

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
Credit Framework for Under Graduate (UG) B.A. Geography (2024-2025)

Level/ Diffic- ulty	Sem	Subject-1	Subject-2	Subject-3	GE/OE	SEC	IKS	AEC	VEC	CC	Total		
4.5/ 100	I	2(T) + 2(P)	2(T) + 2(P)	GEO-101-T Introduction to Physical Geography [2 T] GEO-102-P Practicals in Physical Geography [2 P]	(Select any one of the following) OE-101-GEO Geography of Tourism [2 T]	(Select any one of the following) SEC-101-GEO Introduction to Water analysis [2 T]	2 (T) Generic	2 (T)	2	-	22		
	II	2(T) + 2(P)	2(T) + 2(P)	GEO-151-T Introduction to Human Geography [2 T] GEO-152-P Practicals in Human Geography [2 P]	(Select any one of the following) OE-151-GEO Practicals in Tourism Geography [2 P]	(Select any one of the following) SEC-151-GEO Practicals in Water Analysis [2 P]	-	2 (T)	2	2	22		
	Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits Course NSQF courses/Internship OR Continue with Major and Minor Continue Option: Students will select one subject among the (subject-1, subject-2 and subject-3) as a major and another as minor and third subject will be dropped.												
Level/ Diffic- ulty	Sem.	Major Core	Major Elective	VSC	FP/OJT/CEP	Minor	GE/OE	SEC	IKS	AEC	VEC	CC	Total
5.0/ 200	III	GEO-201-MJ Introduction to Population and Settlement Geography [4T] GEO-202-MJP Practicals in Population and Settlement Geography [2P]		(Select any one of the following) GEO-221-VSC Introduction to Cartography [2T] OR GEO-222-VSC Land Measurement and Surveying [2T]	GEO-231-FP Field Visit and Report Writing [2FP]	GEO 241 MN Geography of India [2T] GEO 242 MNP Practicals in Map Reading [2P]	(Select any one of the following) GEO-201-OE Political Geography [2T]		GEO-201- IKS Development of Indian Geographical Knowledge [2T]	2 (T)	-	2	22
	IV	GEO-251-MJ Introduction to Geomorphology [4 T] GEO-252-MJP Practicals in Geomorphology [2 P]		(Select any one of the following) GEO 271 VSC Practicals in Cartography [2 P] OR GEO 272 VSC Practicals in Land Measurement and Surveying [2P]	GEO-281-CEP Community Engagement Programme [2 CEP]	GEO-291-MN Geography of Maharashtra [2 T] GEO-292-MNP Practical in Statistical analysis [2P]	GEO-251-OE Applications of GPS [2P]	GEO-251-SEC Practicals in Weather Reports [2P]	-	2 (T)	-	2	22
Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits Course NSQF courses/Internship OR Continue with Major and Minor													

SAVITRIBAI PHULE PUNE UNIVERSITY, PUNE
Credit Framework for Under Graduate (UG) B.A. Geography (2024-2025)

Level/ Diffic- ulty	Sem.	Credits Related to Major					Minor	GE/OE	SEC	IKS	AEC	VEC	CC	Total
		Major Core	Major Elective	VSC	FP/OJT/CEP									
5.5/ 300	V	GEO-301-MJ Geography of India [4T] GEO-302-MJ Soil Geography [4 T] GEO-303-MJP Practicals in Map Projections and Statistical Analysis [4 P]	(Select any one of the following) GEO-310-MJ Climatology [2 T] OR GEO-311-MJ Introduction to GIS [2 T] (Select any one of the following) GEO-312-MJP Practicals in Climatology [2 P] OR GEO(A) 313 MJP Practicals in GIS [2 P]	(Select any one of the following) GEO-321-VSC Introduction to GPS [2 T] OR GEO-322-VSC Tourism Geography [2 T]	GEO-331-FP/CEP Field visit and report writing [2 FP]	GEO-341-MN Environmental Geography [2 T]								22
	VI	GEO-351-MJ Watershed Management [4T] GEO-352-MJ Agriculture Geography [4 T] GEO-353-MJP Practicals in Spatial Analysis [4 P]	(Select any one of the following) GEO-360-MJ Geography of Disaster Management [2 T] OR GEO-361-MJ Introduction to Remote Sensing [2 T] (Select any one of the following) GEO-362-MJP Practicals in Watershed Management [2 P] OR GEO-363-MJP Practicals in Remote Sensing [2 P]	(Select any one of the following) GEO-371-VSC Practicals in Advanced Surveying [2 P] OR GEO-372-VSC Practical's in Tour Planning [2 P]	GEO-381-OJT [4 OJT]								22	
Total 3 Year		44	8	8	10	18	8	8	6	4	8	4	6	132
Exit option: Award of UG Degree in Major with 132 credits and an additional 4 credits Course NSQF courses/Internship OR Continue with Major and Minor														

Savitribai Phule Pune University, Pune
B.A. (Geography) as per NEP 2020

Name of the Programme	:	B.A (Geography)
Class	:	F.Y.B.A
Semester	:	I
Name of Vertical Group	:	Main Subject
Course Code	:	GEO-101-T
Course Title	:	Introduction to Physical Geography
Type of course	:	Theory
Total Credits	:	02
Workload	:	(15 hours/credit) 2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To acquaint students with basic principles of Physical Geography
2. To introduce the processes and patterns in the atmosphere, hydrosphere and lithosphere.
3. To develop scientific insights into dynamics of the earth system.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1.	Introduction to Physical Geography	i. Introduction, definition and branches of Geography ii. Definition and Branches of Physical Geography iii. Nature, Scope and importance of Physical Geography	08
2	Lithosphere	i. Interior of the Earth - Structure and Composition ii. Wegener's Continental Drift Theory	06
3.	Atmosphere	i. Concept of weather and climate. ii. Composition and structure of the atmosphere iii. Factors affecting horizontal distribution of the temperature	08
4.	Hydrosphere	i. General structure of ocean floor ii. Movements of ocean water a. Tides- meaning, causes and types	08

Course Outcome:

By the end of this course, student will be able to:

- CO 1** : Understand fundamental concepts, theories and approaches of Physical Geography
- CO 2** : Recognize functions of complex interactive earth systems.
- CO 3** : Demonstrate scientific explanation of physical processes of the atmosphere, hydrosphere and lithosphere.
- CO 4** : Describe diverse human activities in changing natural environment.

References:

1. Dayal P., (1996), Text Book of Geomorphology, Shukla Book Depot, Patna.
2. Kale V.S. and Gupta A., (2015), Introduction of Geomorphology, University Press, Kolkata.
3. Lal, D. S., (1998), Climatology, Chaitanya Publishing House, Allahabad.
4. Kale V.S. and Gupta A., (2001), Elements of Geomorphology, Oxford Univ. Press.
5. Monkhouse F.J., (1951), Principles of Physical Geography, McGraw Hill Pub - New York.
6. Singh Savindra., (2000), Physical Geography, Prayag Pustak Bhavan, Allahabad.
7. Singh Savindra., (2000), Oceanography, Prayag Pustak Bhavan, Allahabad.
8. Husain, M., (2001), Fundamentals of Physical Geography, Rawat Publication, Jaipur.
9. Siddhartha, K., (2001), The Earth's Dynamic Surface, Kosalaya Publications Pvt. Ltd, New Delhi.
10. Lutgens, F.K. and Tarbuck, E.J., (2007), The Atmosphere, Pearson Prentice Hall, New Jersey.
11. Bergman, Edward E., (1995), Human Geography: Culture, Connections and Landscape, Prentice-Hall, New Jersey.
12. Fellman, J.L., (1997), Human Geography-Landscapes of Human Activities. Brown and Benchman Pub., U.S.A.
13. Johnston, R.J., (1994), Dictionary of Human Geography, Blackwell, Oxford.
14. Chandna, R.C., (2000), Geography of Population: Concepts, Determinants and Patterns, Kalyani Publishers, New Delhi.
15. वाणी, बी.के. आणि पाटील एन.एम., (२०२०), प्राकृतिक व मानवी भूगोल, अथर्व प्रकाशन, जळगाव.

Savitribai Phule Pune University, Pune
B.A. (Geography) as per NEP 2020

Name of the Programme	:	B.A. (Geography)
Class	:	F.Y.B.A.
Semester	:	I
Name of Vertical Group	:	Main Subject
Course Code	:	GEO-102-P
Course Title	:	Practicals in Physical Geography
Type of course	:	Practical
Total Credits	:	02
Workload	:	2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To acquaint students with methods of relief representation
2. To develop skills of students in interpreting contour maps, landforms and other relief features

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
01	Qualitative Methods of Relief Representation	Methods of Relief Representation Qualitative Methods a. Hachures b. Hill shading c. Color shading or tinting	20
02	Quantitative Methods of Relief Representation	Methods of Relief Representation Quantitative Methods a. Spot Height b. Bench Mark c. Triangulation Method d. Contours e. Form lines	20
03	Representation of slope and landforms by contours	Representation of slope by contours a. Gentle and steep slope b. Even and uneven slope c. Concave and convex slope Representation of landforms by contours a. Conical hill b. Cliff c. V shaped valley d. Ridge e. Plateau f. Pass	20

Course Outcome:**By the end of this course, student will be able to:**

- CO 1** : Identify different methods of relief representation
- CO 2** : Apply both qualitative and quantitative methods in representing and interpreting geographical features

References:

1. Ahirrao, D. Y. And Karanjkehele, E.K., (2002), Pratyakshik Bhugol, Sudarshan Publication, Nashik.
2. Chandana, R. C., (2015), Geography of Population, Kalyani Publisher, New Delhi.
3. Hans Raj, (1978), Fundamentals of Demography: (population Studies with Special Reference to India), Surjeet Publication, Delhi.
4. Jadhav, S., Chaudhari, A. and Chaudhari, A., (2020), Pratyakshik Bhugol, Prashant Publication, Jalgaon.
5. Nagtode P. M., and Lanjewar H.D., (2009), Nakashashtra, Pimplapure Publication, Nagpur
6. Sarkar Ashis, (2015), Practical Geography: A Systematic Approach, Orient Blackswan Pvt Ltd, Hyderabad
7. Singh, G., (2005), Map Work and Practical Geography, Vikas Publishing House Pvt. Ltd., New Delhi.
8. Singh, R.L., (2005), Elements of Practical Geography. Kalyani Publishers, New Delhi.
9. Singh, J. and Dhillon, S., (1994), Agricultural Geography. McGraw Hill Education India Pvt Ltd, New Delhi.

Savitribai Phule Pune University, Pune
B.A. (Geography) as per NEP 2020

Name of the Programme	:	B.A. (Geography)
Class	:	F.Y.B.A.
Semester	:	I
Name of Vertical Group	:	OE
Course Code	:	OE-101-GEO
Course Title	:	Geography of Tourism
Type of course	:	Theory
Total Credits	:	02
Workload	:	(15 hours/credit) 2 Credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To understand the diverse nature and broad scope of Tourism Geography.
2. To provide students with a broad understanding of recent and emerging types of tourism.
3. To gain insights into specialized forms of tourism and understand their characteristics and sustainability considerations associated with them.
4. To explore the socio-cultural determinants of tourism.
5. To classify and analyse diverse tourism trends, enabling the students the dynamic nature of the tourism industry.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1	Introduction to Tourism Geography	i. Definition, Nature and Scope of Tourism Geography ii. Concept of Tourist and Tourism iii. Importance of Tourism in Geography	10
2	Determinants of Tourism Development	i. Physical a. Relief b. Climate c. Forest d. Water ii. Socio-Cultural a. Religious b. Historical c. Cultural iii. Political a. Policies iv. Other a. Accessibility b. Safety of Tourists	10
3	Classification and recent types of	i. Classification of Tourism based on a. Nationality b. Travel Period	10

Topic No	Topic Name	Sub Topic	No. of Hours
	Tourism	c. Purpose of Tourism ii. Recent types of Tourism a. Agro Tourism b. Ecotourism c. Wildlife Tourism d. Health Tourism e. Sports Tourism	

Course Outcome:

By the end of this course, student will be able to:

- CO 1** : Understand of the definition, nature, and scope of tourism.
- CO 2** : Recognize and articulate the economic, social, and cultural importance of tourism.
- CO 3** : Categorize tourism based on nationality, understanding the distinctions between domestic and international tourism.
- CO 4** : Analyze the impact of physical determinants such as relief, climate, forests, and water bodies on tourism development and experiences.
- CO 5** : Identify and evaluate the influence of religious, historical, and cultural factors on tourist attractions and destination choices.

References:

- Cooper, C. and Hall, M., (2008). Tourism and Leisure: Issues and Challenges. Channel View Publications, Bristol.
- Goeldner, C. R. and Ritchie, J. R. B., (2017). Tourism: Principles, Practices, Philosophies. John Wiley & Sons, Hoboken.
- Singh, V. and Joshi, S., (2012). Tourism Planning and Development: Concepts and Issues. Sterling Publishers, New Delhi.
- Page, S. and Connell, J., (2009). Tourism: A Modern Synthesis. Cengage Learning, Hampshire.
- Seth P.N., (1985), Successful Tourism Management, Sterling Publisher Ltd., New Delhi.
- Mhatre, S., (2015), Tourism Geography: An Integrated Approach. Himalaya Publishing House, Mumbai.
- Kulkarni, A., and Shah, N. (2018), Tourism in Nashik: A Comprehensive Guide. Notion Press, Chennai.
- Deshmukh, P., (2019), Tourism in Ahmednagar: Trends and Challenges. Udyog Sahayadri, Ahmednagar.
- Patil, N. and Chavan, S., (2017), Tourism in Pune: Exploring the Cultural Capital. Sahyadri Books, Pune.
- Sharma, S. and Gupta, M., (2013), Tourism Development in India: A Case Study Approach. PHI Learning Pvt. Ltd., New Delhi.

Savitribai Phule Pune University, Pune
B.A. (Geography) as per NEP 2020

Name of the Programme	:	B.A. (Geography)
Class	:	F.Y.B.A
Semester	:	I
Name of Vertical Group	:	V 1
Course Code	:	SEC-101-GEO
Course Title	:	Introduction to Water Analysis
Type of course	:	Theory
Total Credits	:	02
Workload	:	Total Workload: -2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To understand water quality parameters.
2. To learn various types and sources of water
3. To learn various quality indices useful for drinking and irrigation water analysis.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1	Parameters of water quality	i. Parameters of water quality: - Physical, - Chemical, - Biological, ii. Significance of water analysis	10
2	Types of water sources and pollutions	i. Types of water sources, occurrence, and importance ii. Water pollution: source, types, and management	06
3	Standards of water quality	i. BIS (Bureau of Indian Standards) ii. WHO (World Health Organization)	04
4	Characteristics of Water quality indices	i. Indices for drinking water - WQI ii. Indices for irrigation water - Sodium Adsorption Ratio (SAR) (Richards 1954), - Residual Sodium Carbonate (RSC) (Eaton 1950), - Sodium Percentage (SP) (Wilcox 1955), - Kelly's ratio (Kelly 1963)	10

Course Outcome:

By the end of this course, student will be able to:

- CO 1** : Comprehensive understanding of various water quality parameters useful for assessment of water resources.
- CO 2** : Understand water quality standards of BIS and WHO.
- CO 3** : Understand the characteristics of water quality indices for drinking water and irrigation.

References:

1. Standard Methods for the Examination of Water and Wastewater - American Public Health Association, American Water Works Association, Water Environment Federation.
2. Water Quality Assessments: A Guide to the Use of Biota, Sediments and Water in Environmental Monitoring - Deborah V. Chapman (Editor).
3. Water Quality: Guidelines, Standards and Health - Lorna Fewtrell and Jamie Bartram.
4. Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation - Nelson L. Nemerow and Franklin J. Agardy.
5. BIS 10500:2012 - Drinking Water Specification
6. BIS 2296:1982 - Specifications for Packaged Natural Mineral Water
7. BIS 3025:1983 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water
8. BIS 3589:2001 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water (Revision of IS 3025)
9. BIS 1622:2008 - Drinking Water - Specification
10. BIS 3025:1964 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water

Savitribai Phule Pune University, Pune
B.A. (Geography) as per NEP 2020

Name of the Programme	:	B.A. (Geography)
Class	:	F.Y.B.A.
Semester	:	II
Name of Vertical Group	:	Main Subject
Course Code	:	GEO-151-T
Course Title	:	Introduction to Human Geography
Type of course	:	Theory
Total Credits	:	02
Workload	:	(15 hours/credit) 2 credits x 15 hours = 30 hours in semester

Objectives of the Course:

1. To create awareness amongst students regarding the fundamental concepts of Human Geography, including its meaning, nature and scope.
2. To understand the branches of Human geography i.e. Population Geography, Settlement Geography and Agriculture Geography.
3. To explore different types and patterns of settlement.
4. To understand the types of agriculture with problems.

Topics and Learning Points

Topic No.	Topic Name	Sub Topics	No. of Hours
1.	Introduction to Human Geography	i. Meaning and definition of Human Geography ii. Nature and scope of Human Geography iii. Branches and Importance of Human Geography	08
2.	Population and Settlement	i. Factors affecting on distribution of population ii. Composition of Indian Population: Gender and Literacy iii. Theory of Demographic Transition iv. Types and patterns of rural settlement	12
3.	Agriculture	i. Types of agriculture (Intensive, Subsistence) ii. Factors affecting Indian agriculture iii. Problems of Indian agriculture	12

Course Outcome:

By the end of this course, student will be able to:

- CO 1** : Define and explain the meaning, nature and scope of Human Geography.
CO 2 : Discuss the different branches of Human Geography
CO 3 : Appreciate the growth, distribution and composition of population in India
CO 4 : Analyse the types and patterns of rural settlements

References:

1. Chandna, R.C. (2010) Population Geography, Kalyani Publisher.
2. Daniel, P.A. and Hopkinson, M.F. (1989) The Geography of Settlement, Oliver and Boyd, London.
3. Hassan, M.I. (2005) Population Geography, Rawat Publications, Jaipur
4. Johnston R; Gregory D, Pratt G. et al. (2008) The Dictionary of Human Geography, Blackwell Publication.
5. Jordan-Bychkov et al. (2006) The Human Mosaic: A Thematic Introduction to Cultural Geography. W. H. Freeman and Company, New York.
6. Jyotiram More and Musmade Arjun (2015) Regional Geography of India Diamond Publication Pune.
7. Kaushik, S.D. (2010) Manavi Bhugol, Rastogi Publication, Meerut.
8. Maurya, S.D. (2012) Manav Bhugol, Sharda Pustak Bhawan. Allahabad.
9. Musmade Arjun, Sonawane Amit and Jyotiram More, Population & Settlement Geography, (2015), Diamond Publication Pune.
10. Sudeepta Adhikari (2016) Orient Blackswan PVT, New Delhi.

Savitribai Phule Pune University, Pune
B.A. (Geography) as per NEP 2020

Name of the Programme	:	B.A. (Geography)
Class	:	F.Y.B.A.
Semester	:	II
Name of Vertical Group	:	Main Subject
Course Code	:	GEO-152-P
Course Title	:	Practicals in Human Geography
Type of course	:	Practical
Total Credits	:	02
Workload	:	Total Workload: -2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To understand and interpret various population indices.
2. To analyse settlement patterns using various measures of nucleation and dispersion.
3. To develop their skills in utilizing techniques in Agricultural Geography.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1	Population	Population Indices i. Age Sex Pyramid ii. Dependency Ratio iii. Infant Mortality Ratio iv. Population Growth Rate	16
2	Settlement	Measures of Nucleation and Dispersion of Settlement i. Rank Size Rule ii. Nearest Neighbour analysis	20
3	Agriculture	i. Crop Combination method: Weaver's method ii. Crop diversification method: Bhatia's method	24

Course Outcome:

By the end of this course, student will be able to:

- CO 1** : Identify different methods of representation of population indices.
- CO 2** : Identify patterns of nucleation and dispersion in human settlements
- CO 3** : Calculate and interpret crop combination methods to analyze spatial patterns and trends in agricultural land use

References:

1. **Carter Harold** (1977): The study of Urban Geography
2. **Hans Raj** (1978): Fundamentals of Demography
3. **Hudson F.S.** (1976): Geography of Settlements
4. **Michael E. and E. Hurse**: Transportation Geography
5. **Pollard A. H. and Farhat Yusu**: Demographic Techniques
6. **Singh, R. L.** Reading in Rural Settlement Geography
7. **Yeats, M. H.** (1974). An introduction to Quantitative Analysis in Human Geography
8. **Singh, J. and Dhillon** (1984): Agricultural Geography.
9. **Liendsor, J. M.** (1997): Techniques in Human Geography, Routledge.

Savitribai Phule Pune University, Pune
B.A. (Geography) as per NEP 2020

Name of the Programme	:	B.A. (Geography)
Class	:	F.Y.B.A.
Semester	:	II
Name of Vertical Group	:	V4 VSC
Course Code	:	OE-151-GEO
Course Title	:	Practicals in Tourism Geography
Type of course	:	Practical
Total Credits	:	02
Workload	:	2 Credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To provide students with practical knowledge and skills related to tour planning and management.
2. To familiarize students with the information about the necessary documentation for tour planning
3. To train the students with the essential online booking process
4. To recognize the importance of tour planning in the tourism industry.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1	Introduction of Tour planning	i. Meaning of Tour planning ii. Elements of Tour planning iii. Classification of Tour planning: individual, family, group and mass level iv. Importance of tour planning.	16
2	Techniques of Tour Planning	i. Preparation of Tour Planning: Leaflet of tour planning, Passenger documentation, Insurance calculation, Currency exchange, Time exchange and calculation, Distance measurement. ii. Tourist Guide iii. Computer application for tour planning. iv. Procedure of passport & visa application. v. Booking and cancellation system: Transportation (Air, Rail, Road) and hospitality (accommodation)	24
3	Planning and visit to tourist place	Preparation of one short or long international/ national/ local tour plan.	20

Course Outcome:

By the end of this course, student will be able to:

- CO 1** : Identify and describe the essential elements of tour planning.
- CO 2** : Prepare tour planning materials, including documentation and booking and cancellation systems for transport and accommodation.
- CO 3** : Develop skills required to plan and manage tours effectively.

References:

1. Bhatt H (2007) Tourism Planning and Development, Commonwealth Publishers, New Delhi
2. Bhatia AK (2002), Tourism Development: Principles and Practices, Revised edition Sterling Publishers Private Limited, New Delhi.
3. Chand, M (2002) Travel Agency Management, Anmol Publication
4. Ghosh Bishwanth (2000), Tourism & Travel Management, Second Revised Edition Vikas Publishing House Pvt Ltd, New Delhi.
5. Seth, P.N. (1998). An Introduction to Travel and Tourism, Sterling Publishers Pvt. Ltd., New Delhi.
6. Muluk, Doke, Musmade, More (2021), Geography of Tourism – II, Nirali Publication, Pune
7. Sinha, P (1998). Tourism Planning. Anmol Publication Pvt. Ltd., New Delhi.
8. Pacharne, Patil, Suryavanshi, Chaudhar (2014) Tourism Geography, Atharv Publication, Pune.

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B.A. (Geography) as per NEP 2020

Name of the Programme	:	B.A. (Geography)
Class	:	F.Y.B.A.
Semester	:	II
Name of Vertical Group	:	SEC
Course Code	:	SEC-151-GEO
Course Title	:	Practicals in water analysis
Type of course	:	Practical
Total Credits	:	02
Workload	:	Total Workload: -2 credits x 30 hours = 60 hours in semester

Objectives of the Course:

1. To identify and explain key water quality parameters.
2. To learn various quality indices useful for drinking and irrigation water analysis.
3. To train the students for the interpretation of water quality data with the comparison of regulatory standards.

Topics and Learning Points

Topic No	Topic Name	Sub Topic	No. of Hours
1	Introduction to water quality	i. Definition ii. Water quality parameters: Physical, Chemical iii. Standards of water quality assessment: BIS (Bureau of Indian Standards) and WHO (World Health Organization) iv. Classification of water qualities	16
2	Water quality analysis for drinking water	i. Calculation of WQI using weighted parameters ii. Gibbs Analysis	20
3	Water quality analysis for irrigation	i. Calculate, and compare WHO standards and interpret two examples of each following indices a. Sodium Adsorption Ratio (SAR) (Richards 1954), b. Residual Sodium Carbonate (RSC) (Eaton 1950), c. Sodium Percentage (SP) (Wilcox 1955), d. Kelly's ratio (Kelly 1963),	24

Course Outcome:

By the end of this course, student will be able to:

- CO 1** : Comprehensive understanding of various quality indices useful for assessment of water resources.
- CO 2** : Select and calculate appropriate water quality indices based on specific objectives and available data.
- CO 3** : Interpret the overall water qualities with a comparison of BIS and WHO standards.

References:

1. Standard Methods for the Examination of Water and Wastewater - American Public Health Association, American Water Works Association, Water Environment Federation.
2. Water Quality Assessments: A Guide to the Use of Biota, Sediments and Water in Environmental Monitoring - Deborah V. Chapman (Editor).
3. Water Quality: Guidelines, Standards and Health - Lorna Fewtrell and Jamie Bartram.
4. Environmental Engineering: Water, Wastewater, Soil and Groundwater Treatment and Remediation - Nelson L. Nemerow and Franklin J. Agardy.
5. BIS 10500:2012 - Drinking Water Specification
6. BIS 2296:1982 - Specifications for Packaged Natural Mineral Water
7. BIS 3025:1983 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water
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9. BIS 1622:2008 - Drinking Water - Specification
10. BIS 3025:1964 - Methods of Sampling and Test (Physical and Chemical) for Water and Waste Water