEOLOGY OF SARVODAYA 9

Egoism- Altruism and universalism- The Ideal of Sarvodaya and Vasudhaiva Kutumbakam

UNIT IV SUSTENANCE OF LIFE 9

The Problem of Sustenance of value in the process of Social, Political and Technological Changes

UNIT V VIEWS ON HIERARCHY OF VALUES 9

The Problem of hierarchy of values and their choice, The views of Pt. Madan Mohan Malviya and Mahatma Gandhi

TOTAL: 45 PERIODS

OUTCOMES:

CO1: Able to understand definition and classification of values.
CO2: Able to understand purusartha.
CO3: Able to understand sarvodaya idea.
CO4: Able to understand sustenance of life.
CO5: Able to understand views of hierarchy of values.

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

TEXTBOOKS:

1. AwadeshPradhan :MahamanakeVichara. (B.H.U., Vanarasi-2007)
2. Little, William, : An Introduction of Ethics (Allied Publisher, Indian Reprint 1955)
3. William, K Frankena : Ethics (Prentice Hall of India, 1988)

HU5173 **HUMAN RELATIONS AT WORK** **L T P C**
3 0 0 3

OBJECTIVES:

- Illustrate human relations at work its relationship with self.
- Explain the importance of interacting with people at work to develop teamwork.
- Infer the importance of physical health in maintaining human relations at work.
- Describe the importance of staying psychologically healthy.
- Identify the essential qualities for progressing in career.

UNIT I UNDERSTANDING AND MANAGING YOURSELF 9

Human Relations and You: Self-Esteem and Self-Confidence: Self-Motivation and Goal Setting; Emotional Intelligence, Attitudes, and Happiness; Values and Ethics and Problem Solving and Creativity.

UNIT II DEALING EFFECTIVELY WITH PEOPLE 9

Communication in the Workplace; Specialized Tactics for Getting Along with Others in the Workplace; Managing Conflict; Becoming an Effective Leader; Motivating Others and Developing Teamwork; Diversity and Cross-Cultural Competence.

UNIT III STAYING PHYSICALLY HEALTHY 9

Yoga, Pranayam and Exercise: Aerobic and anaerobic.

UNIT IV STAYING PSYCHOLOGICALLY HEALTHY 9

Managing Stress and Personal Problems, Meditation.

UNIT V DEVELOPING CAREER THRUST 9

Getting Ahead in Your Career, Learning Strategies, Perception, Life Span Changes, and Developing Good Work Habits.

TOTAL: 45 PERIODS

OUTCOMES:

Students will be able to
CO1: Understand the importance of self-management.
CO2: Know how to deal with people to develop teamwork.
CO3: Know the importance of staying healthy.
CO4: Know how to manage stress and personal problems.
CO5: Develop the personal qualities essential for career growth.

TEXT BOOK:

1. Dubrien, A. J. (2017). Human Relations for Career and Personal Success: Concepts, Applications, and Skills, 11th Ed. Upper Saddle River, NJ: Pearson.

REFERENCES:

1. Greenberg, J. S. (2017). Comprehensive stress management (14th edition), New York: McGraw Hill.
2. Udai, Y. (2015). Yogasanaurpranayam. New Delhi: N.S. Publications.

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

HU5174 **PSYCHOLOGICAL PROCESSES** **L T P C**
3 0 0 3

COURSE DESCRIPTION

Psychological Processes course is designed for students to be aware of the basic principles of psychology for the better understanding of people's psyche and behaviour around them. This course enables learners to use the optimal use of different forms of thinking skills and thereby results in effective communication in diverse situations. Every unit of the syllabus highlights the psychological process of people, the most powerful and constructive use of perceptions.

OBJECTIVES

The major objectives of this course is

- To develop students' awareness – on psychology, learning behavior and usage of perception effectively.
- To learn to use the various kinds of thinking in a formal context.
- To critically evaluate content and comprehend the message on the bases of perception, personality and intelligence.

UNIT 1: INTRODUCTION

What is psychology? - Why study psychology? - Psychology as science – Behavior and its role in human communication – socio-cultural bases of behaviour – Biological bases of behavior - Brain and its functions – Principles of Heredity – Cognition and its functions Fields of psychology – Cognitve and Perceptual – Industrial and Organizational.

UNIT 2: SENSORY & PERCEPTUAL PROCESSES

Some general properties of Senses: Visual system – the eye, colour vision – Auditory system – Hearing, listening, Sounds - Other senses - Selective attention; physiological correlates of attention; Internal influences on perception learning – set - motivation & emotion - cognitive styles; External influences on perception figure and ground separation – movement – organization – illusion; Internal- external interactions: Constancy - Depth Perception- Binocular & Monocular Perception; Perceptual defense & Perceptual vigilance; Sensory deprivation -Sensory bombardment; ESP - Social Perception.

UNIT 3: COGNITION & AFFECT

Learning and memory – philosophy of mind – concepts - words – images – semantic features – Association of words - Repetition - Retrieval - Chunking - Schemata - Emotion and motivation - nature and types of motivation – Biological & Psychosocial motivation – nature and types of emotions - physiological & cognitive bases of emotions - expressions of emotions - managing negative emotions - enhancing positive emotions.

UNIT 4: THINKING, PROBLEM-SOLVING & DECISION MAKING

Thinking skills - Types of thinking skills - Concrete & Abstract thinking - Convergent & Divergent - Analytical & Creative thinking – Problem & Possibility thinking – Vertical & Lateral thinking – Problem solving skills – stages of problem solving skills – Decision making - intuition and reasoning skills - Thinking and language - The thinking process- concepts, problem solving, decision-making, creative thinking; language communication.

UNIT 5: PERSONALITY & INTELLIGENCE

Psychological phenomena & Attributes of humans - cognition, motivation, and behavior - thoughts, feelings, perceptions, and actions – personality dimensions, traits, patterns - Specialized knowledge, performance accomplishments, automaticity or ease of functioning, skilled performance under challenge - generative flexibility, and speed of learning or behavior change.

References

1. Morgan, C.T.and King, R.A (1994) Introduction to Psychology, Tata McGraw Hill Co Ltd, New Delhi.
2. Robert A. Baron (2002), Psychology, 5th Edition, Prentice Hall, India.
3. Michael W.Passer, Ronald E.smith (2007), Psychology: The science of mind and

Behavior,3rd Edition Tata McGraw-Hill Edition.
4. Robert S.Feldman (2004) Understanding Psychology 6th Edition Tata McGraw – Hill.
5. Endler, N. S., & Summerfeldt, L. J. (1995). Intelligence. personality. psychopathology. and adjustment. In D. H. Saklofske & M. Zeidner (Eds.). International handbook of personality and intelligence (pp. 249-284). New York: Plenum Press.
6. Ford, M. E. (1994). A living systems approach to the integration of personality and intelligence. In R. J. Sternberg. & P. Ruzgis (Eds.). Personality and intelligence (pp. 188-21 7). New York: Cambridge University Press.
- De Bono, E (1990) Lateral Thinking, Harper Perennial, New York.

HU5175 EDUCATION, TECHNOLOGY AND SOCIETY L T P C
3 0 0 3

COURSE DESCRIPTION

This course introduces students to multidisciplinary studies in Education, Technology and Society. Students will get an understanding of the relationship between education, technology and society. They will also learn about the long lasting impact of good education in a technologically advanced society.

COURSE OBJECTIVES:

The course aims

- To help learners understand the basics of different types of technology utilised in the field of education
- To make them realize the impact of education in society
- To make them evolve as responsible citizen in a technologically advanced society.

LEARNING OUTCOMES

By the end of the course, learners will be able to

- Understand the various apps of technology apps and use them to access, generate and present information effectively.
- Apply technology based resources and other media formats equitably, ethically and legally.
- Integrate their technical education for betterment of society as well as their personal life.

UNIT I INDIAN EDUCATION SYSTEM

Gurukul to ICT education – Teacher as facilitator – Macaulay's Minutes – English medium vs Regional medium – Importance of Education in Modern India - Challenges in Education

UNIT II LEARNING THEORIES

Learning Theories – Behaviorism – Cognitivism – Social Constuctivism – Humanism Learning Styles - Multiple Intelligences - Emotional Intelligence - Blooms Taxonomy

UNIT III TECHNOLOGICAL ADVANCEMENTS

Web tools – Social media in education – elearning – MOOCs – Mobile assisted learning – Learning Apps – Blended learning - Self-directed learning

UNIT IV EDUCATIONAL TECHNOLOGY

Technological implications on Education – Teaching, Learning & Testing with Technology - Advantages and drawbacks – Critical analysis on the use of technology

UNIT V ETHICAL IMPLICATIONS

Plagiarism - Online Copyright issues - Ethical and value implications of education and technology on individual and society.

TOTAL:45 PERIODS

TEACHING METHODS

Teaching modes include guest lectures, discussion groups, presentations, visual media, and a practicum style of learning.

EVALUATION

As this is course is not a content based course, it focuses more on the ethical use of technology in education and society, and so, evaluation can be based on assignments and discussions. So there is no need for an end semester examination. Internals marks can be taken for the total marks.

INTERNAL (100 % WEIGHTAGE)

(a) Written Test (40 marks)

(b) Assignment: Write a real time report of the technology use in any school / college (15 marks)
(c) Presentation: Students choose any one of the technological tools and present its relevance to education and society (15 marks)
(d) Group discussion: Students discuss in groups on case studies relating to various challenges in education and technology use in society (20 marks)
(e) Blog entry: Making weekly blog posts in Class Blog on the topics related to the course posted by the instructor and commenting on others' posts. (10 marks)

REFERENCES

1) Education and Social order by Bertrand Russel
2) Theories of learning by Bower and Hilgard
3) Technology and Society by Jan L Harrington

HU5176 PHILOSOPHY L T P C
3 0 0 3

OBJECTIVES

- To create a new understanding by teaching philosophy through a comparison of Indian and Western traditions.
- To Fosters critical thinking and imagination by dealing with inter-related concepts in literature and science.
- To bridge the gap between the sciences and humanities through introspective analyses.
- To nurture an understanding of the self and elucidates ways to progress towards a higher understanding of one's self and others.

UNIT I KNOWLEDGE 9

Knowledge (Vidya) Versus Ignorance (Avidya)- Brihadaranyaka Upanishad. Unity and Multiplicity – Isha Upanishad. What is True Knowledge? Ways to True Knowledge. Introduction to Philosophy of Yoga, Socratic Debate, Plato's Views. Asking and Answering Questions to Stimulate Critical Thinking and to Draw Ideas. Argumentative Dialogues. Dialectical Methods to Arrive at Conclusions.

UNIT II ORIGIN 9

Origin of Universe And Creation – 'Nasidiya Sukta' in Relation With Big Bang Theory. Greek Concept of Chaos. The Concept of Space – Space as the Final Goal – Udgitha. Relationship Between Teacher And Student - The Knowledge Of Combinations, Body And Speech - Siksha Valli – Taittriya Upanishad.

UNIT III WORD 9

Aum- Speech and Breath as Pair – Chandogya Upanishad and Brihadaryanaka Upanishad. Significance of Chants, Structure of Language and Cosmic Correspondences. The Non-Dual Word – Bhartrihari's Vakyapadiyam. Sphota-Ultimate Reality Expressed Through Language. Intention. Thought 'Sabdanaor' and Speaking.

UNIT IV KNOWLEDGE AS POWER/OPPRESSION 9

Power- as Self-Realization in Gita. Krishna's Advice to Arjuna on How to Conquer Mind. Francis Bacon – Four Idols – What Prevents One From Gaining Knowledge? Michel Foucault- Knowledge as Oppression. Panopticon. Rtam (Truth) and Satyam (Eternal Truth).

UNIT V SELF KNOWLEDGE/BRAHMAN 9

Knowledge about Self, Transcendental Self. The Different Chakras and the Stages of Sublimation. Philosophy of Yoga and Siva for Union of Mind and Body. Concept of Yin/Yang. Aspects of the Feminine / Masculine.

TOTAL : 45 PERIODS

OUTCOMES:

On completion of the course, the students will be able to:

1. Think sceptically, ask questions and to arrive at deductions.
2. Connect and relate different branches of thought.
3. Comprehends the relation between language, thought and action.
4. Arrive at a better understanding of self and others and forms a new outlook.

REFERENCES:

1. Swami Nikhilananda: The Upanishads, Swami Nikhilananda, Advaita Ashrama, Kolkata.
2. Swamy Tapasyananda: Srimad Bhagavad Gita, The Scripture of Mankind, Sri Ramakrishna Math, Chennai.
3. Subrahmanyam, Korada: Vakyapadiyam of Bhartrhari Brahmakanda, Sri Garib Dass series.
4. Swami Lokeswarananda: Chandogya Upanishad, Swami Lokeswarananda,

Ramakrishna Mission Institute of Culture, Kolkata.
5. Brahma, Apuruseya: The Four Vedas: Translated in English.
6. Haich, Elizabeth: Sexual Energy and Yoga.
7. Bacon, Francis: Power as Knowledge
8. Vlastos, Gregory: Socrates Ironist and Moral Philosopher.
9. Plato: The Republic, Penguin.
10. Gutting, Garry: Foucault A Very Short Introduction, Oxford

HU5177 APPLICATIONS OF PSYCHOLOGY IN EVERYDAY LIFE **L T P C**
3 0 0 3

UNIT I INTRODUCTION **7**
Nature and fields.

UNIT II PSYCHOLOGY IN INDUSTRIES AND ORGANIZATIONS **9**
Job analysis; fatigue and accidents; consumer behavior.

UNIT III PSYCHOLOGY AND MENTAL HEALTH **11**
Abnormality, symptoms and causes psychological disorders

UNIT IV PSYCHOLOGY AND COUNSELING **7**
Need of Counseling, Counselor and the Counselee, Counseling Process, Areas of Counseling.

UNIT V PSYCHOLOGY AND SOCIAL BEHAVIOUR **11**
Group, group dynamics, teambuilding, Prejudice and stereotypes; Effective Communication, conflict and negotiation.

TOTAL: 45 PERIODS

TEXTBOOKS

1. Schultz, D. & Schultz, S.E. (2009). Psychology and Work Today (10th ed.). New Jersey:Pearson/Prentice Hall
2. Butcher, J. N., Mineka, S., & Hooley, J. M. (2010). Abnormal psychology (14th ed.). New York: Pearson
3. Gladding, S. T. (2014). Counselling: A comprehensive profession. New Delhi: Pearson Education
4. Aronson, E., Wilson, T. D., & Akert, R. M. (2010). Social Psychology (7th Ed.). Upper Saddle River, NJ: Prentice Hall