



**MOTHER TERESA WOMEN'S UNIVERSITY
KODAIKANAL- 624101**

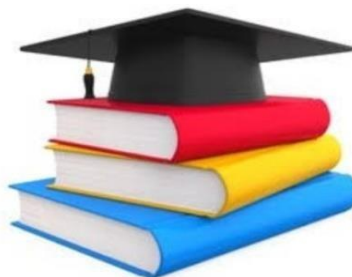


DEPARTMENT OF GEOGRAPHY

B.Sc. GEOGRAPHY

Curriculum Framework, Syllabus, and Regulations

(Based on TANSCHÉ Syllabus under Choice Based Credit System - CBCS)



(For the candidates to be admitted from the Academic Year 2023-24)

LEARNING OUTCOMES–BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	B.Sc. GEOGRAPHY
Programme Code:	
Duration:	3 Years (UG)
Programme Outcomes:	<p>P01: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study</p> <p>P02: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one’s views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.</p> <p>P03: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.</p> <p>P04: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non- familiar problems, rather than replicate curriculum content knowledge; and apply one’s learning to real life situations.</p> <p>P05: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid</p>

	<p>conclusions and support them with evidence and examples, and addressing opposing viewpoints.</p> <p>PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation</p> <p>PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team</p> <p>PO8: Scientific reasoning: Ability to analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.</p> <p>PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society.</p> <p>PO10 Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.</p> <p>PO 11 Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.</p> <p>PO 12 Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to</p>
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	<p>effectively engage in a multicultural society and interact respectfully with diverse groups.</p> <p>PO 13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.</p> <p>PO 14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.</p> <p>PO 15: Lifelong learning: Ability to acquire knowledge and skills, including „learning how to learn“, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.</p>
<p>Programme Specific Outcomes:</p>	<p>On successful completion of Bachelor of Physics with Computer Applications programme, the student should be able to:</p> <p>PSO1: Disciplinary Knowledge: Understand the fundamental principles, concepts, and theories related to physics and computer science. Also, exhibit proficiency in performing experiments in the laboratory.</p> <p>PSO2: Critical Thinking: Analyse complex problems, evaluate</p>

	<p>information, synthesize information, apply theoretical concepts to practical situations, identify assumptions and biases, make informed decisions and communicate effectively</p> <p>PS03: Problem Solving: Employ theoretical concepts and critical reasoning ability with physical, mathematical and technical skills to solve problems, acquire data, analyze their physical significance and explore new design possibilities.</p> <p>PS04: Analytical & Scientific Reasoning: Apply scientific methods, collect and analyse data, test hypotheses, evaluate evidence, apply statistical techniques and use computational models.</p> <p>PS05: Research related skills: Formulate research questions, conduct literature reviews, design and execute research studies, communicate research findings and collaborate in research projects.</p> <p>PS06: Self-directed & Lifelong Learning: Set learning goals, manage their own learning, reflect on their learning, adapt to new contexts, seek out new knowledge, collaborate with others and to continuously improve their skills and knowledge, through ongoing learning and professional development, and contribute to the growth and development of their field.</p>
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PO/PSO	PS01	PS02	PS03	PS04	PS05	PS06
P01	✓					
P02		✓				
P03			✓			
P04				✓		
P05					✓	
P06						✓

2. Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising statistical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced statistical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The General Studies and Statistics based problem solving skills are included as mandatory components in the 'Training for Competitive Examinations' course at the final semester, a first of its kind.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Statistical Quality Control course is included to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.
- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.

- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest DBMS and Computer software for Analytics.

Value additions in the Revamped Curriculum:

Semester	Newly Introduced Components	Outcome / Benefits
I	<p>Foundation Course</p> <p>To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning abstract Statistics and simulating mathematical concepts to real world.</p>	<ul style="list-style-type: none"> • Instil confidence among students • Create interest for the subject
I, II, III, IV	<p>Skill Enhancement Papers (Discipline centric / Generic / Entrepreneurial)</p>	<ul style="list-style-type: none"> • Industry ready graduates • Skilled human resource • Students are equipped with essential skills to make them employable • Training on Computing / Computational skills enable the students gain knowledge and exposure on latest computational aspects • Data analytical skills will enable students gain internships, apprenticeships, field work involving data collection, compilation, analysis etc. • Entrepreneurial skill training will provide an opportunity for independent livelihood

		<ul style="list-style-type: none"> • Generates self – employment • Create small scale entrepreneurs • Training to girls leads to women empowerment
		<ul style="list-style-type: none"> • Discipline centric skill will improve the Technical knowhow of solving real life problems using ICT tools
III, IV, V & VI	Elective Papers – An open choice of topics categorized under Generic and Discipline Centric	<ul style="list-style-type: none"> • Strengthening the domain knowledge • Introducing the stakeholders to the State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature • Students are exposed to Latest topics on Computer Science / IT, that require strong statistical background • Emerging topics in higher education / industry / communication network / health sector etc. are introduced with hands-on-training, facilitates designing of statistical models in the respective sectors
IV	DBMS and Programming skill, Biostatistics, Statistical Quality Control, Official Statistics, Operations Research	<ul style="list-style-type: none"> • Exposure to industry moulds students into solution providers • Generates Industry ready graduates • Employment opportunities enhanced
II Year Vacation activity	Internship / Industrial Training	<ul style="list-style-type: none"> • Practical training at the Industry/ Banking Sector / Private/ Public sector organizations / Educational institutions, enable the students gain professional experience and also become responsible citizens.
V Semester	Project with Viva – voce	<ul style="list-style-type: none"> • Self-learning is enhanced • Application of the concept to real situation is conceived resulting in tangible outcome

VI Semester	Introduction of Professional Competency component	<ul style="list-style-type: none"> • Curriculum design accommodates all category of learners; ‘Statistics for Advanced Explain’ component will comprise of advanced topics in Statistics and allied fields, for those in the peer group / aspiring researchers; • ‘Training for Competitive Examinations’ –caters to the needs of the aspirants towards most sought – after services of the nation viz, UPSC, ISS, CDS, NDA, Banking Services, CAT, TNPSC group services, etc.
Extra Credits: For Advanced Learners / Honors degree		<ul style="list-style-type: none"> • To cater to the needs of peer learners / research aspirants
Skills acquired from the Courses		<ul style="list-style-type: none"> • Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Credit Distribution for UG Programmes

Sem I	Credit	H	Sem II	Credit	H	Sem III	Credit	H	Sem IV	Credit	H	Sem V	Credit	H	Sem VI	Credit	H
Part 1. Language - Tamil	3	6	Part..1. Language - Tamil	3	6	Part..1. Language - Tamil	3	6	Part..1. Language - Tamil	3	6	5.1 Core Course -\CC IX	4	5	6.1 Core Course - CC XIII	4	6
Part.2 English	3	6	Part..2 English	3	6	Part..2 English	3	6	Part..2 English	3	6	5.2 Core Course - CC X	4	5	6.2 Core Course - CC XIV	4	6
1.3 Core Course - CC I	5	5	2..3 Core Course - CC III	5	5	3.3 Core Course - CC V	5	5	4.3 Core Course - CC VII Core Industry Module	5	5	5. 3.Core Course CC - XI	4	5	6.3 Core Course - CC XV	4	6
1.4 Core Course - CC II	5	5	2.4 Core Course - CC IV	5	5	3.4 Core Course - CC VI	5	5	4.4 Core Course - CC VIII	5	5	5. 4.Core Course -/ Project with viva- voce CC -XII	4	5	6.4 Elective - VII Generic/ Discipline Specific	3	5
1.5 Elective I Generic/ Discipline Specific	3	4	2.5 Elective II Generic/ Discipline Specific	3	4	3.5 Elective III Generic/ Discipline Specific	3	4	4.5 Elective IV Generic/ Discipline Specific	3	3	5.5 Elective V Generic/ Discipline Specific	3	4	6.5 Elective VIII Generic/ Discipline Specific	3	5
1.6 Skill Enhancement Course SEC-1	2	2	2.6 Skill Enhancement Course SEC-2	2	2	3.6 Skill Enhancement Course SEC-4, (Entrepreneurial Skill)	1	1	4.6 Skill Enhancement Course SEC-6	2	2	5.6 Elective VI Generic/ Discipline Specific	3	4	6.6 Extension Activity	1	-
1.7 Skill Enhancement - (Foundation Course)	2	2	2.7 Skill Enhancement Course -SEC-3	2	2	3.7 Skill Enhancement Course SEC-5	2	2	4.7 Skill Enhancement Course SEC-7	2	2	5.7 Value Education	2	2	6.7 Professional Competency Skill	2	2
						3.8 E.V.S.	-	1	4.8 E.V.S	2	1	5.8 Summer Internship /Industrial Training	2				
	23	30		23	30		22	30		25	30		26	30		21	30

Total - 140 Credits

**Choice Based Credit System (CBCS), Learning Outcomes Based Curriculum Framework
(LOCF) Guideline Based Credit and Hours Distribution System
For all UG courses including Lab Hours**

First Year – Semester-I

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses [in Total]	13	14
Part-4	Skill Enhancement Course SEC-1	2	2
	Foundation Course	2	2
		23	30

Semester-II

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course –SEC-2	2	2
	Skill Enhancement Course –SEC-3 (Discipline / Subject Specific)	2	2
		23	30

Second Year – Semester –III

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	14
Part-4	Skill Enhancement Course –SEC-4 (Entrepreneurial Based)	1	1
	Skill Enhancement Course –SEC-5 (Discipline / Subject Specific)	2	2
	E.V.S	–	1
		22	30

Semester – IV

Part	List of Courses	Credit	No. of Hours
Part-1	Language – Tamil	3	6
Part-2	English	3	6
Part-3	Core Courses & Elective Courses including laboratory [in Total]	13	13
Part-4	Skill Enhancement Course –SEC-6 (Discipline / Subject Specific)	2	2
	Skill Enhancement Course –SEC-7 (Discipline / Subject Specific)	2	2
	E.V.S	2	1
		25	30

Third Year
Semester – V

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based	22	26
Part-4	Value Education	2	2
	Internship / Industrial Visit / Field Visit	2	2
		26	30

Semester – VI

Part	List of Courses	Credit	No. of Hours
Part-3	Core Courses including Project / Elective Based & LAB	18	28
Part-4	Extension Activity	1	-
	Professional Competency Skill	2	2
		21	30

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	13	13	13	13	22	18	92
Part IV	4	4	3	6	4	1	22
Part V	-	-	-	-	-	2	2
Total	23	23	22	25	26	21	140

***Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the under graduate programme and the other components. IV, V have to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.**

Methods of Evaluation			
Internal Evaluation	Continuous Internal Assessment Test		25 Marks
	Assignments		
	Seminars		
	Attendance and Class Participation		
External Evaluation	End Semester Examination		75 Marks
	Total		100 Marks
Methods of Assessment			
Recall (K1)	Simple definitions, MCQ, Recall steps, Concept definitions		

Understand/ Comprehend (K2)	MCQ, True/False, Short essays, Concept explanations, Short summary or overview
Application (K3)	Suggest idea/concept with examples, Suggest formulae, Solve problems, Observe, Explain
Analyze (K4)	Problem-solving questions, Finish a procedure in many steps, Differentiate between various ideas, Map knowledge
Evaluate (K5)	Longer essay/ Evaluation essay, Critique or justify with pros and cons
Create (K6)	Check knowledge in specific or offbeat situations, Discussion, Debating or Presentations

- **Question paper pattern for External examination for Core and Elective papers:**

WRITTEN EXAMINATION QUESTION PAPER PATTERN

Theory Paper (Bloom's Taxonomy based)

(Common for UG, PG, Certificate, Diploma and P.G.Diploma Programmes)

Intended Learning Skills	Maximum 75 Marks Passing Minimum: 50% Duration: Three Hours
Memory Recall/Example/ Counter Example / Knowledge about the Concepts/Understanding	Part-A (10x2=20Marks) Answer ALL questions Each Question carries 2 marks
	Two questions from each Unit
	Question 1 to Question 10
Descriptions/Application (problems)	Part-B (5x5=25Marks) Answer ALL questions Each question carries 5 Marks
	Either - or Type Both parts of each question from the same Unit

	<p align="center">Question 11 (a) or 11(b) to Question 15(a) or 15(b)</p>
<p align="center">Analysis/Synthesis / Evaluation</p>	<p align="center">Part-C (3x 10 = 30 Marks) Answer any THREE questions Each question carries 10 Marks</p>
	<p align="center">There shall be FIVE questions covering all the five units</p>
	<p align="center">Question 16 to Question 20</p>

***Minimum credits required to pass: 140**

B.Sc. Geography

First Year

Semester – I

Part	Course Code	List of Courses	Credit	No. of Hours	CIA	ESE	Total Marks
Part-1	U23TAL11	Language – Tamil	3	6	25	75	100
Part-2	U23ENL21	English	3	6	25	75	100
Part-3	U23GET11	Core Course – 01 – I Fundamentals of Geomorphology	5	5	25	75	100
	U23GET12	Core Course – 02– II Cartography	5	5	25	75	100
	U23GEA11	Ancillary Botany - I	3	4	25	75	100
Part-4	U23GES11	Skill Enhancement Course SEC – 1 (NME) Basic Geography for Non Geographers	2	2	25	75	100
	U23GEF11	Foundation Course Mapping Techniques	2	2	25	75	100
Total			23	30			

Semester – II

Part	Course Title	List of Courses	Credit	No. of Hours	CIA	ESE	Total Marks
Part-1	U23TAL12	Language – Tamil	3	6	25	75	100
Part-2	U23ENL22	English	3	6	25	75	100
Part-3	U23GET23	Core Course – 03 – III Climatology	5	5	25	75	100
	U23GET24	Core Course – 04 – IV Human Geography	5	5	25	75	100
	U23GEA22	Ancillary Botany - II	3	4	25	75	100
Part-4	U23GES22	Skill Enhancement Course – SEC – 2 (NME) Soft Skills	2	2	25	75	100
	U23GES23	Skill Enhancement Course – SEC – 3 Representation of Relief Features	2	2	25	75	100
Total			23	30			

Credit Distribution for all UG other than B.Com, BBA and BCA

S.No	Part	Course Details	Credit
1	III	Core(15x4)	60
2		Elective Generic/ Discipline Specific Elective(8x3=24)	24
3	I& II	Language & English (Lang- 4x3=6 Eng-4x3=6)	24
4	IV	NME(2x2)	4
5		EVS(1x2)	2
6		Value Education(1x2)	2
7		Extension Activity(1x1)	1
8		<ul style="list-style-type: none"> • Ability Enhancement [AECC]- Soft Skill(4x2=8) • Skill Enhancement Course [7 Courses] • Professional Competency Skill 	8 13 2
		Total Credits	140

**Remarks: English Soft Skill Two Hours Will be handled by English Teachers
(4+2 = 6 hours for English).**

SEMESTER – I

SEMESTER – I			
COURSE CORE – CC – I			
U23GET11 - FUNDAMENTALS OF GEOMORPHOLOGY			
TEACHING HOURS : 60			
UNIT	LEARNING OBJECTIVES		
C01	To understand scope and content of Geomorphology; and explains the Rocks and types of rocks.		
C02	To Explains the continental drift theory, classify Endogenic and Exogenic forces. Discuss the fold, fault and volcano types.		
C03	To illustrate the factors affecting weathering and its types		
C04	To compare and classify Glacier and its types and types of landforms		
C05	To explain the work of wind waves		
UNIT	DETAILS	NO. OF HOURS	COURSE OBJECTIVES
I	Geomorphology – Meaning – Scope and Content (Structure of the earth) – Rocks – Rocks types (Igneous Rock, Metamorphic Rock, and Sedimentary Rock)	12	C01
II	Wegner’s continental drift theory – Sea floor spreading – Plate tectonics – Earth movements (Endogenic and Exogenic) – Fold and its types – Fault and its types – Earthquake and its types – Types of Volcanoes.	12	C02
III	Weathering: Factors affecting Weathering – Types of Weathering Mass Wasting and its types – Agents of Gradation – Normal Cycle of Erosion – Davis cycle (structure, stage, process) Work of Rivers – Erosion – Transportation – Deposition – Erosional Landforms – Depositional Landforms.	12	C03

IV	Work of Glaciers – Types of Glaciers – Glacial Landforms – Erosional Landforms Underground Water – Water Table – Aquifer – Spring and its types – Karst Landforms – Erosional Landforms and Depositional Landforms	12	C04
V	Work of Wind – Erosional Landforms and Depositional Landforms. Work of waves – Erosional landforms – Depositional landforms of Sea waves and Types of coasts.	12	C05
VI	Assessment Unit		
UNIT	LEARNING OUTCOMES		
I	Recall the meaning, Scope and Content of Geomorphology . Summarise the interior structure of the earth, differentiate the types of rocks their formation, and the Rock cycle, understand the formation of major landforms and Knows the distribution of Land and Sea, Are able to identify the formation and type of rocks		
II	Relates Wegner’s continental drift theory, Sea floor spreading, Plate tectonics and Earth movements (endogenetic and exogenetic) to the formation of mountain, plateau, plains and lakes with its types		
III	Differentiates the weathering process and mass wasting and their types, understands Normal Cycle of Erosion of Davis (structure, stage, process), and identifies Work of Rivers.		
IV	Understands and appreciates the formation of various landforms by Glacier, underground water, Aquifer and karst topography.		
V	Understands and appreciates the formation of various landforms formed by wind and waves		
VI	Assessment Unit		
TEXT BOOK:			
1	Savindra Singh (2012) :Physical Geography		
2	Siddhartha.K&Mukherjee.R (2008): The Earth’s Dynamic Surface		

3	Majid Hussain (2004): Fundamentals of Physical Geography
4	Richard. H. Bryant (2006): Physical geography made Simple
5	Dayal P.A. (2001):Text book of Geomorphology
WEB SOURCE:	
1	En.wikipedia.org/wiki/Geomorphology
2	En.wikipedia.org/wiki/volcano
3	http://www.geographynotes.com/articles/applied-geomorphology-meaning-two-main-lines-specific-applications-and-techniques/779
4	En.wikipedia.org/wiki/Geomorphology

CO/PO /PSO	PO									
	1. Disciplinary Knowledge and Skill	2. Skilled Communicators	3. Critical Thinkers and Problem Solver	4. Sense of Inquiry	5. Team Players/ Worker	6. Skilled Project Managers	7. Digitally Efficient	8. Ethical Awareness/ Reasoning	9. National and International Perspective	10. life Long Learners
C01	3	2	1	2	2	1		1	1	1
C02	3	2	1		1	1	2	1	1	1
C03	3	2	2	2	2	1	2	1	1	1
C04	3	2	2		1	1		1	1	1
C05	3	2	2	2	2	1	2	1	1	1
Avg	3	2	2	2	2	1	2	1	1	1
Total	15	10	6	8	3	6	5	5	5	6

SEMESTER – I			
COURSE CORE – CC – II			
U23GET12 - CARTOGRAPHY			
TEACHING HOURS : 60			
UNIT	LEARNING OBJECTIVES		
C01	To understand the development and history of Cartography, with the types of maps.		
C02	To illustrate and examine the components of Maps		
C03	To elaborate on the representation of mapping techniques		
C04	To enrich the development of remote sensing in the cartography		
C05	To summarize the recent technologies in digital Cartography		
UNIT	DETAILS	NO. OF HOURS	COURSE OBJECTIVES
I	Definition – History and Development of Cartography – Maps – Types of Maps based on Scale Purpose, Relief and Thematic Maps Qualitative and Quantitative uses of Maps in Geography	12	CO1
II	Components of a Maps – Scale – Direction – Projection – Conventional Signs and Symbols – Lettering, Symbolization.	12	CO2
III	Techniques of Map Representation – Isopleth – Interpolation of Contours – Mapping of Socio – Economic Data – Dot Maps Circle – Sphere – Square – Choropleth – Choro schematic – Choro Chromatic Maps.	12	CO3
IV	Development of Remote Sensing – Aerial Photography, Aerial Photo Interpretation – Satellite Imageries – Advantage of Digital Maps over Conventional Maps	12	CO4
V	Recent Technologies in Cartography – CAD – GIS – ARC GIS – QGIS – GPS	12	CO5
VI	Assessment Units		

UNIT	LEARNING OUTCOMES
I	Understanding the basic concepts of cartography, scope of the study, its history and development in Geography. It is important to explore student's knowledge in maps and its types. Explore the Purposes in creation of thematic maps, weather maps, special purpose maps and Topographic maps. Acquire the knowe through shape and size of the earth. To develop the skills to work on cartographic process and analyse the concept of earth as a cartographic problem to construction
II	Appreciate the goals of map design. Construct the elements of map design like scale and its types, direction, understanding True north, Grid, magnetic north, and legend. Develop the in depth knowledge of geographic co ordinate system.
III	Understanding of facts and ideas of representation of physical data through contour diagram, making profiles and block diagrams to get idea of topographical structure. Define the techniques of thematic mapping, and its types of simple, complex and semi) explains and explore the Mapping of terrain (contouring, layer tinting, hill shading, Hachures)
IV	Understands the role of cartography in the development of remote sensing techniques, learns to interpret aerial photograph, satellite imagery and differentiate the digital cartography and traditional cartography.
V	Learns the recent technologies in Cartography
VI	Assessment Unit
TEXT BOOK:	
1	Judith A.Tyner (2010):Principles of Map Design, The Guilford press, New York , London.
2	Misra,P. and A. Ramesh.(2006). <i>Fundamentals of Cartography</i> . McMillan Co. Publishing, New Delhi.
3	Misra, R.P. and Ramesh A. (2002) :Fundamentals of Cartography, concept publishing company
4	Robinson, H. (1995). <i>Elements of Cartography</i> . (6th Edition). John Wiley and Sons, New York
5	Tyner, Judith.(1992). <i>Introduction to thematic Cartography</i> . Prentice Hall, New

	Jersey. Border, D. (1990). <i>Cartography: Thematic map design</i> . WCB WMC Brocan Pub
WEB SOURCE:	
1	http://en.wikipedia.org/wiki/carography
2	http://www.geography.wisc.edu/histcart
3	http://www.map-symbol.com/sym_lib.htm .

CO/PO/ PSO	PO									
	1. Disciplinary Knowledge and Skill	2. Skilled Communicators	3. Critical Thinkers and Problem Solver	4. Sense of Inquiry	5. Team Players/ Worker	6. Skilled Project Managers	7. Digitally Efficient	8. Ethical Awareness/ Reasoning	9. National and International Perspective	10. Life Long Learners
CO1	3	1					1	1	1	1
CO2	3	1	1	1			1	1	1	1
CO3	3	1	2	1	1	1	1	1	1	1
CO4	3	2	2	1	1	1	1	1	1	1
CO5	3	2	2	2	1	1	1	1	1	1
AVG	3	1	2	1	2	1	1	1	1	1
TOTAL	15	7	7	5	3	3	5	5	5	5

SEMESTER – I
ALLIED – I

U23GEA11 - BOTANY THEORY

Credit: 3

Course Code:

Hours: 4

Learning Objectives:

- ❖ To understand the taxonomy aspects of plants
- ❖ To learn the structure, reproduction & classification of lower plants
- ❖ To identify the plants as either monocotyledons or dicotyledons
- ❖ To gain knowledge for water absorption mechanism and photosynthesis

- UNIT I CHARACTERISTICS OF ALGAE AND FUNGI:** Classification of Algae, Structure and Reproduction of Algae- Oscillatoria, Sargassum. Economic importance of Algae. General characters of fungi, life cycle of Puccinia, Economic importance of Fungi ..
- UNIT II CRYPTOGAMS AND PHANEROGAMS:** Structure and life cycle of Bryophyte - Funaria Structure and life cycle of Pteridophyte -Lycopodium Structure and life cycle of Gymnosperm- Gnetum.
- UNIT III PLANT ANATOMY:** Types of tissues and Meristems. Primary structure, of Dicot and monocot stem, root. Structure of mature Anther and ovule, Fertilization and Dicot embryo.
- UNIT IV** General Outline of Bentham & Hooker's classification, Merits & Demerits. Floral Characters and Economic importance of Rubiaceae, Caesalpinaceae, Asclepidaceae and Poaceae.
- UNIT V PLANT PHYSIOLOGY:** Absorption of water and minerals, Transpiration- movement and loss of water in plants; Stomatal physiology, Photosynthesis; Photosynthetic pigments, light and Dark reaction (C3 cycle only). Photorespiration.

TEXT BOOKS:

1. *Pandey, P.B. College Botany - 1: Including Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta. Chand Publishing, New Delhi. 2014.*

2. Bilgrami, K.S. *A Textbook of Algae*. CBS Publisher & Distributors, New Delhi, ISBN: 978-8123900490. 2010.

REFERENCE BOOKS:

1. Sharma, P. D. *Microbiology*, Rastogi & Co., Meerut. 2011.
2. Alexopoulos, C.J., C.M. Mims and M. BlackMell. *Introductory Mycology*. IV Edition. Miley India (P) Ltd., Daryaganj, New Delhi. 2007.
3. Vashishta, Sinha A.K, Adarsh Kumar. *Bryophytes*, S.Chand & Company ltd., New Delhi. 2011.

E-REFERENCES

1. http://herba.msu.ru/shipunov/school/biol_154/textbook/intro_botany.pdf
2. http://www.survivorlibrary.com/library/strasburgers_text-book_of_botany_1921.pdf
3. https://biolympiads.com/wp-content/uploads/2018/09/1-Botany_Basics.pdf

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
C01	Acquire knowledge of classification of algae and fungi and its economic importance.	K1
C02	Know the lifecycle of bryophytes, pteridophytes and gymnosperm.	K2
C03	Compare and differentiate the dicot and monocot plants.	K3
C04	Identify the Rubiaceae, Caesalpinaceae, Asclepidaceae and Poaceae family by using floral characters.	K3
C05	Understand the transpiration, water absorption and photosynthesis	K2

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate*

Outcome Mapping:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	2	3	4	5	6	7	8	1	2	3	4	5
C01	S	S	S	S	M	S	S	M	S	M	M	M	S
C02	S	S	S	S	M	S	S	S	S	M	S	S	S
C03	S	S	S	S	S	M	S	S	S	S	S	M	S
C04	S	S	S	S	S	S	M	S	M	S	S	M	S
C05	S	S	S	S	S	S	S	M	S	S	S	S	M
C05	S	S	S	S	S	S	S	M	S	S	S	S	M

**Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0*

SEMESTER – I			
SKILL ENHANCEMENT COURSE SEC – 1 (NME)			
U23GES11 - BASIC GEOGRAPHY FOR NON GEOGRAPHERS			
TEACHING HOURS : 60			
UNIT	LEARNING OBJECTIVES		
CO1	To enrich the basic knowledge of the Earth, and its composition, enhance the knowledge of the structure of the atmosphere.		
CO2	To explore the different the zones of Ocean with varying water depths, acquire knowledge on the deposits of Ocean		
CO3	To illustrate the Natural regions of the world		
CO4	To elaborate the Evolution of humans and races		
CO5	To understand the distribution and patterns of Population		
UNIT	DETAILS	NO. OF HOURS	COURSE OBJECTIVES
I	Earth – Origin, Interior, Age, size, shape of the Earth – Rocks and its Types – Atmosphere: Origin and nature, Composition and Structure of the atmosphere.	12	CO1
II	Continental Shelf, Continental Slope, Continental Rise and Trenches – Bottom relief of Ocean – Distribution of Salinity – Ocean Currents – Ocean Deposits – Tides	12	CO2
III	Regions– Natural regions of the world – Equatorial, Tropical and temperate grasslands, tropical and temperate deserts, Tundra regions	12	CO3
IV	Evolution of humans – Determinism and Possibilism – Major races of the world – Major religions of the world – Major Languages of the world – Major Tribes of India with Special Reference to Tamilnadu	12	CO4
V	Population Distribution – Density and growth – Population Problems – Migration and its types.	12	CO5
VI	Assessment Unit		

UNIT	LEARNING OUTCOMES
I	Analyse the changes over the universe periodically, distinguish the earth rotation and revolution and its causes explain how day and night cause, Recall Climatic elements explain the composition and Structure of the Atmosphere define Insolation examine the Heat Balance compares Horizontal and Vertical Distribution of Temperature.
II	Explains distribution of Land and Sea describes the structure and composition of the Ocean floor the oceanic crust, Group Activity makes a model of Ocean Bottom relief.
III	Develop the in depth knowledge of natural resource and its importance. classify the resources and human intervention and development Applying acquired knowledge marking the region in the map
IV	Recall the Nature and Scope of Human geography, compare with the other branch of Geography , Understand the significance of Human geography, analyse the Man and environment relationship, examine the population data
V	Understanding the basic concepts and significance of population geography, scope of the study, its history and development in Geography. It is important to explore student's knowledge in world population distribution
VI	Assessment Unit
TEXT BOOK:	
1	Thornbury, W. D. (1960): Principles of Geomorphology, John Wiley and Sons, New York.
2	Savindra Singh (2002): Physical Geography, PrayagPustakBhawan, Allahabad.
3	D. S. Lal: Climatology. ShardaPustakBhawan
4	D. S. Lal: Climatology. ShardaPustakBhawan ,11 , University road Allahabad-211002 Edition 2003.
WEB SOURCE:	
1	https://letstalkscience.ca/educational-resources/stem-in-context/processes-shape-landforms
2	https://www.universetoday.com/

3	https://www.yourarticlelibrary.com/population/theories-of-population-malthus-theory-marxs-theory-and-theory-of-demographic-transition/31397
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CO/PO/PSO	PO									
	1. Disciplinary Knowledge and Skill	2. Skilled Communicators	3. Critical Thinkers and Problem Solver	4. Sense of Inquiry	5. Team Players/ Worker	6. Skilled Project Managers	7. Digitally Efficient	8. Ethical Awareness/ Reasoning	9. National and International Perspective	10. Life Long Learners
C01	3	2	1	2	2	1		1	1	1
C02	3	2	1		1	1	2	1	1	1
C03	3	2	2	2	2	1	2	1	1	1
C04	3	2	2		1	1		1	1	1
C05	3	2	2	2	2	1	2	1	1	1
Avg	3	2	2	2	2	1	2	1	1	1
Total	15	10	6	8	3	6	5	5	5	6

SEMESTER - I			
ABILITY ENHANCEMENT COMPULSORY COURSE (AECC) SOFT SKILL - I			
U23GEF11 - MAPPING TECHNIQUES			
TEACHING HOURS : 60			
UNIT	LEARNING OBJECTIVES		
C01	To understand the components of Maps and Scale Measurements		
C02	To illustrate and examine the Representation of the direction on Maps		
C03	To elaborate on the need for conventional signs and symbols in Maps		
C04	To enhance techniques applied in the Representation of relief on maps.		
C05	To introduce the mapping techniques applied to interpret contours		
UNIT	DETAILS	NO. OF HOURS	COURSE OBJECTIVES
I	Map components - Maps- Types of Maps - Scales - Representative fraction and Statement of the scale - Types of scales - Plain scales - Pace scale - Time scale - comparative scale - Diagonal scale.	12	C01
II	Representation of direction on maps : Directions-True north, Grid, Magnetic north - Magnetic declination - Bearings - True bearing and magnetic bearing - Latitude and Longitude - International dateline - International Time Calculation - Map setting in the field - Map reading.	12	C02
III	Conventional signs and symbols - Measurement of distance (Thread - Divider - Opisometer) and Measurement of area (Graphical and strip method) - Enlargement and Reduction of maps - Combination of Maps.	12	C03
IV	Representation of relief on maps: Spot heights, bench mark, triangulation station - layer shading -	12	C04

	Hachuring, hill shading and Contours – Interpolation of contours.		
V	Contour section drawing – Types of slopes (Uniform, Concave and Convex) – (Hill – Plateau – Ridge – Escarpment – V-Shaped Valley – Waterfalls and Sand dunes) – Profiles (Serial – Superimposed – Projected – Composite).	12	CO5
VI	Assessment Unit		
UNIT	LEARNING OUTCOMES		
I	Recalls. Map components – Maps– Types of MaScale–and Statement of the scale– Types – how it is important to explore their knowledge Representative fraction and Statement of the scale– Types of scales – Plain scales – Pace scale – Time scale		
II	Understanding of facts Representation of direction on maps – Explain the Directions–True north, Grid, Magnetic north – Magnetic declination and Identify the– Latitude and Longitude – International dateline – Explian the International Time Calculation – Map setting in the field – Map reading		
III	Define the Conventional signs and symbols– calculate the Measurement of distance (Thread – Divider Opisometer) and Measurement of area (Graphical and strip method) – Enlargement and Reduction of maps – Combination of Map		
IV	The Representation of relief on maps, Spot heights, , bench mark, triangulation ,station – layer shading– and calculate the Interpolation of contours.		
V	Understands the Contour section drawing–Types of slopes (Uniform, Concave and Convex)–(Hill Plateau–Ridge– Escarpment V–shaped Valley–Waterfalls and Sand dunes)– draw a Profiles (serial– superimposed–projected – composite).		
VI	Assessment Unit		
TEXT BOOK:			
1	Saha, Pijushkanti (2010): Advanced Practical Geography. Books and Allied pvt Ltd.		

2	Bagulia A.M (2006): Practical Geography, Anmol Pyblishers.
3	Khan , M.D .Zulfequar Ahmed (1997) : Text book of Practical Geography. Concept Publishing Company , New Delhi.
WEB SOURCE:	
1	http://www.worldatlas.com/aatlas/imageg.
2	http://en.wikipedia.org/wiki/mapscale.
3	http://en.wikipedia.org/wiki/internationaldateline
4	http://en.wikipedia.org/wiki/mapscale.

CO/PO /PSO	PO									
	1. Disciplinary Knowledge and Skill	2. Skilled communicators	3. Critical Thinkers and Problem Solver	4. Sense of Inquiry	5. Team Players/ Worker	6. Skilled Project Managers	7. Digitally Efficient	8. Ethical Awareness/ Reasoning	9. National and International Perspective	10. Life Long Learners
C01	3	1	1	1			1	1	1	1
C02	3	1	1	1			1	1	1	1
C03	3	1	1	2	2	1	1	1	1	1
C04	3	2	2	1	2	1	1	1	1	1
C05	3	2	2	1	2	1	1	1	1	1
Avg	3	1	2	1	2	1	1	1	1	1
Total	15	7	7	6	6	3	5	5	5	5

SEMESTER – II

SEMESTER - II			
CORE COURSE - CC - III			
U23GET23 - CLIMATOLOGY			
TEACHING HOURS : 60			
UNIT	LEARNING OBJECTIVES		
C01	To understand the basic concepts and scope of climate and differentiate the weather and climate and assess the composition of atmosphere.		
C02	To classify the Atmospheric Pressure and Winds		
C03	To illustrate the types of air masses and fronts		
C04	To elaborate the Atmospheric Moisture and climatic regions		
C05	To understand the basic concepts of Cyclone and its mechanism		
C06	Assessment Unit		
UNIT	DETAILS	NO. OF HOURS	COURSE OBJECTIVES
I	Scope and Content – Weather and Climate – Climatic Elements – Atmospheric Composition and Structure – Insolation and Temperature: Factors and Distribution, Heat Budget, Temperature Inversion.	12	C01
II	Atmospheric Pressure and Winds: Planetary Winds, Forces affecting Winds, General Circulation of Air, Jet Streams.	12	C02
III	Air Masses – Classification of Air Masses – Fronts – Classification of Fronts.	12	C03
IV	Atmospheric Moisture: Evaporation, Humidity, Condensation, Fog and Clouds, Precipitation Types, Stability and Instability; Climatic Regions.	12	C04
V	Cyclones: Tropical Cyclones, Temperate Cyclones, Monsoon – Origin and Mechanism, El Nino – LA Nina.	12	C05
VI	Assessment Unit		

UNIT	LEARNING OUTCOMES
I	Recall Climatic elements explain the composition and Structure of the Atmosphere define Insolation examine the Heat Balance compares Horizontal and Vertical Distribution of Temperature.
II	Defines Atmospheric Pressure, Compares Horizontal and Vertical Distribution of Pressure draw the major Pressure Belts Differentiates Planetary Winds, Periodic and Local Winds, Group Activity Make a Model on Major pressure Belts and Planetary winds.
III	illustrate the formation of Jet Streams summaries the formation of Air Masses and Fronts.C
IV	Defines and differentiate Humidity (absolute humidity, Relative humidity) explains Fog and its Types identifies Clouds (High, Medium and Low) narrates Forms of precipitation and Types of Rainfall (Convictional, Orographic and Cyclonic) discuss and debate on Issues in Global Climate Changes.
V	draw map for Circulation of Ocean Currents and the distribution Discuss and debate on ElNino – LaNina
VI	Assessment Unit
TEXT BOOK:	
1	Lal D.S (2006): Climatology, Chaitanya Publishing House, New Delhi.
2	Roger. G. Barry & Richard J. Choley, (2002): Atmosphere, Weather and Climate, Seventh Edition, Methunen& co Ltd, New York.
3	Gochenleong (2001): Certificate Physical and Human Geography, Oxford university press, New Delhi.
4	Siddhartha. K , (2000): Atmosphere, Weather and Climate, Kisalaya publications Pvt Ltd Delhi.
WEB SOURCE:	
1	en-wikipedia.org/win/physical-geography
2	www.physical-geography.net/about.html
3	www.4shared.net/physical+geography .
4	science>earth-sciences>geography">books.google.com>science>earth-sciences>geography

CO/PO /PSO	PO									
	1. Disciplinary Knowledge and Skill	2. Skilled Communicators	3. Critical Thinkers and Problem Solver	4. Sense of Inquiry	5. Team Players/ Worker	6. Skilled Project Managers	7. Digitally Efficient	8. Ethical Awareness/ Reasoning	9. National and International Perspective	10. Life Long Learners
C01	3	1	1	1	1	1	2	1	1	1
C02	3	1	1	1	1	1	2	1	1	1
C03	3	1	2	1	2	1	1	1	1	1
C04	3	2	1	1	2	1	1	1	1	1
C05	3	2	1	2	2	1	1	1	1	1
Avg	3	1	1	1	2	1	2	1	1	1
Total	15	7	6	6	8	5	7	5	5	5

SEMESTER - I			
CORE COURSE - CC - IV			
U23GET24 - HUMAN GEOGRAPHY			
TEACHING HOURS : 60			
UNIT	LEARNING OBJECTIVES		
C01	To understand the basic concepts of Human Geography and assess the relationship between Man and Environment.		
C02	To elaborate the school of thoughts		
C03	To discuss the distribution of Major Human Races in World		
C04	To illustrate the World Major Religions		
C05	To compare and distinguish the World Major Languages and Language groups		
C06	Assessment Unit		
UNIT	DETAILS	NO. OF HOURS	COURSE OBJECTIVES
I	Human Geography – Nature, Scope and Significance of Human Geography – Man and Environment Relationship.	12	C01
II	Schools of Thoughts: Determinism, Neo Determinism, Possibilism – French – German – British – UK – Humanism – Behaviorism.	12	C02
III	Major Human Races in World – Classification of Major Races – Caucasoid – Mongoloid – Negroid – Racial Parameters and indices.	12	C03
IV	World Major Religions: Religion distribution – Hinduism – Buddhism – Jainism – Christianity – Islam – Religions in India.	12	C04
V	World Major Languages and Language groups – Tamil, Chinese, English – Hindi – Arabic – German – French and Portuguese.	12	C05
VI	Assessment Unit		C06

UNIT	LEARNING OUTCOMES
I	Recall the Nature and Scope of Human geography, compare with the other branch of Geography , Understand the significance of Human geography, analyse the Man and environment relationship, explain the theories of population, examine the population data
II	Understands the basis of the study of Geography through the elaborate understanding of the School of thoughts
III	Explain the distribution of Major human races in the world, compare World Distribution of Races, analyse Racial parameters and indices(Shape, Skull, Face, Nose, Stature,, examine White (Caucasian), Classifying Asian (Mongoloid), outline the Black (Negroid Group discussion Classification of Races
IV	Recall the Major Religions, explain Hinduism, Buddhism, Jainism, Christianity, Islam, examine the Religious distribution around the world, compare Languages, Vernacular and Dialectics.
V	estimate the distribution of Language groups (Chinese, Spanish, English, Hindi, Arabic German, French and Portuguese
VI	Assessment Unit
TEXT BOOK:	
1	Majid Hussain (2011) Human geography, Rawat publications, New Delhi
2	Lekh raj singh (2009): Fundamentals of human geography, Sharda pustakbhawan,publishers
3	Majid Hussain (2009): Concise geography, Tata mc graw hills education private limited, New Delhi.
WEB SOURCE:	
1	http://jizaberg.tumblr.com/post/24880131860/download-researching-human-geography-pdf-ebook
2	http://walkgeographies.files.wordpress.com/2009/03/gregoryetal_dictionary_human_geography_2009.pdf

CO/PO/ PSO	PO									
	1. Disciplinary Knowledge and Skill	2. Skilled Communicators	3. Critical Thinkers and Problem Solver	4. Sense of Inquiry	5. Team Players/ Worker	6. Skilled Project Managers	7. Digitally Efficient	8. Ethical Awareness/ Reasoning	9. National and International Perspective	10. Life Long Learners
C01	3	1	1	1			1	1	1	1
C02	3	1	1	1			1	1	1	1
C03	3	1	1	2	2	1	1	1	1	1
C04	3	2	2	1	2	1	1	1	1	1
C05	3	2	2	1	2	1	1	1	1	1
Avg	3	1	2	1	2	1	1	1	1	1
Total	15	7	7	6	6	3	5	5	5	5

SEMESTER – II**ALLIED – II****U23GEA22 - BOTANY PRACTICAL****Credit: 3****Course Code:****Hours: 4****Learning Objectives:**

- ❖ To learn sectioning and mounting skills
- ❖ To observe the morphological feature for understanding the taxonomy
- ❖ To know the structure, reproduction & classification of lower plants
- ❖ To identify the plants as either monocotyledons or dicotyledons
- ❖ To gain knowledge on internal structure of plants by sectioning

UNIT I	Algae - Oscillatoria (Harmogonia) Sargassum (Morphology) Fungi - Puccinia (T.S of Wheat leaf uredospore Teleutospore) Bryophytes - Funnaria (Habit) Pteridophyte – Lycopodium (Morphology,T.s of Stem, L.S. of cone) Gymnosperm - Gentum (morphology, T.S. of Stem showing secondary growth, Gentum , male cone, Female cone.
UNIT II	Taxonomy - Identification and description of the families those are included in the theory 1. Rubiaceae, 2. Caesalpinaceae, 3. Asclepidaceae & 4. Poaceae
UNIT III	Anatomy: Study of Apical meristem (shoot apex) Tissues - Parenchyma, Collenchymas, Sclerenchyma, T.S of Dicot stem.
UNIT IV	Embryology: General Outline of Bentham & Hooker's classification, Merits & Demerits. Floral Characters and Economic importance of Rubiaceae, Caesalpinaceae, Asclepidaceae and Poaceae.
UNIT V	PLANT PHYSIOLOGY: Experiments to demonstrate i. Osmosis - Thistle funnel experiment, ii. Evolution of oxygen during photosynthesis, iii. Ganong's light screen experiment

TEXT BOOKS:

1. Sivakumar, K. *Algae- A Practical Approach*. MJP Publishers, Chennai, India. 2016.
2. Gupta, V.K., Tuohy, M.G., Ayyachamy, M., Turner, K.M. and O'Donovan, A.

Laboratory Protocols in Fungal Biology: Current Methods in Fungal Biology. Springer, London, UK. 2013.

3. Chmielewski, J. G. and Kravesky, D. *General Botany laboratory Manual. AuthorHouse, Bloomington, USA. 2013.*
4. Bendre, A. M. *A Text Book Of Practical Botany – Rastogi Publications, Meerut, India. 2010.*

REFERENCE BOOKS:

1. Sharma, P. D. *Microbiology, Rastogi & Co., Meerut. 2011.*
2. Alexopoulos, C.J., C.M. Mims and M. BlackMell. *Introductory Mycology. IV Edition. Miley India (P) Ltd., Daryaganj, New Delhi. 2007.*
3. Vashishta, Sinha A.K, Adarsh Kumar. *Bryophytes, S.Chand & Company Ltd., New Delhi. 2011.*

Learning Outcomes:

CO	After the completion of the course, students will be able to	Remarks
C01	identify and differentiate algae, Fungi, Bryophytes and Pteridophytes	K3
C02	Identify and classify the rubiaceae, caesalpinaceae, asclepidaceae & poaceae family plants	K3
C03	Observe the various plant tissues and differentiate Monocot and Dicot plants through sectioning	K2
C04	Understand the parts of plant embryo.	K2
C05	Get practical knowledge on thistle funnel experiment and other physiological experiments	K1

**K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyze, K5 – Evaluate*

Outcome Mapping:

CO	PROGRAMME OUTCOMES (PO)								PROGRAMME SPECIFIC OUTCOMES (PSO)				
	1	2	3	4	5	6	7	8	1	2	3	4	5
C01	S	S	S	M	M	S	S	M	S	S	S	M	S
C02	S	S	S	S	M	S	S	S	S	M	S	S	M
C03	S	S	S	S	S	M	S	M	S	S	S	M	S
C04	S	S	S	S	S	S	M	S	M	S	S	M	S
C05	S	S	S	S	S	S	S	M	S	S	S	S	M
C05	S	M	M	S	S	S	S	M	S	M	S	S	M

**Strongly Correlating – 3, Moderately Correlating – 2, Weekly Correlating – 1, No Correlation – 0*

SEMESTER – II			
ELECTIVE GENERIC/ DISCIPLINE SPECIFIC ELECTIVE – II			
BIO GEOGRAPHY			
TEACHING HOURS : 60			
UNIT	LEARNING OBJECTIVES		
C01	To understand the content of Bio–Geography and components of biosphere.		
C02	To identify elements and types of biodiversity		
C03	To illustrate the different types of Biomes of India		
C04	To understand the ecosystem balance and biosphere reserves		
C05	To elucidate the association between biodiversity and sustainable development.		
C06	Assessment Unit		
UNIT	DETAILS	NO. OF HOURS	COURSE OBJECTIVES
I	Bio Geography – Nature, Scope and Content – branches of Biogeography – types of biogeography, Evolution of flora and fauna with geological time scale – Biosphere – components of the biosphere – Ecology and Environment.	12	C01
II	Biodiversity – Meaning – Definition – Elements and Types of Biodiversity – Biodiversity – Hot Spots – Value and Importance of Biodiversity – Biodiversity	12	C02
III	Biomes of India – Terrestrial Biomes, Freshwater Biomes, Marine biomes – Biosphere Reserves of India. Anthropogenic Biome.	12	C03
IV	Ecosystem balance – Species Extinction (nature of extinction, threatened species, species conservation, Gene banks, and Botanical Gardens, Zoological Gardens and Captive Breeding Centres, Biosphere Reserves, National Parks and Wildlife Sanctuaries	12	C04
V	Bio diversity and Sustainable Development – Global	12	C05

	Environmental Policies - EIA - Environmental Education and Legislation - Treaties and laws to protect endangered species, SDG - 17 Goals.		
VI	Assessment Unit		
UNIT	LEARNING OUTCOMES		
I	Define Biogeography the content and scope of bio geography appreciate evolution of fauna and flora Recall components of biosphere - explain Structure, Functions, Units and Types of Ecosystems Differentiate ecosystem, ecology and environment Group activity based on this web reference		
II	Lists Factors influencing the distribution of flora and fauna - compares the factors and their influence on flora Physiographic factors (Topography, water bodies, sunlight, salinity) - Climatic factors (Temperature, Rainfall, Wind, Humidity) - Edaphic factors (soil air, soil moisture, soil texture, soil Ph) - Bio factors (competition, predation, diseases, humans)		
III	Define Biogeographical Regions of Plants and Animals - appreciates Biogeographic realms of the world - Nearctic, Palearctic, Afrotropic, Indomalaya, Australasia, Neotropic, Oceania and Antarctic- understands WWF classification of Biomes - Terrestrial, freshwater and marine biomes - compares Biogeochemical cycles Group Activity - model making for biomes.		
IV	Lists Influence of Man on Environment - defines and lists the types of Ecological Succession realizes the impact of influence analyse Ecological change and Imbalances - (Pollution, soil degradation, deforestation, desertification, acid rain, ozone depletion) Discuss on Environmental Degradation and Environmental Management Activity Debate		
V	Analyzing and interpret National and International Policies and programmer on Animal Conservation (Biosphere Programmer 1971, Environmental Education Conference EEC 1975, UNESCO, The Earth Summit - Rio-de Jineiro, 1992, UNESCO, Project Elephant, 1992, Project Tiger, Conservation of Rhinos in Assam, 1987) - develop India Wild life Protection Acts - Bio Diversity Bill.		

VI	Assessment Unit
TEXT BOOK:	
1	S.P. Mishra and S,P. Pandey : Essential Environmental Studies; Ane Books Pvt. Ltd, 2010
2	George Simonds Bougler (2009):The Science Teaching of Forestry
3	Savindrasingh (2008):Environmental Geography
4	Bhattacharyya N.N (2003): Bio Geography, Rajesh Publication New Delhi.
WEB SOURCE:	
1	www.botany.wisc.edu/
2	www.biogeography.com

CO/PO/ PSO	PO									
	1. Disciplinary Knowledge and Skill	2. Skilled communicators	3. Critical Thinkers and Problem Solver	4. Sense of Inquiry	5. Team Players/	6. Skilled Project Managers	7. Digitally Efficient	8. Ethical Awareness/ Reasoning	9. National and International Perspective	10. Life Long Learners
CO1	3	2	1	1			1	1	1	1
CO2	3	2	1	1			1	1	1	1
CO3	3	2	1	2	2	1	1	1	1	1
CO4	3	2	2	2	2	1	1	1	1	1
CO5	3	2	2	2	1	1	1	2	1	1
Average	3	2	1	2	1	1	1	1	1	1
Total	15	10	7	8	5	3	6	6	5	5

SEMESTER - II			
SKILL ENHANCEMENT COURSE - SEC - 3			
U23GES23 - REPRESENTATION OF RELIEF FEATURES			
TEACHING HOURS : 60			
UNIT	LEARNING OBJECTIVES		
C01	To enhance the students in gaining knowledge of concepts and components using Drainage basin and network morphometric		
C02	To get an idea of Calculation of runoff		
C03	To enhances the Calculation of hydraulic geometry equations.		
C04	To display the new technology used to analyze Measurement of channel cross-section		
C05	To enrich the knowledge about the Calculation of velocity		
C06	Assessment Unit		
UNIT	DETAILS	NO. OF HOURS	COURSE OBJECTIVES
I	Drainage basin and network morphometry - Longitudinal profile - Hack's stream gradient index.	12	C01
II	Calculation of runoff - sediment load - sediment yield	12	C02
III	Calculation of hydraulic geometry equations.	12	C03
IV	Measurement of channel cross-section in the field - study of erosional and depositional features in the field Creating sketch maps.	12	C04
V	Calculation of velocity - discharge using Manning equation - Estimation of unit stream power - shear.	12	C05
VI	Assessment Unit		
UNIT	LEARNING OUTCOMES		
I	Morphometric analysis And Gradient analysis. Explain the Smith, Robinson, Wentworth method. Assume Hypsometric curves. Simplify the Terrain classification and Altimetric, Frequency curve.		
II	Hydrology, Water level fluctuation using ground water data , Explain Mapping Rainfall, distribution		

III	The Contour drawing and explain the Serial Profiles, Superimposed, Projected and composite profile. Compile the Block Diagram
IV	Solve Theissen Polygon Method, Isohyets method, Analyse water balance graph
V	Understanding the Estimation of unit stream power
VI	Assessment Unit
TEXT BOOK:	
1	Charlton, R. (2008): Fundamentals of Fluvial Geomorphology, Routledge, Oxon.
2	Kondolf, G. M. and Piegay, H. (2003): Tools in Fluvial Geomorphology, Wiley, Chichester.
3	Robert, A. (2003): River Processes - An Introduction to Fluvial Dynamics, Arnold, London
4	Schumm, S. A. (1977): Fluvial Systems, Wiley, New York
WEB SOURCE:	
1	agilemodeling.com/artifacts/physicalDataModel.htm
2	https://en.wikipedia.org/wiki/Morphometrics
3	https://www.wou.edu/las/physci/taylor/g322/drainage_anal.pdf

CO/PO /PSO	PO									
	1. Disciplinary Knowledge and Skill	2. Skilled Communicators	3. Critical Thinkers and Problem Solver	4. Sense of Inquiry	5. Team Players /Worker	6. Skilled Project Managers	7. Digitally Efficient	8. Ethical Awareness/ Reasoning	9. National and International Perspective	10. Life Long Learners
C01	3	1	1	1			1	1	1	1
C02	3	1	1	1			1	1	1	1
C03	3	1	1	2	2	1	1	1	1	1
C04	3	2	2	1	2	1	1	1	1	1
C05	3	2	2	1	2	1	1	1	1	1
Avg	3	1	2	1	2	1	1	1	1	1
Total	15	7	7	6	6	3	5	5	5	5

