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With CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR - 416 004, MAHARASHTRA
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शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४,महाराष्ट्र
दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी ०२३१—२६०९०९३/९४

SU/BOS/Science/556 **Date: 25/07/2023**

To,

The Principal, All Concerned Affiliated Colleges/Institutions Shivaji University, Kolhapur	The Head/Co-ordinator/Director All Concerned Department (Science) Shivaji University, Kolhapur.

Subject: Regarding syllabi of as per NEP-2020 under the Faculty of Science and Technology.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabi, nature of question paper and equivalence of degree programme under the Faculty of Science and Technology.

1.	M.Sc. Part I Geography	3.	Dept of Statistics Value Added Course i) Artificial Intelligence and Machine Learning -I ii) Artificial Intelligence and Machine Learning -II
2.	M.Sc. Part I Chemistry (Inorganic, Organic, Physical, Analytical, Industrial, Applied)		

This syllabus, nature of question and equivalence shall be implemented from the academic year 2023-2024 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website **www.unishivaji.ac.in** > Online Syllabus.

The question papers on the pre-revised syllabi of above-mentioned course will be set for the examinations to be held in October /November 2023 & March/April 2024. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Dy Registrar
Dr. S. M. Kubal

Copy to:

1	The Dean, Faculty of Science & Technology	5	P.G. Admission/Seminar Section
2	Director, Board of Examinations and Evaluation	6	Computer Centre/ Eligibility Section
3	The Chairman, Respective Board of Studies	7	Affiliation Section (U.G.) (P.G.)
4	B.Sc. Exam/ Appointment Section	8	Centre for Distance Education

Shivaji University, Kolhapur
Department of Geography
(Faculty of Science and Technology)

Revised Syllabus (CBCS) *(as per NEP 2020)* ***of***
M.A./M.Sc. in Geography (2 Years) (Level 8 & 9)

Implemented From…
Part I (Level 8): Academic Year 2023-24 onwards
(i.e., from June 2023)

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Choice Based Credit System with Multiple Entry and Multiple Exit Option (NEP – 2020)
M.A./M.Sc. Geography Programme Structure
M.A./M.Sc. Part – I (Level 8)

SEMESTER-I (Duration- Six Months)										
Sr. No.	Course Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
		Lectures (Per week)	Hours (Per week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours:Min	Maximum Marks	Minimum Marks	Exam. Hours
1	MT-101	4	4	4	80	32	3	20	8	1
2	MT-102	4	4	4	80	32	3	20	8	1
3	MT-103	4	4	4	80	32	3	20	8	1
4	ET-101/102/103	4	4	4	80	32	3	20	8	1
5	MP-101	4	8	4	100	40	5	--	--	--
6	MP-102	2	4	2	50	20	2:30	--	--	--
Total (A)		--	**28**	**22**	**470**	--	--	**80**	--	--
SEMESTER-II (Duration- Six Months)										
1	MT-204	4	4	4	80	32	3	20	8	1
2	MT-205	4	4	4	80	32	3	20	8	1
3	ET-204/205/206	4	4	4	80	32	3	20	8	1
4	EP-201/202/203	4	8	4	100	40	5	--	--	--
5	MP-203	2	4	2	50	20	2:30	--	--	--
6	#FP/OJT-201	4**	8**	4	60	24	3	40	16	*
Total (B)		--	**32**	**22**	**450**	--	--	**100**	--	--
Total (A+B)				**44**	**920**	--	--	**180**	--	--

Note(s):

•Student contact hours per week : **24** / **28** Hours (Min.)	•Total Marks for M.A./M.Sc.-I: **1100**
•Theory Lectures **60** Minutes Each and Practical Lectures **120** Minutes Each	• Total Credits for M.A./M.Sc.-I (Semester I & II) : **44**
•MT- Mandatory Theory Course •ET- Elective Theory Course •MP- Mandatory Practical Course •EP- Elective Practical Course •#FP/JT- Field Project / On Job Training (**during vacation) •RP- Research Project	• Theory and Practical examination will be conducted at the end of respective semester. •Practical courses may be divided into sub-sections. •*Duration of practical examination as per respective BOS guidelines. •***Separate passing is mandatory for Theory and Practical examination as well as University and Internal assessment.***
•Requirement for Entry at Level 8: Completed all requirements of the Bachelor's Degree (Level 7) with Geography as principal / major subject.	
•Exit Option at Level 8: Students can exit after Level 8 with Post Graduate Diploma in Geography if he/she completes the course equivalent to minimum of 44 credits.	

Choice Based Credit System with Multiple Entry and Multiple Exit Option (NEP – 2020)
M.A./M.Sc. Geography Programme Structure
M.A./M.Sc. Part – II (Level 9)

Sr. No.	Course Code	Teaching Scheme			Examination Scheme					
		Theory and Practical			University Assessment (UA)			Internal Assessment (IA)		
		Lectures (Per week)	Hours (Per week)	Credit	Maximum Marks	Minimum Marks	Exam. Hours	Maximum Marks	Minimum Marks	Exam. Hours
SEMESTER-III (Duration- Six Month)										
1	MT-306	4	4	4	80	32	3	20	8	1
2	MT-307	4	4	4	80	32	3	20	8	1
3	ET-307/308/309	4	4	4	80	32	3	20	8	1
4	MP-304	4	8	4	100	40	5	--	--	--
5	MP-305	2	4	2	50	20	2:30	--	--	--
6	RP-301	4	8	4	80	32	4	20	8	*
Total (C)		--	**32**	**22**	**470**	--	--	**80**	--	--
SEMESTER-IV (Duration- Six Month)										
1	MT-401	4	4	4	80	32	3	20	8	1
2	MT-402	4	4	4	80	32	3	20	8	1
3	ET-410/411/412	4	4	4	80	32	3	20	8	1
4	EP-404/405	4	8	4	100	40	5	--	--	--
5	RP-402	6	12	6	120	48	6	30	12	*
Total (D)		--	**32**	**22**	**460**	--	--	**90**	--	--
Total (C+D)				**48**	**930**	--	--	**170**	--	--

Note(s):

•Student contact hours per week : **32** Hours (Min.)	•Total Marks for M.A./M.Sc.-II: **1100**
•Theory Lectures **60** Minutes Each and Practical Lectures **120** Minutes Each	• Total Credits for M.A./M.Sc.-II (Semester III & IV): **44**
•MT- Mandatory Theory Course •ET- Elective Theory Course •MP- Mandatory Practical Course •EP- Elective Practical Course •FP/OJT- Field Project / On Job Training •RP- Research Project	• Theory and Practical examination will be conducted at the end of respective semester. •Practical courses may be divided into sub-sections. •*Duration of practical examination as per respective BOS guidelines. •***Separate passing is mandatory for Theory and Practical examination as well as University and Internal assessment.***
•Requirement for Entry at Level 9: **1) Completed all requirements of the relevant Post Graduate Diploma (Level 8) in Geography** **2) Bachelor's Degree (Honours / Research) (Level 8) in Geography**	
•Exit Option at Level 9: Students can exit after Level 9 with Master's Degree in Geography if he/she completes the course equivalent to minimum of 88 credits.	

Programme and Course Guidelines:

1. **Title of the Course:** M.A./M.Sc. in Geography (with multiple entry and exit option).
2. **Year of Implementation:** Revised syllabus will be implemented from academic year 2023-24.
3. **Programme Duration:** The M.A./M.Sc. programme duration is of two years comprising of four semesters. Each semester spanning for 6 months of minimum 120 working days (minimum 90 teaching days).
4. **Scheme of Examination for Internal Assessment** and Requirement before appearance for University Assessment:

Course Type	Total Internal Assessment Marks	Class Test	Seminar Presentation	Assignment	Project Reports	Study Tour Report	Supervisor's Report
Theory	20	10	10	Optional	--	--	--
Practical – 4 Credits	Nil	--	--	Required	--	--	--
Practical – 2 Credits	Nil	--	--	Required	--	--	--
Field Project / On Job Training – 4 Credits	40	--	Required	--	Required	--	40
Research Project – 4 Credits	20	--	Required	--	Required	Required	20
Research Project – 6 Credits	30	--	Required	--	Required	--	30

5. **Scheme of Examination and Nature of Question Paper for University Assessment:**

I. Nature of Theory Question Paper (80 Marks):

Question No.	Type of Question (Word limit)	Number of Questions to be Asked	Number of Questions to be Answered	Marks per Question	Total Marks
Q1.	Objective type (MCQ)	08	08	02	16
Q2.	Short Answer	04	04	04	16
Q3.	Short Notes	03	02	08	16
Q4.	Long Answer/ Essay type	02	01	16	16
Q5.	Long Answer/ Essay type	02	01	16	16
Total = 05	--	--	--	--	**80**

II(a). Nature of **Practical Question Paper** for Major Practical (**100 Marks**) Assessment:

Question No.	Type of Question/ Assessment	Marks
Q1	Practical/ Lab Assessment	20
Q2	Practical/ Lab Assessment	20
Q3	Practical/ Lab Assessment	20
Q4.	Practical/ Lab Assessment	15
Q5.	Practical Assignment/ Journal	15
Q6.	Viva-voce	10
Total = 06	--	**100**

II(b). Nature of **Practical Question Paper** for Minor Practical (**50 Marks**) Assessment

Question No.	Type of Question/ Assessment	Marks
Q1.	Practical/ Lab Assessment	20
Q2.	Practical/ Lab Assessment	15
Q3.	Practical Assignment/ Journal	8
Q4.	Viva-voce	7
Total = 04	--	**50**

III. Scheme of Examination for **Field Project / Job Training (60 Marks)**

Question No.	Type of Question/ Assessment	Marks
Q1.	Seminar Presentation	20
Q2.	Evaluation of Project Report/ Job Report	20
Q3.	Viva-voce	20
Total = 03	--	**60**

IV(a). Scheme of Examination for **Research Project –I (80 Marks)**

Question No.	Type of Question/ Assessment	Marks
Q1.	Seminar Presentation	20
Q2.	Evaluation of Project Report	25
Q3.	Evaluation of Study Tour Report	15
Q4.	Viva-voce	20
Total = 04	--	**80**

IV(b). Scheme of Examination for **Research Project –II / Dissertation (120 Marks)**

Question No.	Type of Question/ Assessment	Marks
Q1.	Seminar Presentation	30
Q2.	Evaluation of Project Report	60
Q3.	Viva-voce	30
Total = 03	--	**120**

*Nature of question paper may be different than specified here in case of online assessment.

6. Course Structure (CBCS): M.A./M.Sc. Geography Part –I (Level-8) and Part –II (Level-9)

Course Type	Course No.	Course Title	Teaching Hrs /week	Credits
		Semester - I		
Mandatory Theory	MT-101	Geomorphology	4	4
	MT-102	Principles of Climatology	4	4
	MT-103	Economic Geography	4	4
Elective Theory (any one)	ET-101	Population Geography and Human Resource Development	4	4
	ET-102	Settlement Geography	4	4
	ET-103	Geography of Health and Nutrition	4	4
Mandatory Practical	MP-101	Research Methodology in Geography	8	4
	MP-102	Computer Applications in Geography	4	2
		Total Credit (Cumulative)		**22 (22)**
		Semester - II		
Mandatory Theory	MT-204	Advanced Cartography and Surveying	4	4
	MT-205	Climate Change and Disaster Management	4	4
Elective Theory (any one)	ET-204	Fundamentals and Applications of GIS and GPS	4	4
	ET-205	Fundamentals of Soil Geography	4	4
	ET-206	Tourism Geography	4	4
Elective Practical (any one)	EP-201	Introduction to GIS Software and GPS	8	4
	EP-202	Soil and Water Analysis	8	4
	EP-203	Practical in Tourism Geography	8	4
Mandatory Practical	MP-203	Advanced Surveying	4	2
Field Project/On Job Training (any one)	FP-201 or OJT-201	Field Project / On Job Training (during vacation)	8	4
		Total Credit (Cumulative)		**22 (44)**
		Semester - III		
Mandatory Theory	MT-306	Geohydrology and Oceanography	4	4
	MT-307	Fundamentals of Remote Sensing and DIP	4	4
Elective Theory (any one)	ET-307	Biogeography	4	4
	ET-308	Geography of Environment	4	4
	ET-309	Political Geography	4	4
Mandatory Practical	MP-304	Photogrammetry, Remote Sensing and DIP	8	4
	MP-305	Statistical Techniques in Geography	4	2
Research Project	RP-301	Research Project – I	8	4
		Total Credit (Cumulative)		**22 (66)**
		Semester - IV		
Mandatory Theory	MT-408	Regional Planning and Development	4	4
	MT-409	Development of Geographical Thought	4	4
Elective Theory (any one)	ET-410	Agricultural Geography	4	4
	ET-411	Geography of Resources	4	4
	ET-412	Social and Cultural Geography	4	4
Elective Practical (any one)	EP-404	Geographical Data Representation Methods – Physical Geography	8	4
	EP-405	Geographical Data Representation Methods – Human Geography	8	4
Research Project	RP-402	Research Project – II (Dissertation)	12	6
		Total Credit (Cumulative)		**22 (88)**

Course Type	Course Code	Number of Courses	Credit Per Course	Total Credits
Mandatory - Theory	MT	09	04	36
Mandatory – Practical (incl. Research Methodology)	MP	05	02/04	14
Elective - Theory	ET	04	04	16
Elective - Practical	EP	02	04	08
Field Project / Job Training	FP/JT	01	04	04
Research Project	RP	02	04/06	10

8. Equivalence in Accordance with Title and Content of Courses (for revised syllabus):

Sr. No.	Title of Old Course (2022-23)	Title of New Course (2023-24)
1.	CC-101: Fundamentals of Geomorphology CC-401: Applied Geomorphology	MT-101: Geomorphology
2.	CC-102: Principles of Climatology	MT-102: Principles of Climatology
3.	CC-103: Economic Geography	MT-103: Economic Geography
4.	CC-104: Geography of Population and Human Resource Development	ET-101: Population Geography and Human Resource Development
5.	DSE-304(1): Settlement Geography	ET-102: Settlement Geography
6.	DSE-404(3): Geography of Health and Nutrition	ET-103: Geography of Health and Nutrition
7.	305.1 Research Methodology and Geographical Excursion (2 Credit)	MP-101: Research Methodology in Geography
8.	205.1 Computer Applications in Geography	MP-102: Computer Applications in Geography (2 Credit)
9.	CCS-203: Advanced Cartography and Surveying	MT-204: Advanced Cartography and Surveying
10.	CC-301: Applied Climatology and Climate Change	MT-205: Climate Change and Disaster Management
11.	DSE-403(1): Fundamentals and Applications of GIS and GPS	ET-204: Fundamentals and Applications of GIS and GPS
12.	DSE-403(2): Fundamentals of Soil Geography	ET-205: Fundamentals of Soil Geography
13.	DSE-404(2): Tourism Geography	ET-206: Tourism Geography
14.	405.2 Introduction to GIS Software and GPS	EP-201: Introduction to GIS Software and GPS
15.	405.2 Soil and Water Analysis	EP-202: Soil and Water Analysis
16.	--	EP-203: Practical in Tourism Geography
17.	105.1 Practicals in Geomorphology and Surveying (1)	MP-203: Advanced Surveying (2 Credit)
18.	--	FP-201: Field Project / JT-201: On Job Training (during vacation)
19.	CC-202: Geohydrology and Oceanography	MT-306: Geohydrology and Oceanography
20.	CCS-302: Fundamentals of Remote Sensing and DIP	MT-307: Fundamentals of Remote Sensing and DIP
21.	DSE-303(2): Biogeography	ET-307: Biogeography
22.	DSE-303(1): Geography of Environment	ET-308: Geography of Environment
23.	DSE-304(3): Political Geography	ET-309: Political Geography
24.	405.1: Photogrammetry, Remote Sensing and DIP	MP-304: Photogrammetry, Remote Sensing and DIP
25.	205.2 Statistical Techniques in Geography	MP-305: Statistical Techniques in Geography (2 Credit)
26.	--	RP-301: Research Project – I
27	CCS-402: Regional Planning and Development	MT-408: Regional Planning and Development
28	CC-201: Development of Modern Geographical Thought	MT-409: Development of Geographical Thought
29	DSE-404(1): Agricultural Geography	ET-410: Agricultural Geography
30	--	ET-411: Geography of Resources
31	CCS-204: Social and Cultural Geography	ET412: Social and Cultural Geography
32	105.1 Practicals in Geomorphology and Surveying (2) 105.2 Analysis of Climatic Data	EP-404: Geographical Data Representation Methods – Physical Geography
33	105.3 Analysis of Socio-economic Data 205.3 Quantitative Techniques in Geography	EP-405: Geographical Data Representation Methods – Human Geography
34	305.2 Dissertation/ Project – 6 Credits	RP-402: Research Project – II (Dissertation) (6 Credit)
35	DSE-304(2): Geography of India	--

- All new/ revised courses are 4 credit courses unless mentioned otherwise.

7. Program Educational Objectives (PEOs):

1. To enhance students' ability to apply their specialized knowledge in the geographical domain.
2. To develop employability skills and competencies to serve the job requirements in the society.
3. Inspire students to develop the abilities among them to offer services in the entrepreneurial environment.
4. To cultivate the interest among students to conduct research activities in the discipline of Geography.

8. Programme Outcomes (POs):

1. Students will have comprehensive knowledge in the discipline of Geography.
2. They will have ability of making comprehensive analysis, interpret spatial problems, and suggest proper solutions by using theoretical, methodological, and instrumental knowledge of Geography.
3. Good employability skills as per current need of the society to compete in the competitive world.
4. They will have good understanding about proper utilization of natural resources through geographical knowledge.
5. Aware about the regional and national environmental issues, recent trends, and technological advancements in the discipline of Geography.
6. Develop research interest to solve critical and emerging societal issues related to geography and the surrounding environment.

MT-101: Geomorphology

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Understand the nature and scope of geomorphology and establish the relationship between the tectonism and geomorphology with the knowledge of interior of the Earth.*
2. *Look into the evolution of continents and ocean basins with continental drift theory.*
3. *Know the endogenetic and exogenetic forces controlling landform development with special reference to the denudation processes.*
4. *Verify the impact of dynamic agencies on denudation and their work.*
5. *Understand the cycle of erosion with different views with special reference to hill slope development.*
6. *See the application of geomorphology in the view of anthropogenic and environmental geomorphology.*

Unit-1: Fundamentals **15 Lectures**

Meaning nature and scope of geomorphology, Interior of the Earth, Earthquakes, Volcanoes and associated features, folding and faulting.

Unit-2: Concepts in Geomorphology **15 Lectures**

Evolution of Continents and ocean basins, Continental Drift theory of Wegener, Theory of Plate Tectonics. Geosynclinals theory of Kobber, Theory of Isostasy

Unit-3: Factors controlling landform development **20 Lectures**

Weathering, Erosion and Mass wasting. Landforms of Fluvial, Glacial, Coastal, Aeolian and Karst topography, Geographical Cycle of Davis, Hill Slope development, views of W.M. Davis, Walther Penck, Allen Wood and L.C. King.

Unit-4: Applied Geomorphology **10 Lectures**

Anthropogenic Geomorphology, Environmental Geomorphology and recent trends in Geomorphology.

Reference:

1. Allaby, Michael (2008): Oxford Dictionary of Earth Science, Oxford University Press, New York.
2. Bloom, A.L. (1991): Geomorphology, 2nd Ed Englewood Cliffs, M.J. Prentice Hall.
3. Chorley, R.J. Schumm,S.A. & Sugden, D.E. (1985): Geomorphology, Methuen & Co. Ltd., London, New York.
4. Brierley, G.J. & Fryirs, K.A. (2005): Geomorphology and River Management, Blackwell Publishing, Oxford UK.
5. Briggs, K. (1985): Physical Geography Process and System, Hodder and Stoughton, London.
6. Christopherson, R.W. (1995): Elemental Geosystems: A Foundation in Physical Geography, Prentice Hall Englewood Cliffs, New Jersey.
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12. Lobeck, A.K. (1939): Geomorphology, McGraw Hill, New York. .
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16. Singh, Savindra (1998): Geomorphology, Prayag Pustak Bhavan ,Allahabad.
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18. Spark, B. W. (1986): Geomorphology, Longman, London.
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22. Wadia, D.N. (1993): Geology of India, Tata McGraw Hill Edition, New Delhi.
23. Worcester, P. G. (1948): Textbook of Geomorphology, Princeton, D.Van, Nortrand.

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5. https://www.scientificamerican.com/article/why-is-the-earths-core-so/
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14. https://www.sciencedirect.com/journal/geomorphology
15. https://www.researchgate.net/publication/314239593_Applied_Geomorphology
16. https://www.nature.com/subjects/geomorphology

MT-102: Principles of Climatology

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Distinguish the weather and climate with an understanding of structure and composition of Atmosphere;*
2. *Understand the variations of weather systems in terms of Stability and Instability of atmosphere;*
3. *Enable the students to understand the vertical and horizontal distribution of atmospheric air;*
4. *Get complete information about Atmospheric Disturbances in terms of cyclones and anti-cyclones;*
5. *Understand the regional and seasonal variations of weather systems in India;*
6. *Know the significance of synoptic Climatology in pollution studies and navigation*

Unit - 1: **15 Lectures**

Introduction to Climatology: Significance of Climatology, Modern Climatological studies, Origin and evolution of the earth's atmosphere, Structure and Composition of Atmosphere, Insolation, Heat transfer-Radiation, Convection and conduction, Terrestrial heat balance.

Unit - 2: **15 Lectures**

Moisture in the Atmosphere: Changes of state, Processes that cause changes of state, Humidity, Humidity measurements, Adiabatic temperature change in atmosphere, Stability and Instability of atmosphere, Condensation- Clouds and fogs, Precipitation - precipitation processes, types and forms.

Unit - 3: **15 Lectures**

Motion in the Atmosphere: Air Pressure, Pressure measurement and distribution, Factors affecting wind, Pressure belts, Classification of Wind, Planetary winds, Monsoon and Local winds, Air Masses, Classification and modifications of Air Masses.

Unit - 4: **15 Lectures**

Atmospheric Disturbances: Fronts: Characteristics and types, Tropical Cyclones, Anticyclones, Thunderstorms, Tornadoes, Hurricanes, Water spouts; Weather forecasting and application of meteorological satellites with special reference to India. Application of Synoptic Climatology in pollution studies and navigation.

References:

Books & Reports:

1. **Aguado, E.,** and Burt, J.E. **(2013)**: *Understanding Weather and Climate*, Pearson, New York, 552pp.
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Journals:

Bulletin of the American Meteorological Society (https://journals.ametsoc.org/toc/bams/current)

Climate Dynamics (https://link.springer.com/journal/volumesAndIssues/382)

International journal of Climatology (https://rmets.onlinelibrary.wiley.com/journal/10970088)

Journal of Climate (https://journals.ametsoc.org/toc/clim/current)

Nature Climate Change (https://www.nature.com/nclimate/)

Weather and Climate Extremes (https://www.sciencedirect.com/journal/weather-and-climate-extremes)

Mausam (http://metnet.imd.gov.in/imdmausam/)

MT-103: Economic Geography

Course Outcomes (COs): *After completing the course, students will be able to*

- *Understand the concepts and basis of economic processes*
- *Get acquainted with theories and models in economic geography*
- *Get comprehensive knowledge of World energy resources, situation and distribution*
- *Know about the Nature, scope and Principles of Industrial Geography*
- *Understand transport and Trade policies of country*
- *Get detail knowledge of economic power determinants of country and able to analyze the economic development of country.*

Unit-1: Basics of Economic Geography **15 Lectures**

Nature and scope; Approaches to the study of economic geography; Basis of economic processes: Production, exchange & consumption, Classification and characteristics of economic activities. Demand, supply, elasticity, Determinants of national income, investment, inflation, unemployment, risk and uncertainty, long-term investment planning, Special Economic Zones.

Unit-2: Energy Resources **10 Lectures**

Concept of resources, Classification of resources, Renewable & Non-renewable energy resources, World energy situation and distribution; Sources of Energy: Coal, Oil, Natural gas and Nuclear energy, OPEC-energy crisis.

Unit- 3: Industrial Geography **15 Lectures**

Nature and scope of Industrial Geography, Factors of Industrial Location, Principles of Industrial Location: – Profit maximization, Least cost location- A. Weber & A. Losch- industrial location theories, Rostow's model, Industrial regionalization; World industries: locational patterns and problems; New industrial policies of India.

Unit-4: Transportation & Trade **20 Lectures**

Modes of transportation, Road Network analysis, Accessibility, connectivity and Modern geospatial applications in road network, Interregional and Intraregional: Ullman's tried- Complementarily- Intervening Opportunity- Transferability, Trade Policy; Export processing zones, International Trade Characteristics, patterns of world trade, Regional Trade blocks EEC, EFTA, & WTO.

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ET-101: Population Geography and Human Resource Development

Course Outcomes (COs): *After completing the course, the students will develop an aptitude to:*

1. *Infer factors influencing population distribution and growth;*
2. *Compute and explore fertility, mortality and migration.*
3. *Analyse the population-resource regions and discover problems arising due to over and under population.*
4. *Understand and create awareness about provincial aspects of gender equity, status of women, social well-being and quality of life.*
5. *Acquire skill to describe regional patterns of population composition.*
6. *Obtain expertise to compute Human Development Index for micro, meso and macro regions.*

Unit-1: Introduction **20 Lectures**

Meaning, nature and scope of Population Geography; Population Geography and Demography; Sources of population data – Census, Sample surveys and vital statistics; Population dynamics: Population distribution and growth - measures, patterns and determinants with reference to World, India and States; Fertility, Mortality - Concepts; Indices, Trends and Determinants -India; Migration- Types, Determinants and consequences; Measures and methods of estimations.

Unit-2: Population Theories **10 Lectures**

Theories of population: Malthus, Marx, Sadler, Demographic Transition Model; Migration theories: Ravenstein and Everette Lee; Epidemiological Transition.

Unit-3: Characteristics of population resource **10 Lectures**

Characteristics of population composition and change: India and States – age, sex, rural-urban, occupational structure, and educational levels; Over, under & optimum population; Population resource regions of the world.

Unit-4: Human Development and Population Policies **20 Lectures**

Human development Index: Concepts, Pillars, Approaches; Human development Patterns World & India, Gender Equity, Social well-being and quality of life; Status of women – social, economic and health; Population Policies in developed and developing nations, National Population Policy of India.

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Journals:

Demography: https://link.springer.com/journal/13524

International Migration Review: https://journals.sagepub.com/home/mrx

Journal of Population Research: https://link.springer.com/journal/12546

Population and Environment: https://link.springer.com/journal/11111

Population Bulletin: https://www.prb.org/population-bulletins/

Population Development Review: https://onlinelibrary.wiley.com/loi/17284457

Population, Space, and Place: https://onlinelibrary.wiley.com/journal/15448452

Population Studies: https://www.tandfonline.com/loi/rpst20

Studies in Family Planning: https://onlinelibrary.wiley.com/journal/17284465

The Professional Geographer: https://www.tandfonline.com/loi/rtpg20

Useful Websites:

Census of India: http://censusindia.gov.in/

National Commission for Women: http://ncwapps.nic.in/default.aspx

Population Council: https://www.popcouncil.org/

Population Division of United Nations: https://www.un.org/en/development/desa/population/index.asp

Population Reference Bureau: www.prb.org

The World Bank: www.worldbank.org

United Nations Development Program: http://hdr.undp.org/en/

ET-102: Settlement Geography

Course Outcomes (Cos): *After completing the course, students will be able to*

1. *Know the fundamentals of settlement geography*
2. *Understand the approaches to rural settlement geography; rural services; hierarchy; morphology etc.*
3. *Know the concept and processes of urban settlement studies; urban problem & their planning; concept smart cities, urban agriculture, etc.*
4. *Understand the theories and models of settlement geography to understand the structure of settlements.*

Unit-1: Fundamentals of Settlement Geography **10 Lectures**

Settlement Geography – The nature, scope and significance; origin and growth of rural and urban settlements; Definition and types of settlements; Site, situation and locational factors of settlements. Spacing, dispersion and localization. Characteristics of rural settlements.

Unit-2: Geography of Rural Settlements **15 Lectures**

Introduction to rural settlement geography, Approaches to rural settlement geography; socio-economic structure of rural settlements; Rural-service centers-nature, hierarchy, service area and interaction; Indian villages-evolution and multiplicity, regional characteristics, Rural planning and integrated development in India.

Unit-3: Geography of Urban Settlements **20 Lectures**

Introduction to urban settlement geography, Concept and processes of urbanization, suburbanization, Rural-urban fringe, urban sprawl, Functional classification of urban settlements; Conurbation, Size and spacing of cities- rank-size rule, law of primate city, urban hierarchies; Urban problems, Urban planning and challenges, Concept of smart city, Garden city movement, Urban agriculture.

Unit-4: Theories and Models in Settlement Geography **15 Lectures**

Multiple nuclei model by Harris and Ullman; Central place theory by W. Christaller; Concentric zone model by E. W. Burgees; Sector model by Homer and Hoyt. Urban poverty, Slums: Characteristics, Planning. Master plans of towns.

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ET-103: Geography of Health and Nutrition

Course outcome (COs): *After completing the course, the students will develop an aptitude to:*

1. *Acquaint the students with the role of geographical factors, viz., physical, demographic, social and economic factors, influencing the spatial distribution of diseases;*
2. *Decipher the causes of the changing disease pattern;*
3. *Understand the WHO classification of diseases;*
4. *Get to know the food groups and food pyramid.*
5. *Highlight the relation of health with nutrition, environmental degradation and urbanization;*
6. *Be introduced with the classification and types of nutrients and their role in human body; and*
7. *Make the students abreast of existing health-care facilities, so as to train them with better health care planning for the country.*

Unit-1: Geography of Health Introduction **10 Lectures**

Nature, scope and significance; Geographical factors affecting human health with special reference to physical, social, economic, environmental and diseases arising from them.

Unit-2: Classification of Diseases **15 Lectures**

Classification of diseases: genetic, communicable and non-communicable; occupational and nutritional deficiency diseases; WHO classification of diseases, Pattern of World distribution of major diseases; Epidemiological transition theory.

Unit-3: Human Ecology of Diseases and Human Nutrition **15 Lectures**

Ecology, etiology and transmission of major diseases: cholera, malaria, tuberculosis, hepatitis, leprosy, cardiovascular, cancer, COVID-19, AIDS and STDS; Diffusion of diseases and its causes; Food groups: balanced diet, food pyramid; Classification and types of nutrients; macro and micro nutrients; Nutrients: role of nutrients in human body; nutrient deficiencies and requirements for Indians, Deficiency disorders and problems of micro and meso nutrients, mal-nutrition in India.

Unit-4: Health Care **20 Lectures**

Health Care - International level, with special reference to WHO, UNICEF and National level, with special reference to Government and NGOs; Availability, accessibility and utilization of health care services; Primary health care; Inequalities in health care services in India; family welfare, immunization, national disease eradication, and Health for All programmes, Health care response to COVID-19.

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Websites:

Global Nutritional Report: https://globalnutritionreport.org/reports/global-nutrition-report-2018/

National Digital Library of India: https://ndl.iitkgp.ac.in/

National Health Programs, India: https://nhm.gov.in/

WHO International Classification of Diseases: https://www.who.int/classifications/icd/en/

MP-101: Research Methodology in Geography

(Practical)

Course Outcomes (COs): *After completing this course, the students will develop skill to:*

1. *Identify the objectives and significance of research in geography;*
2. *Prepare schedule and questionnaire in geography;*
3. *Collect data of physical and human elements;*
4. *Tabulate data, formulate research design and represent data by using most appropriate methods;*
5. *Effective writing, maintaining research ethics and academic integrity;*
6. *Write abstracts, thesis, project report and research papers*

Unit-I: Research Methodology: An Introduction **30 Hrs.**

Exercise(s):

1-3: Definition, meaning, objectives and significance of research, approaches in research.
4: Defining research problem
5: Meaning and Need of research design
6-7: Sampling methods and sampling size
8: Concept of hypothesis

Unit-2: Data collection and Preparation **30 Hrs.**

Exercise(s):

9-11: Data types, Data sources and data collection methods
12-13: Preparation of schedule & questionnaire
14-15: Concept of qualitative and quantitative analysis of data
16-17: Presentation and interpretation of data

Unit-3: Effective Research Writing **30 Hrs.**

Exercise(s):

18-19: Literature review; writing styles and manuals
20-22: Writing of abstracts, project report and research papers
23-24: Referencing system, references, webliography, bibliography
25-26: Footnotes, glossary, appendices

Unit-4: Recent Trends in Geographical Research and Publication **30 Hrs.**

Exercise(s):

27-28: Recent trends in Physical and Human Geographical research
29-30: Applications of Computer, Remote Sensing and GIS in Geographical research
31-32: Publication metrics: h-index, g-index, i10index, altimetric, citation and measuring impact of research
33-34: Research publishers and Open access publishing: Journal finders Elsevier, Springer
35-36: Research ethics in publication, Predatory publishers & journals

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Useful Web Resources:

Elsevier Journals: https://www.elsevier.com
Google Scholar: https://scholar.google.co.in/
Web of Science: https://clarivate.com/products/web-of-science/
Scopus: https://www.scopus.com/home.uri
JSTOR: https://www.jstor.org/
Directory of Open Access Journals (DOAJ): https://doaj.org/
Science Open: https://www.scienceopen.com/
Microsoft Academic: https://academic.microsoft.com/home

MP-102: Computer Applications in Geography

(Practical)

Course *Outcomes (COs):* *After completing the course, students will be able to*

1. *Learn the representation of geographic data using various computational methods;*
2. *Develop writing, editing, and presentation skill for representation of geographical information;*
3. *Compute statistical parameters with the help of computer;*
4. *Prepare and design maps and graphs with the help of computer software;*
5. *Apply computational techniques relevant in the discipline of Geography;*
6. *Know about sources and uses of online educational resources and e-learning methods;*

Unit-1: Computer hardware and software; Writing / formatting of texts, graphs, tables, and references using MS word; Preparation of power point presentation using MS power point; Use of MS excel; Presentation and analysis of geographic data using graphs, charts, maps with the help of computer.

35 Hrs.

Practical Exercise(s):

1: Demonstration of computer hardware, useful software and their uses.

2: Writing / formatting of text paragraphs.

3: Inserting, creating, and editing of text box, smart art, pictures and graphs.

4: Construction and editing of tables.

5: Reference writing styles using MS word with examples.

6: Preparation of MS power point presentation.

7: Data management using MS Excel.

8-12: Presentation and analysis of geographic data using MS Excel – preparation of graphs/charts (bar graph, line graph, pie diagram, scatter diagram and trend line).

13: Map editing and labeling.

Unit-2: Computer, email and password security; Online data storage and management using online storage facilities; Preparation and editing of google forms; Browsing of online educational resources; E-learning.

25 Hrs.

Practical Exercise(s):

14: Computer, email and password security.

15: Storing and retrieving of data/ documents using online data storage facilities (Google Drive, OneDrive etc.).

16: Preparation of online questionnaire / online survey through google forms.

17: Identification, browsing, and storing of online educational resources.

18: Comprehensive browsing and listing of useful geographical websites.

19: E-learning objectives, methods, and listing of open online e-learning websites.

20-21: E-learning through e-content and open online courses: e-PG Pathshala, digital library, MOOCS – SWAYAM.

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National Digital Library of India: https://ndl.iitkgp.ac.in/

Shivaji University Library (E-Resources): http://www.unishivaji.ac.in/library/E-Resources

MT-201: Advanced Cartography and Surveying

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Understand basic principles of cartography and surveying*
2. *Gain understandings of various cartographic methods and techniques*
3. *Acquaint with the skills of digital cartography*
4. *Identify sources and types of errors occurs during surveying*
5. *Get familiar with the basic aspects of linear, vertical and angular measurements of surveying.*

Unit - 1: Fundamentals of Cartography **15 Lectures**

Definition, nature and scope of cartography, Basics of geodesy, Scale- definition, types & importance, Concept of datum- vertical and horizontal, Co-ordinate systems- geographical and projected, Map- definition, types and significance, Cartographic methods and techniques for representation of data.

Unit - 2: Digital Cartography **20 Lectures**

Introduction to digital cartography, Manual cartography vs. Digital cartography, Cartographic data and its sources, Cartographic database, Design principles of cartography, Map design, Symbolization, Visualization and generalization, Digital cartography- hardware and software, Advantages and disadvantages, Applications of digital cartography.

Unit - 3: Fundamentals of Surveying **10 Lectures**

Definition, classification and principles of surveying, Nature of surveying work- field work and office work, Sources and types of errors, Precision and accuracy, Units of measurements.

Unit - 4: Surveying Measurements **15 Lectures**

Linear measurement-types of ranging, Methods-approximate, direct, optical and electronic, Errors and applications, Angular measurement-types of measured angles, Compass, Meridian, Bearings and azimuths, Errors, Corrections and precautions, Vertical measurement-types and methods of leveling, Contouring- definition, characteristics, methods and interpolation.

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Indian Institute of Surveying & Mapping: http://www.iism.nic.in/
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Indian National Cartographic Association: https://incaindia.org/
Bhuvan Indian Geo Platform of ISRO: https://bhuvan.nrsc.gov.in/

MT-202: Climate Change and Disaster Management

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Recognize the importance of climate on human life;*
2. *Identify and categorize climate types and climatic regions of the world;*
3. *Get comprehensive knowledge about causes and impacts of atmospheric pollution, GHGs emission, ozone layer depletion, acid rain and el-nino;*
4. *Know about the history, recent trends, impacts and dynamics of climate change on earth;*
5. *Assess future risks of climate change and the adaptation and mitigation options;*
6. *Understand causes, consequences and vulnerabilities of various natural and man-made disasters;*
7. *Plan for prevention, preparation and mitigation of disasters;*

Unit - 1: Global Climate Change Issues and Impacts 24 Lectures

History and relevance of climate change studies; Role and impact of climate on human being and environment; Global climatic regions; Climatic classification of Koppen and Thornthwaite; World pattern of temperature and precipitation; Causes, impacts and society's response to change in air quality and atmospheric pollution; Causes and impacts of greenhouse gas (GHGs) emission, ozone layer depletion, acid rain; El-nino and southern oscillation (ENSO).

Unit - 2: Paleoclimatology and Climate Change Observations 14 Lectures

Paleoclimatology - climate dynamics and water balance with reference to evolution of the earth systems; General overview of the climate change – observed changes and its impacts; Recent trends of climate change and its impact on natural and human subsystems; Significant climate anomalies and extreme weather events; Future climate changes – risks and impacts; Adaptation and mitigation options of climate change.

Unit - 3: Natural Hazards and Disasters 12 Lectures

Meaning and types of hazards and disasters; Causes and impacts of natural and man-made disasters (earthquake, volcanic eruption, landslides, avalanches, cyclones, floods, droughts, tsunamis, forest fire, nuclear, biological and chemical disasters); Disaster exposure and vulnerabilities in Maharashtra, India and the world.

Unit - 4: Disaster Management 10 Lectures

Prevention and mitigation of disasters; Disaster preparedness and response plan; Disaster management cycle; Administration and multiple stakeholders' response to disaster management; Disaster management acts and regulations; Use of modern technologies for disaster management.

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Books & Reports:

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27. ***World Development Report 2010: Development and Climate Change***, World Bank, Washington D.C., 417pp.

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Atmospheric Environment (https://www.sciencedirect.com/journal/atmospheric-environment)
Bulletin of the American Meteorological Society (https://journals.ametsoc.org/toc/bams/current)
Climatic Change (https://link.springer.com/journal/volumesAndIssues/10584)
Climate Dynamics (https://link.springer.com/journal/volumesAndIssues/382)
Global Environmental Change (https://www.sciencedirect.com/journal/global-environmental-change)
International journal of Climatology (https://rmets.onlinelibrary.wiley.com/journal/10970088)
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Mausam (http://metnet.imd.gov.in/imdmausam/)
Nature Climate Change (https://www.nature.com/nclimate/)
Nature Geoscience (https://www.nature.com/ngeo/)
Weather and Climate Extremes (https://www.sciencedirect.com/journal/weather-and-climate-extremes)
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Intergovernmental Panel on Climate Change: https://www.ipcc.ch/
NASA-Climate Change and Global Warming: https://climate.nasa.gov/
NCDC-NOAA: https://www.ncdc.noaa.gov/sotc/
World Meteorological Organization: https://public.wmo.int/en

ET-201: Fundamentals and Applications of GIS and GPS

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Understand the basic concepts of Geographical Information System and GPS.*
2. *Know various applications of GIS and GPS in various fields.*
3. *Familiar with modern techniques of geography.*
4. *Apply these skills in professional careers.*

Unit 1: Introduction to GIS **20 Lectures**

Definition of GIS, History and development of GIS, Components and Future of GIS, Types of Geographic data; Raster and Vector data model; Spatial data input: Digitization and Conversion; Point, line and polygon; Concept of Arc, node and vertices; Digitization errors; Topology and topological relationship.

Unit 2: GIS Analysis **12 Lectures**

Spatial analysis: Overlay and Buffer Analysis, Interpolation techniques in GIS; Network analysis; Terrain analysis: DEM, DTM and TIN; Data quality issues; Database Management system (DBMS); Types of attribute data, Relational Model, Normalization and SQL.

Unit 3: Introduction to GPS **12 Lectures**

Introduction to GPS; types of GPS System; Space, Control and User Segment; GPS satellite; Working principle of GPS; Source of GPS errors; Differential GPS; GNSS & GIS Integration, Applications of GPS.

Unit 4: Applications of Geospatial Technology **16 Lectures**

Geospatial Technology in Urban and Regional planning, Water resource management, Soil resource Management, Agricultural Management, Forestry and Environment, Land use/ and Land cover mapping, Natural hazards assessment.

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Books and Reports:

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Research Journals:

GeoInformatica
Journal of Geographic Information System
Journal of Geographical Sciences.
Geo-environmental Disasters
Geo- spatial Information Science
Agricultural Water Management
Land Use Policy

Websites:

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https://gisgeography.com/what-gis-geographic-information-systems/
http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?TopicName=Topology%20basics
https://www.esri.com/news/arcuser/0401/topo.html
https://gisgeography.com/100-earth-remote-sensing-applications-uses/
https://www.gps.gov/systems/gps/

ET-202: Fundamentals of Soil Geography

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Understand the concepts and principles of soil formation.*
2. *Study the role of essential nutrient for plant growth and development.*
3. *Determine the physical and chemical properties of soils.*
4. *Enable the students to realize the Soil and environmental problems;*
5. *Know the significance of soil conservation and methods of Soil reclamation.*

Unit-1: **15 Lectures**

Introduction to soil geography: Concepts and definitions, Process of origin of soil, pedogenesis, soil profile and categories of soil taxonomy-major groups. Soil forming processes and factors, Weathering and soils, Soil as a medium for plant growth, Managing Soil Health: Concepts and Practices, Essential nutrient elements, Plant roots and soil relations. Soil fertility and soil productivity.

Unit-2: **15 Lectures**

Physical properties of soil: Soil morphology, Soil texture, Soil Structure; Genesis and Types of structure, Soil consistence, Soil:- moisture, colour, porosity and permeability; Regulation of Air and Water in Soil; Management Practices to Improve Soil Health, Effects of tillage on structure and porosity.

Unit-3: **15 Lectures**

Chemical properties of soil: Organic soils and Mineral soils, Chemical composition of soils, Ion exchange, Cation exchange, Determination of soil pH, Management of soil pH, Soil clays, humus, Soil organic matter, and NPK.

Unit-4: **15 Lectures**

Soil and environmental problems: Classification of tropical soils, Soil erosion, Universal soil loss equation (USLE), Nature and management of saline and sodic soils. Trace metals, Soil Contamination, Micronutrients and Toxic Elements in soils: Iron, manganese, Copper and zinc. Conservation of soil, Methods of Soil reclamation.

References:

1. **Miller, R. W.** and Donahue, R. L**. (1992):** Soils: An Introduction to Soils and Plant Growth, Prentice-Hall of India, New Delhi
2. **Brady, N. C.,** and Weil, R. R**. (2008):** The Nature and Properties of Soils, Prentice Hall, New Jersey
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Research Journals:

Journal of Soils and Sediments (JSS) (https://www.springer.com/journal/11368)

Soil and Sediment Contamination: An International Journal (https://www.tandfonline.com/toc/bssc20/current)

International Journal of Sediment Research (https://www.journals.elsevier.com/international-journal-of-sediment-research)

ET-203: Tourism Geography

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Understand the concepts and components in tourism geography*
2. *Know about importance of geography in tourism.*
3. *Know about pattern & tourism in the world and impact of globalization*
4. *Understand different elements of marketing in tourism*
5. *Understand tour and travel agency*
6. *Get detail knowledge about planning process in tourism*
7. *Analyse the growth and development of tourism in India.*

Unit-1: **15 lectures**

Concept of Tourism, nature, scope and importance of tourism. Definition of Traveller – Tourist - Excursionist –Tourism - Basic Components of Tourism - Attraction, Geographical approach in tourism. Multidisciplinary approach. Accommodation, Amenities, Accessibility and Awareness. Types and forms of tourism, Types of accommodation and transportation. Physical, socio cultural and economical impact of tourism.

Unit-2: **15 lectures**

Geography: Meaning, features, branches, and relationship with tourism. Climatic regions of the world, latitude & longitude lines, time zones, international date line, Indian standard time. Importance of Geography in Tourism, Impacts of physiography, Climate and Weather on tourist destination. Geographical patterns of tourism and the tourism characteristics of selected world regions.

Unit-3: **15 lectures**

Marketing of tourism, STP, Marketing Mix, Tourism Product. Meaning of tour and travel agency. Types of travel agency. Types of tour operator. Characteristics of tour and travel agency. History and development of tourism in world. Different Tourism Systems- Leiper's Geospatial Model, Mill-Morrison, Mathieson & Wall, Butler's Tourism Area Life Cycle (TALC) - Doxey's Index – Demonstration Effect – Crompton's Push and Pull Theory, Stanley Plog's Allo-centric and Psycho-centric Model of Destination Preferences, Tourism Area life cycle(TALC)

Unit-4: **15 lectures**

Planning for tourism development. Tourism in India – resources for tourism in India. Growth and development of tourism in India. Problems of tourism in India. Tourism planning in India. Tourism development in Maharashtra.

References:

1. Robinson H. (1976): A Geography of Tourism. Mac Donald and Evans Ltd; London
2. Manoj Dixit & Charu Sheela, (2007)Tourism Products, 2nd Edition, New Royal Books, Lucknow.
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(Practical)

EP-201: Introduction to GIS Software and GPS

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Familiarize with QGIS software and tools.*
2. *Apply Comprehensive knowledge of GIS software and GPS for analysis of geographical data and to solve real world problems*
3. *Understand the role of GIS as decision support system and to develop various model for GIS spatial analysis.*
4. *Examine the various functions of GPS for surveying and mapping.*
5. *Develop practical skills in spatial data acquisition, management, and analysis.*
6. *Learn to create and visualize maps using GIS techniques.*

Unit-1: Introduction to QGIS **30 Hrs.**

Exercise 1: Interface of QGIS
Exercise 2: Working with Projections
Exercise 3: Online GIS Data Sources

Unit-2: Basics of QGIS **30 Hrs.**

Exercise 4: Georeferencing: Toposheet & Image Registration
Exercise 5: Digitization of Map Data
Exercise 6: Working with WMS Data
Exercise 7: Working with Google Earth
Exercise 8: Making a Map Layout

Unit-3: Data Exploration **30 Hrs.**

Exercise 9: Data query: Spatial and Attribute
Exercise 10: Animating Time Series Data
Exercise 11: Interpolating Point Data
Exercise 12: Travel Time Analysis with Traffic Movement
Exercise 13: Service Area Analysis using Open Route Service

Unit-4: Introduction to GPS instrument **30 Hrs.**

Exercise 14: GPS instrument
Exercise 15: Basic functions
Exercise 16: GPS surveying: Setting of GPS coordinates, Waypoints demarcation, Area Calculation through GPS, Navigation by Mobile GPS application.
Exercise 17: Transfer of data in GIS software

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(Practical)

EP-202: Soil and Water Analysis

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Know about the soil sample collection during the soil survey/ field work.*
2. *Analyse the physical properties of soils.*
3. *Analyse the chemical properties of soils*
4. *Determine the physical and chemical properties of water samples.*

Unit-1: Soil Survey **20 Hrs.**

Exercise 1: Field sample collection and preparation.
Exercise 2: Site selection and geomorphic considerations.
Exercise 3: Equipment/tools and reagents.
Exercise 4: Field assessment: saline soils with soluble salts and high pH soils.
Exercise 5: Laboratory sample collection and preparation.
Exercise 6: Field-Moist preparation and Air-Dry preparation.

Unit-2: Physical Analyses of Soil **30 Hrs.**

Exercise 7: Soil Profile, and Analysis of Soil morphology.
Exercise 8: Analysis of Soil colour.
Exercise 9-10: Analysis of soil Structure and Consistence.
Exercise 11-12: Particle-size distribution analysis.
Exercise 13: Determine soil textural classes using Hydrometer.
Exercise 14: Determine soil textural classes using Sieves and shakers.

. **Unit-3: Chemical Extractions and Analysis of Soil** **40 Hrs.**

Exercise 15: Digestion Methods For Elemental Analysis.
Exercise 16: Digestion Method : Nitric-Perchloric acids.
Exercise 17: Digestion Method : Nitric- acid.
Exercise 18: Digestion Method : A mixture of Nitric-hydrochloric acids HNO3–HCl in a ratio 1:3.
Exercise 19: Determination of soil pH.
Exercise 20: Determination of soil Salinity.
Exercise 21: Soil Salinity analysis using Chlorinity Titration.
Exercise 22: Measurement of electrical conductivity (EC).
Exercise 23-24: Determination of Organic matter and Calcium carbonate.
Exercise 25-26: Determination of sodium, calcium and magnesium.

Unit-4: Analysis of Water Samples **30 Hrs.**

Exercise 27: Determination of pH.
Exercise 28: Determination of electrical conductivity.
Exercise 29-30: Determination of turbidity.
Exercise 31-32: Determination of salinity.
Exercise 33: Determination of Carbonates
Exercise 34: Determination of Bicarbonates.

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EP-203: Practical in Tourism Geography

Course Outcomes (COs): *After completing the course, students will be able to*

1. *To educated students in map reading for tourism activities.*
2. *To Make them expertise in tour management*
3. *To make them expertise in travel management*
4. *To create awareness about use of computer and internet for tourism and travel business.*

Exercise(s):

Unit-1: Map Reading **25 Hrs.**

1. Scale of the Map and Measurement of the Distance on Map; Understanding Contour Maps;
2. Map Reading with respect to Transport connectivity (road, rail, air and water) in International Context.
3. Location of Greenwich Mean Time and International Date Line on World Map; Calculation of Time Difference.

Unit-2: Function of Travel and Tour Agencies Collection **35 Hrs.**

1. Dissemination of Travel Information,
2. Travel Documentation, Passport, Visa, Ticketing.
3. Preparation of Itineraries, Planning and
4. Costing of Tours,
5. Ticketing,
6. Product Promotion and other Miscellaneous work
7. Types of Tour Itineraries
8. Organizational Structure of a Standard Travel Agency

Unit-3: Functions of Tour Operators ` ** **30 Hrs.

9. Assembling, Processing and dissemination of information;
10. Liaisoning with Principals;
11. Preparation of Tour Itineraries and Pricing of Tour Package;
12. Pre-tour-arrangements;
13. Tour Operation and Post-tour Management.
14. Components of Standard Tour Packages.

Unit-4: Computer Application in Tourism **30 Hrs.**

15. Ticketing,
16. Hotel booking and other services,
17. Promotion,
18. Websites, and apps.
19. Car hiring.
20. Search of services.
21. Sales promotion.
22. SWOT analysis.

References:

1. Boniface and Coopers, (2016) Worldwide destinations: The Geography of Travel and Tourism, 7th Edition, Rutledge, New Delhi.
2. D.R Khullar, (2018) India - A comprehensive Geography, 1 st Edition, Kalyani Publications, Chennai.
3. Jane Archer, Gwenda Syratt (2021): Manual of Travel Agency Practice (3rd ed.)

MP-203: Advanced Surveying

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Familiar with various advance surveying methodologies*
2. *Develop practical skills as well as organisational and interpersonal abilities*
3. *Perform survey using advanced surveying instruments like theodolite, total station, DGPS and drone*
4. *Create a map based on a survey*

Practical Exercise(s):

Unit-I: **30 Hrs.**

Introduction to Levelling,

1. Concept and Mechanism.
2. Types of levelling instrument.
3. Dumpy level- parts of instrument- temporary and permanent adjustment.
4. Measurement, survey data collection and processing.
5. Preparation of contour map.

Introduction to Theodolite

6. Concept and mechanism.
7. Types of theodolite.
8. Components of theodolite, temporary and permanent adjustment.
9. Survey data collection, processing and mapping.

Unit-II: **30 Hrs.**

Introduction to Total station

10. Concept and mechanism.
11. Components of total station, adjustment and setting of instrument.
12. Survey data collection, processing and mapping.

Introduction to Differential GPS (DGPS)

13. Concept and mechanism.
14. Components of DGPS, adjustment and setting of instrument.
15. Survey data collection, processing and mapping.

Introduction to Drone surveying

16. Concept and mechanism.
17. Field planning, data collection, processing and mapping.

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2. Basak, N.N.(2017) Surveying and Levelling, Tata Mcgraw Hill, New Delhi
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4. Clancy, J. (2013). Site surveying and levelling. Routledge.
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8. Ghosh, J.K.(2010) Elementary Engineering Surveying, Studium Press, New Delhi.
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11. Mikhail E.M., and Anderson J.M. (2013) Surveying: Theory and Practice, McGraw Hill

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13. Roy, S. K. (2010). Fundamentals of surveying. PHI Learning Pvt. Ltd.
14. Subramanian, R.(2012) Surveying & Levelling, Oxford University Press, New Delhi
15. W. Schofield and M. Breach(2007) Engineering Surveying, 6th Edn., CRC Press

FP-201: Field Project

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Carry out field project on their own;*
2. *Formulate project design and methodologies;*
3. *Organize and carry out field visits, collect field data and/or conduct review of literature;*
4. *Effective writing and dissemination of project output having scientific and/or social relevance.*

Duration: One month during vacation

Topic: Project topic should be related to finding, reporting and/or disseminating geographical knowledge having scientific and/or social relevance.

Total Contact Hours: 120 Hrs.

Note (s):

1. *Field project is applicable only to those students who are unable to find placement for on job training.*

2. *They have to work under the guidance of a supervisor to carry out the field project.*

3. *Students are expected to carry out field work and use primary data, analyse it and prepare / submit the project report for evaluation.*

4. *They are also expected to make a presentation on the project work details.*

OJT-201: On Job Training

Course Outcomes (COs): *After completing the course, students will be able to*

1. *Improve their professional skills related to their employability;*
2. *Effectively manage the assigned workload and complete given tusk;*
3. *Learn new concept and improve their knowledgebase;*
4. *Do team work and manage on job practical difficulties.*

Duration: One month during vacation

Joining Report of On Job Training: Students are expected to join for their on job training with prior intimation to the department. They are expected to carry out work under the guidance of job supervisor.

On Job Training Placement: Students can join any institution/ corporation/ industry as per their choice but within the scope of the subject area.

Total Contact Hours: 120 Hrs.

Note (s):

1. *Students need to submit report of their work in prescribed format.*
2. *Internal assessment while on job training will be done by the job supervisor and need to be forwarded to the Department/ University.*