Manual for In-service Education of Teachers and Teacher Educators in Geography

(Higher Secondary Stage)

Team Members

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Content

Manual for In-service Teachers and Teacher Educators in Geography at Higher Secondary Stage

Introduction

Training manual is a book or booklet of instructions designed to improve the quality of a performed task. A training manual may be particularly useful as: a) an introduction to subject matter prior to training, b) an outline to be followed during training, c) a reference to subject matter after training and d) as a general reference material. The objective behind developing the geography manual at higher secondary stage is two fold. First, it should act as a resource for subject teachers who might turn to it for a ready reference in the interest of effectively transacting the geography themes which are taught at the higher secondary stage and second it should guide competent teacher's training organizations such as the *Kendriya Vidyalaya Sangathan, Navodaya Vidyalaya Samiti*, and SCERTs etc in organizing short-term training courses for higher secondary geography teachers in order to grade their teaching skills.

A training manual cannot hope to develop a 'model' way of teaching, as there is no model way of teaching, as there is no model definition of a good teacher. Good teachers are unique in their own ways surely, most of them know that good teaching is not about 'I have covered XYZ in class' but about 'my students know XYZ'. Thus teaching is all about how well the students have learnt/understood.

Successful teaching involves knowing what to do to bring about the desired learning and being able to do it. In order to teach geography successfully teacher must -

(i) know his/her students,

(ii) know the subject matter,

(iii) know materials and

(iv) know teaching procedures of transmitting the knowledge to the students.

It is believed that teachers are the best judges of the situations in the class and hence the methods they adopt are appropriate to the given situation. Hence, besides the given module it is desired that the teachers should think of preparing their own module of different topics in the text and bring about a change in the approach with new and innovative methods of teaching.

Section I

Chapter 1 Organisation of In-service Training

Need for In Service Training for Teachers

Education connotes growth, particularly so for the teachers. Teachers have varied backgrounds in terms of content and pedagogy knowledge, motivational level, qualifications and experiences are concerned. An in-service training of teachers is required to raise the qualification of teachers and to update their knowledge and skills. It helps the teachers:

1. To keep abreast with the latest happenings in the subject area.
2. To help teachers recognise the individual differences in children and modify the method of teaching accordingly.
3. To recognise and master the use of teaching aids like computers, power point presentations, internet to make the teaching-learning process more lively and useful.
4. To incorporate constructivist approach to teaching learning process as per concerns of National Curriculum Framework 2005.
5. To provide teachers an opportunity to meet peers and exchange ideas on better curriculum transaction.
6. To provide an opportunity to engage with other teachers professionally and to update knowledge.

While teaching other methods such as class discussions, group activities, use of outside material like magazines, newspapers, periodicals, and videos have not caught the attention of the teachers. For this, the required training should be given to the teachers.

An in-service teacher-training programme can be successful only if it results in teacher gaining some knowledge or skill, which will increase the effectiveness of the curriculum transaction process in the classroom.

Principles of Organising In-service Education

While organising in-service education of teachers the following guiding principles needs to be followed –

(a) In-service training programmes needs to be build on the basis of the felt needs and sharing of experiences of the teachers

(b) There is a need to give teachers a space to develop and listen their own voices.

(c) Interaction with each other.

(d) Teachers already have experiences of teaching and belief about learners, about colleagues and about teaching-learning process.

(e) In-service training programmes needs to be designed with a clear sense of the aims and how the strategies of the programme are going to achieve these aims.

(f) The content of in-service programmes must be such that teachers can relate to their own experience and also find opportunities to reflect on these experiences.

The Training Process

In general, the training process involves the following steps –

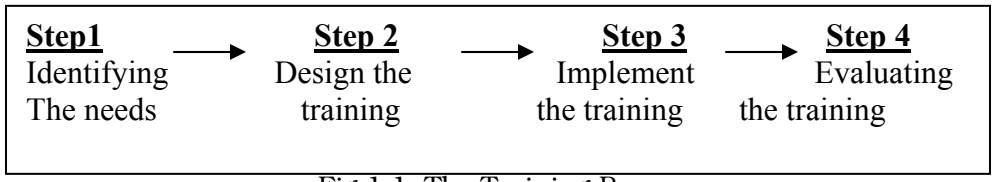


Fig 1.1: The Training Process

This is the standard sequence of activities, there may be more variations depending upon the situation.

Designing successful training programmes requires not only a through understanding of the training requirement/ need but also a well stated definition of the results to be achieved and a thought out plan for achieving those results.

Design is a planning activity which in the context of training, refers to the framework for analysing training problem, defining the intended outcome, determining how to present the content to the learns to achieve those outcomes, developing the training course according to the design, implementing the course, evaluating its effectiveness and devising follow-up activities.

A continuous in-service education teacher is an important factor in the successful implementation of any scheme that devised at the policy level. Therefore, the 'Manual' includes a sample of five-day teachers' education programme to help different in –service teachers' education organisations to conduct similar programmes and facilitate the process of upgrading teachers' skill to implement the NCF guided new Geography syllabus and textbooks with greater efficiency.

However, flexibility is a key for achieving success in the implementation of any training programme. Therefore, the sample "Five-day Teachers' Training Schedule" provided in the manual can also be compressed into either a "Three-day Teachers' Training Schedule" or extended to an "Eight-day Teachers' Training Schedule".

Training Schedule

Day 1: 27-07-2009

9.30 a.m. – 10.30 a.m.	Registration
10.30 a.m. – 11.00 a.m.	Opening and Welcome
11.00 a.m. – 11.15 a.m.	Tea
12.00 p.m. – 1.30 p.m.	Overview of Syllabi & Textbooks of Geography
1.30 p.m. – 2.00 p.m.	Lunch
2.00 p.m. – 3.00 p.m.	Discussion on the module (Physical Geography)
3.00 p.m. – 3.15 p.m.	Tea
3.15 p.m. – 5.00 p.m.	Contd. Discussion on the module (Physical Geography)

Day 2: 28-07-2009

9.30 a.m. – 10.30 a.m.	Recap/Feedback
10.30 a.m. – 11.00 a.m.	Group discussion on the module (Physical Geography
11.00 a.m. – 11.15 a.m.	Tea
12.00 p.m. – 1.30 p.m.	Contd. Discussion on the module (Physical Geography)
1.30 p.m. – 2.00 p.m.	Lunch
2.00 p.m. – 3.00 p.m.	Contd. Discussion on the module (Physical Geography)
3.00 p.m. – 3.15 p.m.	Tea
3.15 p.m. – 5.00 p.m.	Contd. Discussion on the module (Physical Geography)

Day 3: 29-07-2009

9.30 a.m. – 10.30 a.m.	Recap/Feedback
10.30 a.m. – 11.00 a.m.	Discussion on the module (Human Geography
11.00 a.m. – 11.15 a.m.	Tea
12.00 p.m. – 1.30 p.m.	Contd. Discussion on the module (Human Geography)
1.30 p.m. – 2.00 p.m.	Lunch
2.00 p.m. – 3.00 p.m.	Group Discussion on the module (Human Geography)
3.00 p.m. – 3.15 p.m.	Tea
3.15 p.m. – 5.00 p.m.	Contd. Discussion on the module (Human Geography)

Day 4: 30-07-2009

9.30 a.m. – 10.30 a.m.	Recap/Feedback
10.30 a.m. – 11.00 a.m.	Discussion on the module (Practical Work in Geography)
11.00 a.m. – 11.15 a.m.	Tea
12.00 p.m. – 1.30 p.m.	Contd. Discussion on the module (Practical Work in Geography)
1.30 p.m. – 2.00 p.m.	Lunch
2.00 p.m. – 3.00 p.m.	Group Discussion on the module (Practical Work in Geography)
3.00 p.m. – 3.15 p.m.	Tea
3.15 p.m. – 5.00 p.m.	Contd. Discussion on the module (Practical Work in Geography)

Day 5: 31-07-2009

9.30 a.m. – 10.30 a.m.	Recap/Feedback
10.30 a.m. – 11.00 a.m.	Inter linkages/Integration between Physical, Human and Practical Work in Geography)
11.00 a.m. – 11.15 a.m.	Tea
12.00 p.m. – 1.30 p.m.	Contd. Inter linkages/Integration between Physical, Human and Practical Work in Geography)
1.30 p.m. – 2.00 p.m.	Lunch
2.00 p.m. – 3.00 p.m.	Feed back from the participants
3.00 p.m. – 3.15 p.m.	Tea
3.15 p.m. – 5.00 p.m.	Contd. Feed back from participants

Chapter 2: Teacher Training Outcome

Evaluation is an important component/part of any training programme. It helps to know about the requirements and expectations of the participants; how much they have benefited from the course and what else can be done in further training programmes. Therefore, the training programme will also provide for the following:

a) Registration form: It is given to the participants in the beginning of the training programme. Besides their particulars, difficulties faced by them while transacting the curriculum in the class and their expectations from the current training programme can be asked. If possible all their queries can be satisfied in the current training programme.

b) Feedback form: At the end of the programme, it is important to take the feedback from the participants in form of enquiry and suggestions for the improvement. It can be enquired if they had any expectation that went without being addressed during the course of the programme.

Registration Form

1. Title of the Programme	Development of a Manual for Teachers And Teacher Educator in Geography
2. Venue of the Programme	NIE, New Delhi, 27th-31st July 2009
3. Name of the Participant	_____
4. Educational Qualification	_____
5. Teaching Experience	_____
6. Address & Contact Nos.	

School_____ Residence_____

_____ _____

Telephone_____ Telephone_____

E-mail_____ E-mail_____

7. Difficulties, if any, in handling new textbooks in Geography

_____

_____

_____

8. What are your expectations from the current training programme?

_____

_____

Date:

Place:

(Signature of the Participant)

Feedback Form

1. Name of the Participant _____
2. Did your expectations were fulfilled? Yes____ No____ Partly____
3. Did the training programme cover the major teaching issues/skills related to the learning Geography in a balanced manner?
   Yes_____ No_____
   If No, what areas could have been included or left out?

   _____

   _____

   _____
4. In your view, what should be included in a teacher training manual which is not there at the moment?

_____

_____

_____

Date:

Place:

(Signature of the Participant)

Name in Block Letters_____

School_____

All appraisals aim at improvement, understanding strength and weaknesses of the concerned programme. One can identify possible ways to improve upon the future training programmes.

Section II

Chapter 1: Geography Education

Geography, as a subject provides wide range of information and understanding, which is essential for better understanding of the world around us. Geography draws its content both from natural sciences as well as social sciences. It explores the relationship between people and their environment and their interactions at different scales-local, state/region, nation and the world.

Geography from its earliest days as a subject has always had a core focus on maps and spatial pattern and in the recent years GIS has become an important component in Geography. Geographers are also tackling many of the problems/issues which world is facing today e.g. global warming, how the environment works and how human societies interact with it, global economy, food security, impact of new communication technologies, disaster management etc. Keeping all such issues and National Curriculum Framework 2005, the Geography syllabus was revised and new textbooks for classes XI and XII were developed. The prime concerns of National Curriculum Framework 2005 are to allow the child to construct her own knowledge rather than learning from rote and linking the matter presented in school texts with what the child sees and experiences in her own household and community. The new textbooks follow the same approach. The teacher's manual is designed specifically to enable teachers to transact the new Geography Textbooks for classes XI and XII in the light of NCF 2005.

The notion of the textbook has changed from instructive to more suggestive. The textbooks are no more the 'only source' but 'one of the source' for developing ones understanding. It offer enough scope for the learning even to go beyond the very textbooks, creating more appetite for further reading that is necessary to enrich the understanding of a given

phenomenon. Manuals in education are developed with an aim of making teaching of the subject more innovative and purposeful.

While dealing with the new textbooks, teacher should let the students loose and keep the tight rein at certain places according to the requirements, e.g. classroom discussions are always beneficial but one should always be careful about the time management. Teacher should make every effort to assign projects and initiate activities that allow the students to relate the concepts discussed in the classroom to his/her world outside the school. Various issues should be taught keeping in mind the need to inculcate in child a critical appreciation for conservation and environmental concerns. The foundation laid at this stage should be able to equip them with knowledge, skill and aptitude to make contribution in any field they choose.

Concerns of NCF

The fact that learning has become a source of burden and stress on children and their parents is an evidence of a deep distortion in educational aims and quality. To correct this distortion, the NCF 2005 proposes five guiding principles for curriculum development:

i) connecting knowledge to life outside the school;
ii) ensuring that learning shifts away from rote methods;
iii) enriching the curriculum so that it goes beyond textbooks;
iv) making examinations more flexible and integrating them with classroom life; and
v) Nurturing an overriding identity informed by caring concerns within the democratic policy of the country.

Constructivist Approach

Constructivism means construction of knowledge in the sense that learners actively construct their own knowledge by linking new information to the existing knowledge on the basis of their experiences.

In fact, in constructivism, learning is the result of learner's mental constructions. A learner learns by fitting new information together with what he/she already knows and actively constructs his/her own understanding. It is the learner who interacts with objects and events and thereby gains understanding of the features held by such objects or events. Central to constructivism is its conception of learning. In constructivism learning is a process, how the learner arrives at a particular answer. Learning is process of constructing meaningful representations of external reality through experiences.

Given the right context, a learner becomes an active participant in knowledge structuring, engages in restructuring, manipulating, reinventing and experimenting with knowledge to make it meaningful and permanent. Use of conversation, discussion, interactions with others and sharing ideas form an integral aspect for construction of knowledge.

Knowledge construction involves multiple perspectives on representations of concepts and content. When the learners interact in groups and with various materials they generate multiple perspectives. Collaborative and cooperative learning strategies provide conditions for generating and sharing multiple viewpoints.

Construction of knowledge is not instantaneous. Construction of knowledge does not take place in a few seconds. Learner needs to revisit ideas. Ponder them, engage with them, reformulate and use them. If we reflect on the ideas we have learned we may realize that it is the result of repeated exposure and thought.

Aims of Geography Education

In 1999, the Geographical Association of United Kingdom had mentioned the following aims of Geography Education:

- To develop in learners a knowledge and understanding of:
    - where they live, other people and places, and how people and places interrelate and interconnect;

- the significance of location;
- human and physical environments;
- people-environment relationships;
- the cause and consequences of change

- To develop the skills needed to carry out the geographical study (e.g. geographical enquiry, map work and field work);
- To stimulate an interest in, and to encourage an appreciation of the world around us;
- To develop an informed concern for the world around us, and an ability and willingness to take action both locally and globally.

Objectives of the Present Course of Geography

The higher secondary stage is quite important for the students, as it is the foundation for higher education. The foundation at this stage equips them with basic knowledge and the necessary skills to make a meaningful contribution in the field they choose. The present course in Geography for Higher Secondary Stage has been designed in a way that it will help the learners to:

- Familiarise themselves with the terms, key concepts and basic principles of geography;
- Search for, recognise and understand the processes and patterns of the spatial arrangement of the natural as well as human features and phenomena on the earth's surface;
- Understand and analyse the inter-relationship between physical and human environments and their impact;
- Apply geographical knowledge and methods of enquiry to new situations or problems at different levels- local/region, national and global;
- Develop geographical skills, relating to collection, processing and analysis of data/information and preparation of report including maps and graphics and use of computers wherever possible; and,

- Utilize geographical knowledge in understanding issues concerning the community such as environmental issues, socio-economic concerns, and gender and become responsible and effective member of the community.

  The syllabus and the textbooks are based on these objectives and all these issues are progressively incorporated in the teaching of geography.

Chapter 2: Teaching Learning Strategies

Teaching is an art but the success of a teacher lies in making the subject simple and easy to understand for the students. Some persons may have a flair for teaching and some can improve their teaching style if they are fully aware about different ways of teaching. A teacher should always try to use various methods to handle different topics in the class according to need and understanding level of the students.

Learning Styles

There has been a huge upsurge in interest in the study of learning styles in recent years. Learners can be categorised as mainly:

- Visual: They prefer to learn through seeing
- Auditory: They prefer to learn through hearing
- Kinaesthetic: They prefer to learn by getting physically involved

It is important not to categorise any individual as solely a visual, auditory or kinaesthetic learner. They have a preferred or habitual learning style which tends to dominate.

Students Learn Better When

- They are actively involved in the learning process.
- Learning is related to their daily life experiences.
- Learning situations are drawn from their environment.
- Pupil-teacher and pupil-pupil interactions are encouraged.

The Role of the Teacher is to

- Provide variety of learning situations to the learners
- Ensure that each child is engaged in learning activity.
- Encourage learners to compare, debate, share and learn from each other
- Provide help (only when learner asks for it) in the form of 'scaffolds'

Geographic Skills

Geographic skills provide the necessary tools and techniques that enable us to think geographically. They are essential to understand physical and human patterns and processes in our world. They are central to our ability to engage in geographic enquiry and to think critically about phenomena of Earth. Geographic skills should be taught systematically throughout the student's education. The five geographic skills that can be considered for Higher secondary stage are as under:

1. **Skill 1: Asking geographic questions :** the student should know and understand how to:
    - Plan and organise a geography research project (e.g., specify a problem, pose a research question and hypothesis. And identify data sources)

2. **Skill 2: Acquiring geographic information:** the student should know and understand how to:

- Systematically locate and gather geographic information from a variety of primary and secondary sources
- Systematically assess the value and use of geographic information

3. **Skill 3: Organising geographic information :** the student should know and understand how to:
    - Select appropriate forms of maps to organise geographic information
    - Select appropriate forms of graphs, diagrams, tables, and charts to organise geographic information.
4. **Skill 4: Analysing geographic information :** the student should know and understand how to:
    - Use quantitative methods of analysis to interpret geographic information
    - Make inferences and draw conclusions from maps and other geographic representations.

- Use the processes of analysis, synthesis, evaluation and explanation to interpret geographic information from a variety of sources.

5. **Skill 5: Answering geographic information:** the student should know and understand how to:

- Formulate valid generalizations from the results if various kinds of geographic enquiry.
- Evaluate the answers to geographic questions.
- Apply geographic models, generalizations, and theories to the analysis, interpretation, and presentation of geographic information.

Field Work

Some Ideas about Topics of Field Work and their Contents

One should be careful about making a choice about the objectives of the field work. Ideally, it should be connected to the issue/issues that the students have learnt in the school. Table 1.1 provides some ideas about possible topics, suggested sites for field work, major focus and some important variables.

Table: 1.1

S. No.	Topic	Connected to	Possible Sites/ suggested strata	Sub-issues/questions	Important Variables
1	Social Groups and Work	Population, Human Resource development	Village sampling of - General/OBC/SC /ST - Religious Groups	- Is there a convergence between social and economic groups?	- Education - Nature of Main and subsidiary work - size of land holding - Number of days worked - wage rates - Crops grown
2	Migration and its causes	Migration	Urban Slum, Other Urban locality -Migrant	-Who is a migrant? - Why do people migrate? -Do their work	- Social Group - Place from where migrated - Reason for

			-Non-Migrant	status improve after migration? - Are male/female migration patterns different?	migration - Education status – before and after - Work status – before and after
3	Irrigation and Cropping Pattern/ Crop diversification	Agriculture Water Soil	Village - farmers of different size classes	- Is irrigated cropping pattern and yield levels different from un-irrigated cropping patterns and yields - What kind of soils are conducive to growth of particular types of crops - Do small farmers have different cropping patterns/ yield levels from larger ones	- social groups - crops grown - irrigation source and extent by crops - crop area and yield - inputs like seeds, manure, fertilizers amount of crops sold in markets - price of crops -
4	Urbanisation and work Opportunities	Population Economy Transportation	Villages in urban Fringe -village within 2 kms of urban boundary -village more than 5 kms from urban boundary	- How does distance from the urban centre affect accessing work opportunities? - How important is education in accessing non-primary work? - what is the mode of transportation for people who commute to urban areas for work? - Can women travel out of the village to work in nearby urban centres?	- Sex -Age -Education - Nature and place of work - Mode of communication - Salaries and Wages - Casual/regular nature of employment - Education and unemployment
5	Women and work	Human resource development	Urban Slum/ Village -men	- Do women do different types of work compared to	- Age -Education -Type of primary and

		Economy	-women stratified by different age groups	men? - Are the male and female wage rates different? - How many hours do women spend in house-work? - What categories of women do paid work?	subsidiary work -wage rates -location of paid work with respect to residence - types of housework dome by both men and women - hours spent in these work

Chapter 3: Transaction of Themes

3A: Physical Geography

The subject matter of Geography relates to everything that exists around us and has a direct bearing on our life. If we consider the two broad branches of geography, it is the physical geography that forms the natural environment whereas the human geography represents the cultural environment. Since last few decades with ever increasing awareness about the environmental issues the physical geography has assumed greater importance and hence in the present era it is necessary to restate the aims of teaching physical geography.

Objective

The basic aim of teaching physical geography is to introduce the students to the world that exists around them and the process that control the status of natural environment. The resource base of the human comes from the natural environment. The rampant utilization of the resources and its ill effects leading to environmental degradation can only be understood through the study of physical geography. The ever increasing frequency of catastrophic events if is to be countered then it is necessary that the processes leading to such events are well appreciated by the students. Any natural hazard is basically the manifestations of normal processes operating with abnormally high intensities. Hence to mitigate the hazards the understanding of the exact nature of process is necessary and this can only be achieved through the study of physical geography.

Teaching Schedule

The content of the two books, *Fundamentals of Physical Geography* and *India: Physical Environment* are such that it will be difficult for teachers to consider teaching the topics from the two books simultaneously. Moreover the first book *Fundamentals of Physical Geography* deals with

the conceptual part of physical geography while the second book *India: Physical Environment* describes the physiographic characteristics of the region. Unless the conceptual portion is completed it will be difficult to deal with the regional characteristics. It is advisable that the teachers complete the teaching of book Fundamentals of Physical Geography and follow with the *India: Physical Environment*. The teaching objectives and outcome of the lessons given in the textbooks are as under –

Book 1: Fundamentals of Physical Geography			
Unit	Chapter	Objectives	Outcome
1	**Overview:** This unit introduces Geography as a discipline of scientific enquiry. It also highlights the relation of geography with other disciplines and discusses about various branches of Geography.		
	1	To acquaint the student with the encompassing nature of the subject and introduce them to various branches of the subject	At the end of this unit the students should realise that geography as a discipline of scientific enquiry deals with pure as well as social sciences. It has a holistic approach.
2	**Overview:** This unit deals with the planet earth as a single entity.		
	2	1. To introduce how the universe and subsequently different celestial bodies came into existence and evolved. 2. To explain the evolution of lithosphere, hydrosphere and atmosphere	Student should be able to become conscious about the evolution of the universe and its component. Their curiosity regarding how various spheres came into existence should get satisfied.
	3	1. To explain the layered nature of the interior of the earth. 2. To make the student understand how the scientists have acquired the information about the unobservable and unreachable interior.	At the end of this chapter student should be able to know the layered nature of the interior and understand that various process operating in the interior also have a bearing on the development of landforms at the surface.
	4	To explain how the oceans and continents that student see on a world	1. At the end of this chapter students should be able to understand the

		map have achieved their present positions. .	significance of plates and their boundaries. 2. They should be able to appreciate the relation between the plate boundaries and of the locations of earthquake and volcanoes on global scale.
3.	**Overview**: This unit deals with the landforms and the processes responsible for their development. Different landscape assemblages are the product of complex processes. Students should be encouraged to appreciate that the landforms are product of the interaction between the forces (processes) and the materials (rocks, minerals, soils etc.) responding to these forces.		
	5	1. To make the student understand the difference between rocks and minerals. 2. To explain what are the type of rocks and how are they formed.	Student should be able to realise that different types of rocks formed though different processes and hence their characteristics and the strength levels differ.
	6	1. To introduce different types of processes that shapes the landscape. 2. To make student appreciate that the exogenetic processes are largely controlled by the climatic conditions. 3. To explain how the difference in materials forming agents of erosion are reflected in the landforms they produce.	Students should be able to appreciate the difference between the processes like weathering, mass movement and erosion. The students should be able to recognise the process operating in their region.
	7	1. To introduce the student to various landscape assemblages 2, To make them appreciate how different landforms come into existence.	The students should be able to recognise the different landforms that exist in their region.
4	**Overview**: This unit deals with the basic concepts of climate. It explains the elements of climate and factors that control them.		
	8	To explain the composition, structure and the layered nature of the	The students at the end of this chapter should be able to know the vastness of the

		atmosphere	atmosphere and understand the characteristics of different layers.
	9	1. To explain how the energy input in the earth systems differ in different parts of the globe. 2. How and why the earth's temperature remains constant.	At the end of this chapter student should be able to realise why different parts of the globe have different temperature conditions.
	10	To explain how the different temperature conditions lead to the formation of pressure belts and how these in turn control the atmospheric circulation	Students should be able to understand that the atmospheric circulation is by and large controlled by the energy inputs and there exist some kind of permanent wind system called planetary wind system.
	11	To introduce the concept of evaporation and condensation, which control the transfer of water in different forms within the atmosphere. To explain forms of precipitation and types of rainfall.	Students should be able to know the basic processes involved in hydrological cycle. They should understand how the precipitation takes place and in what form.
	12	1. To introduce the system of classification of climate. 2. To introduce the concept of climatic changes and explain why the problem of climatic change has assumed serious nature in recent past.	Students should be able to understand the basis of the system of climatic classification. Students should understand the causes of climatic changes and realise the problems caused by green house gases.
5.	Overview: The unit is devoted to the study of hydrosphere.		
	13	To explain the details of ocean floor relief and the characteristic of ocean waters	The student should be able to recognise the vastness of oceans and realise that the characteristics of ocean waters differ on global scale.

	14	To explain why and how movements in ocean waters are caused.	Students should be able to understand the difference between different forms of ocean water movements. They should also realise the transfer of ocean waters and its effects on the climate of coastal areas.
6.	Overview: The unit is devoted to the study of biosphere.		
	15	To introduce various concepts related to environment such as ecology, ecosystem etc. To explain the concepts balance of environment	The students should be able to appreciate and comprehend the importance of environmental balance.
	16	To introduce the concept of biodiversity.	Students should be able to understand the importance of biodiversity. They should be able to know why the spectrum of biodiversity differs from region to region.

The lesson plan given above for book 1, *Fundamentals of Physical Geography* is in the form of a guideline. It is open to alteration. Best will be the teachers should prepare their own lesson plans and we are sure that it is a normal practice. However if the objectives and the possible learning outcomes are well spelled it becomes easier for the teachers to reach the students in more appropriate way. The following is the lesson plan recommended for book 2 *India: Physical Environment.*

	Book 2 - India: Physical Environment		
Unit	Chapter	Objectives	Outcome
1.	**Overview:** The unit deals with the location of India.		
	1	To acquaint student with the location and the extent of the country.	At the end of the chapter the students should know the extent and appreciate the vastness of the country
2	Overview: The physiographic details such as structure, relief and the drainage system of India are dealt with in this unit.		
	2	To introduce the geological structure and physiographic	The students should a broad idea about the geological

		fabric of the country.	provinces in the country. They should get familiar with the different physiographic regions.
	3	To introduce the drainage systems of the country and its importance in terms of water resource availability	At the end of the chapter it is expected that students should acquire information about different river systems and their importance to the regions they occupy.
3	**Overview**: The climate plays a vital role in the economic life of the country. This unit introduces the prevailing climatic conditions in the country. It also deals with pattern of distribution of the natural vegetation and the soils		
	4	1. To explain the mechanism that leads to the formation of Indian Monsoon. 2. To explain the seasonal variations in the climatic conditions in different parts of the country 3. To introduce to the concept of well and dry spells and the break in monsoon. 4. To introduce the concept of variability of rainfall	This chapter should make the student recognise the importance of climate of the country and its effect on country's economic life.
	5	1. To explain the distribution of natural vegetation in the country. 2. To introduce the nature of wild life in the country and its importance in terms of environmental conditions/	Students should be able to understand the importance of forest cover in the country and its spatial distribution. Students should be able to appreciate the efforts in conservation of wild life.
	6	To introduce the concept of classification of soils. To explain the distribution of soil in the country. To make the student aware about the problem of soil erosion and needs of soil conservation.	Students should realise the nature of soils in different parts of the country and they should also be able to realise the serious ness of the problem of soil erosion.
4	Overview: This unit deals with the natural hazard and disasters: their causes consequences and management.		
	7	To introduce the concept of natural hazard and disaster To introduce the concept of classification of hazard To explain different types of hazards that occur in our	At the end of this chapter students should know the concepts of hazards and disaster. They should also understand the spatial distribution of hazards in out

		country	country.

Illustrative Lesson

Unit: Climate

The Scope and objectives

Book /Unit	Chapters / Sub Units	Objectives
Book1:UnIt 4	Composition and Structure of Atmosphere	To acquaint the students with the complexity of composition, vastness of the extent and layered nature of the atmosphere.
	Solar Radiation, Heat Balance and Temperature	1. To make student understand that the prime source of energy on the earth is the solar radiation and it varies according to latitude. 2. To make them understand that the incoming and outgoing radiation balance and hence the mean temperature of the earth remains constant. 3. To make the student understand the factors controlling distribution of temperature.
	Atmospheric Circulation and Weather Systems	1. To acquaint the student with the concept of pressure cells, their effect on general circulations of air and planetary wind systems and cyclonic systems
	Water in the Atmosphere	1. To explain the students how water is held and circulated in the atmosphere. 2. To explain the mechanism of rainfall. 3. To acquaint them with the pattern of world distribution of rainfall.
	World Climate and Climate Change	1. To introduce the system of classification of climate. 2. To make student aware of the climatic changes and Global warming
Book 2:Un It 3	Climate: Indian Monsoon Climate	
	Unity and diversity in Monsoon Climate	To make student appreciate the diversity in climatic regimes in different parts of India

	Factors Determining the Climate of India Mechanism of Weather	To introduce the locational as well as aerodynamic factors determining Indian Monsoon. To make student understand what conditions in the subcontinent and over Indian Ocean cause the development of monsoon winds
	Nature of Indian Monsoon	To acquaint students with the concept of onset withdrawal of monsoon and breaks in monsoon
	Rhythm of Seasons	To explain the characteristics of different seasons of Indian Monsoon
	Distribution of Rainfall	To explain the distribution of rainfall and factors affecting the same
	Climatic Regions of India	To introduce to the climatic regions of India on the basis of global climatic classification system
	Monsoon and Economic Life	1. To explain how the monsoon influences the economic life in the country, particularly the agrarian economy.

Approach

In this illustrative Lesson we shall be concentrating on Climate of India, with some reference to various topics covered in the first book Fundamentals of Physical Geography. The text given in both the books is quite self-explanatory and does not warrant detailed discussion in this module. Only a few points are discussed below.

Module Elements

1. Beyond the Textbook:

For teaching the chapter on Indian Monsoon the textbook additional information can be obtained from different sources. One of the most dependable and authentic source is Indian Meteorological Department (IMD). One can access the site www.imd.ernet.in/main_new.htm and download daily weather map, satellite images of every date. Besides this the site also provides information on seismological data, seasonal or annual rainfall maps etc. The site for encyclopaedia Britannica is given

below. This also provides additional reading material that teachers should refer.
http://www.britannica.com/EBchecked/topic/121560/climate/53296/The-Indian-monsoon#tab=active~checked%2Citems~checked&title=climate%20%3A%3A%20The%20Indian%20monsoon%20--%20Britannica%20Online%20Encyclopedia

Students can be asked to collect the information on weather conditions at least rainfall during monsoon period (June to September) that is available in daily newspapers. They can draw graphs and identify the breaks in monsoon find out the duration of breaks and also link these with the normal news items related to flood or famine / scarcity conditions prevailing in their region.

Other site of interest that can be recommended is the site for Indian Ocean Monsoon http://www.crseo.ucsb.edu/esrg/IOM2. This site provides good information on mechanism of monsoon. Some of the illustrations as well as the text, given in this module, were obtained from this site. Teachers should visit this site and also encourage students to do so.

2. Monograph: The Indian Monsoon (Some Notes)

Unity and Diversity:

In the textbook a number of examples of extremes of temperature and rainfall conditions observed in different parts of the country have been given. Basic question a student may ask (or one may ask a student to try his imagination) is "why does the diversity exist"?

The energy input in a region on a global level is greatly influenced by the latitude of a place. This we have studied in a chapter on solar radiation in out book – Fundamentals of Physical Geography. The student knows the range latitudinal extent of India, from the very first chapter of the book India: Physical Environment. It is about 30o. Another

factor that influences the temperature is altitude. In this context also we find large variations in our country.

What is a Monsoon?*

The word "monsoon" appears to have originated from the Arabic word *mausim*, which means season. It is most often applied to the seasonal reversals of the wind direction along the shores of the Indian Ocean, especially in the Arabian Sea, that blow from the southwest during one half of the year and from the northeast during the other. As monsoons have come to be better understood, the definition has been broadened to include almost all of the phenomena associated with the annual weather cycle within the tropical and subtropical continents of Asia, Australia and Africa and the adjacent seas and oceans. It is within these regions that the most vigorous and dramatic cycles of weather events on the earth take place.

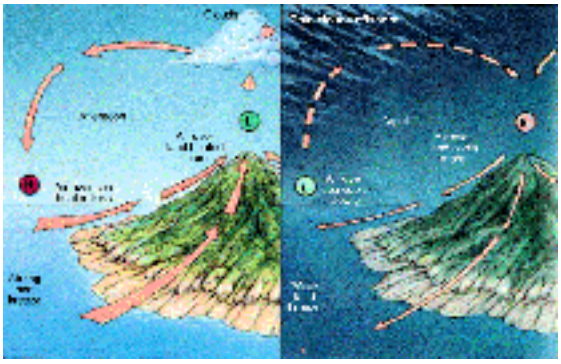
Monsoon Mechanism*

Physical mechanism: All monsoon climates share three basic physical mechanisms. These are; 1. **differential heating** between the land and oceans, 2. **Coriolis force** due to the rotation of the earth and 3. **the role of water** which stores and releases energy as it changes from liquid to vapor and back. It is the combined effect of these three mechanisms, which produces the monsoon's characteristic reversing high winds and precipitation. In the case of the Indian Ocean Monsoon the first and third mechanisms are more intense than any other place in the world. This combines with local *orographic* effects to produce the legendary "monsoons" of the Indian subcontinent

1. Differential heating: Differential heating refers to the difference in how land and water surfaces absorb heat. Water has a higher capacity for storing heat than does land surfaces. This means that the same amount of solar radiation will heat up the ground more than it will the ocean. In addition, heat absorbed by the oceans is distributed, through mixing, over a greater depth than is the heat absorbed by land surfaces.

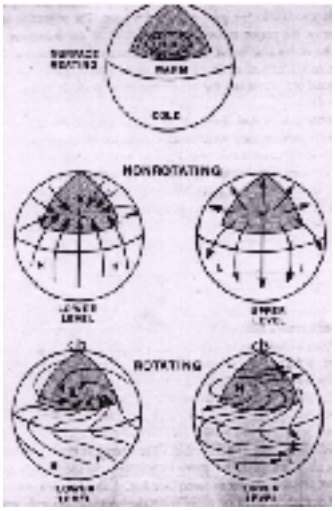
So in the summer, when the amount of solar radiation is highest, the difference between the land and ocean temperatures is highest. This causes the air over the land to heat up and expand causing it to become less dense and rise. This rising air is then replaced with neighboring moisture rich air from over the oceans surface resulting in a sea breeze.

The degree and direction of the differential heating between land and sea is determined by the amount of solar energy reaching the earth's surface. In summer the difference is greatest with the land surface warmer than the oceans causing surface winds to move onshore. In the winter the ocean surface is warmer than the land, but the effect on winds due to this difference is less than in summer. In this case the surface winds are reversed and less intense. Diurnal variability of differential heating results in a "sea breeze": When the differential heating persists over several months, as in winter and summer, strong prevailing winds are produced. These persistent prevailing winds are characteristic of a monsoon climate. Since the Indian Ocean is bounded to the north by the largest landmass on the planet, the effects of differential heating are intense.



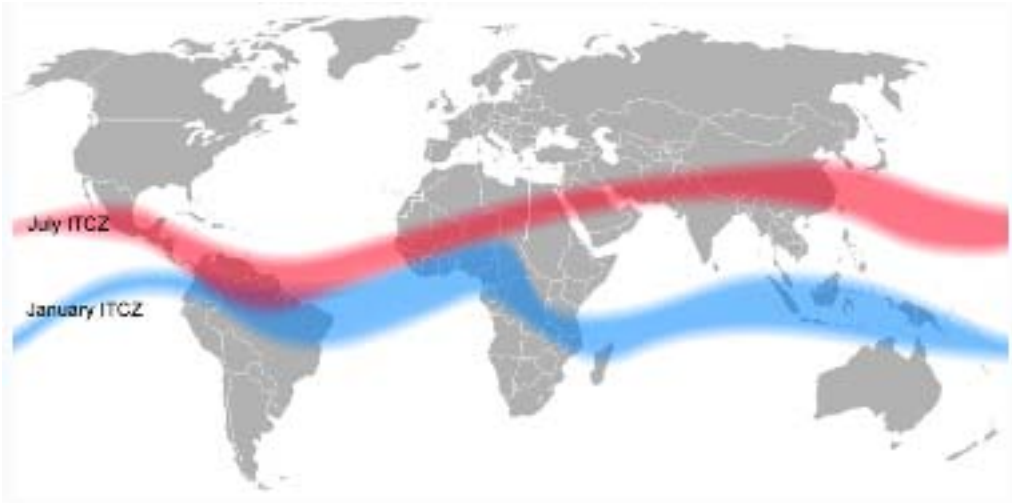
2. Coriolis Force: The large-scale differential heating of the IOM produces prevailing winds, which travel over great distances. Because of the great distances involved these winds are influenced by the Coriolis effect and veer to the right in the northern hemisphere and to the left in the southern hemisphere. Coriolis is an apparent force resulting from the Earth's rotation. Just as the outside of a record moves faster than the inside, the speed of the surface of the Earth closer to the equator moves faster than it does away from the equator. Therefore when a parcel of air or water moves over a great distance its movement must compensate for

the change in speed of the earth's surface underneath it. In the northern hemisphere this results in a change of direction to the right of the motion of the parcel. In the southern hemisphere this is reversed.



Inter Tropical Convergence Zone (ITCZ):

It is a zone of convergence of easterly winds that originate from the subtropical high pressure cells and move towards the equator. This convergence zone migrates to the north or south of the equator following the apparent movement of the Sun. Normally, as in case of the pressure belts, ITCZ shifts about 5o N / S of equator. It is interesting to note that its maximum shift is observed in the areas of Indian Ocean. This is mainly because of the fact that the continent of Asia restricts the extent of the Indian Ocean toward north. ITCZ is also referred as monsoon trough particularly in the Indian Ocean region. On daily weather maps IMD during SW monsoon season shows the location of monsoon trough. It will be interesting if teachers can refer to these maps and show the students the shifting locations of Monsoon trough. The following figure shows the January and July locations of ITCZ on a world map.



Monsoon and Economic Life*

The Indian Ocean Monsoon is more than a meteorological phenomenon however; for the people of the Indian subcontinent. The torrential rains of summer bestow life upon the parched earth left by the hot spring months. The rains end the wandering dust storms, and they provide water for irrigation and agriculture. Although generally looked upon as a godsend, the rains sometimes spell disaster, in the form of floods, for the people of India's lowlands. Sometimes the rains are insufficient resulting in droughts and famine. The winds of the monsoon have also been known to generate tropical cyclones, which are capable of causing terrible destruction to India's coastal settlements. The lives of the people who inhabit the Indian subcontinent are greatly affected by the monsoon climate. The quality of life for a particular year is determined almost entirely by the rains (or lack thereof), which occur during the summer. For an economy based on agriculture, as is India's, where the uncertainty of annual rainfall is so high, the importance of accurate prediction and modelling cannot be overstated.

*These Notes are obtained from article on Indian Ocean Monsoon available at http://www.crseo.ucsb.edu/esrg/IOM2

3. Curriculum, Unit and Lesson Plans

Teacher at the School can develop lesson plans on the Indian monsoon addressing questions across the major topics covered in the textbook and listed above:

Table 1

Sub Unit 1: Factors determining Indian Climate Mechanism of Weather	**Sub Unit 2: Nature of Indian Monsoon**	**Sub Unit 3: Rhythm of Seasons**	**Sub Unit 4: Distribution of Rainfall**
Q1. What are factors related to air pressure and wind that	Q1. What do you understand by the term break in Monsoon?	Q1. What are the seasons recognised by meteorologists?	Q1. Explain the effect of relief and topography on the distribution of

influence Indian Climate? Q.2 How does the shift of ITCZ affects Indian Monsoon? Q3. What is a Jet Stream? When do the easterly jet streams visit Indian Subcontinent?	Q2. Which part of India receives rainfall before 1st June? (refer map in the textbook) Q3. What is EL Nino? How is this phenomenon related to Indian Monsoon?	Q2. Which areas experience winter rainfall in India? Q3. A rain shadow area exists to the east of Western Ghats. Which other region do you find similar conditions? (Hint: Consider Shillong plateau and Brahmaputra Valley)	rainfall in India. Q2.What is meant by coefficient of variation? Q3. Study maps given in fig 4.11 and 4.12. Explain which parts of India have most dependable rainfall.

Table 1 (contd)

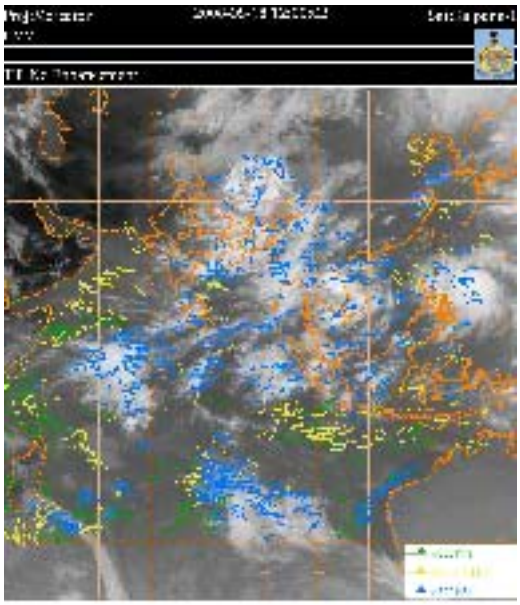
Sub Unit 5: Climatic Regions of India	**Sub Unit 6: Monsoon and Economic Life. Global Warming**
Q.1 Which part of India has E type of climate? Q2. What are the characteristics of BW type of climate? Q3. Which type of climate is observed in the coastal areas of southern Peninsula?	Q1. Explain how the vagaries of monsoon affect the agriculture in India. Q2. 'Floods and famines go hand in hand in India' Elaborate. Q3. What is global warming? How much rise in temperature is expected by the turn of this century?

In the textbooks there is mention of millibar levels.

The surface weather map is now supplemented with several upper-level charts showing the weather conditions at levels such as 700, 500, and 300-millibar levels. These levels correspond approximately to, 3000, 5500 and 9100 metres respectively.

Maps of wind direction at different millibar levels have been given in the next page along with a satellite image showing the cloud cover conditions and wind pattern. Study these maps and see how the pattern

of wind direction changes at different millibar levels. These are daily weather maps and are freely available on the IMD website quoted above. Teachers should be able to download them and show these to the students. Particularly as and when any catastrophic event (such as a cyclonic storm) occurs such maps can be obtained and explained to the students.



3B: Human Geography

The subject matter of Human Geography has been covered in two textbooks, both targeted at class XII students. Geography textbook *Fundamentals of Human Geography* provides the conceptual base and deals briefly with select human geography issues at the global level. Second textbook *India: People and Economy* pursues these discussions in more detail at the country level, aiming to deepen these concepts by tracing patterns and trends, through examples and case studies specific to India.

Between the two textbooks, an attempt has been made to introduce the learner to the main subject matter and basic concepts of Human Geography. The learner is provided with concepts, explanations and theoretical matter in textbook *Fundamentals of Human Geography*. The textbook *India: People and Economy* simultaneously provides illustrations and explanations of the same within the Indian context. The learner is thus easily able to relate to the knowledge not in an abstract way, but as something that is familiar and recognizable within her own context. This experience can be made more enriching and meaningful by the teacher if examples from the child's own village, region or community are given in the classroom.

Objectives

The main objectives of the textbooks on human geography are to deepen the learner's knowledge of important concepts and issues within human geography. Many of these concepts have been introduced at earlier stages as well. Building up on these, the present textbooks aim to further deepen the knowledge of these concepts and issues as well as to demonstrate country level patterns and trends in greater detail. All along an attempt is made to enable the child to relate these concepts and issues to her own life within the community. The emphasis throughout is not on information, but knowledge. The teacher also is required to

follow the same while transacting the textbook in class. For example, in the section on transport and communication, the teacher could emphasise the linkages that transport networks facilitate and the positive and negative consequences of the same on a region or community rather than the length of the road or rail networks. Similarly, in units dealing with population, instead of emphasising the absolute numbers, the teacher could stress on the combination of factors that makes certain regions the most populated.

At the end of the academic year, the expectation is that the learner would have a fairly detailed understanding of the following:

(i) Nature and scope of human geography, its relationship to other sub disciplines and its development over time.
(ii) The distribution of people over the world and within the country, factors that influence this, the reasons people move, the quality of population.
(iii) The wide range of human activities and how these activities are related to the physical environment.
(iv) A brief idea on critical issues as well as planning for sustainable development.

Transacting the Textbook

As has been already mentioned above, the objectives of both book I, *Fundamentals of Human Geography* and book II, *India: People and Economy* are to discuss the main themes i.e. Nature and Scope, Population, Primary, Secondary, Tertiary and Quaternary activities, Transport and Communication, Trade and Settlement in Human Geography. Book I provide the conceptual base and briefly discuss global patterns of these themes. Book II deals exclusively with the Indian context and deepens the child's knowledge of these geographical themes with respect to her own country. It is extremely important for the teacher

to stress on the synergy and synthesis between the two books. The child must learn to recognise her own country as part of the global whole and also at the same time be able to recognise universal themes and issues of human geography within her own context. This objective is defeated if the two books are treated as separate and distinct from each other. A brief overview of the books as well as the thematic linkages are discussed below before providing a more detailed demonstration of transacting specific units.

In book I, the ten chapters are grouped into four units according to theme. Unit I comprising of chapter I discusses the subject matter of human geography, touching briefly upon the debates on the man – nature relationship, the development of the discipline as well as the sub fields within it. The dynamic nature of the subject is stressed in the text and the chapter lays the foundation for a deeper discussion on some of the principle themes within human geography.

Unit II of the same book takes up the issue of population. The three chapters in this unit deal with patterns of world population distribution, population composition and human development. Unit III similarly discusses different human activities while unit IV looks at human settlements. Thus unit II to IV cover all aspects of human environment interaction beginning with the distribution of people over the earth to their various activities and their settlements.

Complementing this is the structure of book II. In this book, the twelve chapters are grouped into five units. Each unit provides a detailed country level discussion of the same aspects of human environment interaction that had been taken up in book I. Thus unit I and II deal with population and human settlements respectively while unit III and IV take up the different human activities. Unit II focuses on primary and secondary activities and includes a chapter on planning. Unit IV deals exclusively with tertiary activities. Specific contemporary human-

environmental issues are taken up for discussion from a geographical perspective in unit V.

It is important for the teacher to appreciate the continuity between the chapters as well as the complementarities between the two textbooks. Accordingly, book I opens the discussion by outlining the nature of human geography and its scope. Moving on, both the textbooks tackle the question of human population first, explaining distribution, composition and growth, before proceeding to a discussion of human activities (including the nature of settlements). Finally specific human-environmental problems which have their origin in different human activities are discussed in book II with special reference to the Indian context.

Teaching Schedule/ Sequence

The child's grasp and application of the concepts and patterns discussed in the two textbooks is greatly facilitated if the teaching schedule emphasises the complementarities between the books in general and the continuity between the units within these in particular. To this end the following teaching schedule is recommended. This is only illustrative in nature and may be modified by the teacher to suit the school calendar and weekly time table.

Proposed Teaching Sequence for Human Geography Textbooks in class XII

Teaching Sequence	*Book*	*Unit to be covered*	*Chapter Number and Name*	
1	I	I	Chapter 1: Human Geography: Nature and scope	
2	I	II	Chapter 2: The World Population: Distribution, Density and Growth	
3	I	II	Chapter 3: Population Composition	
4	II	I	Chapter 1: Population: Distribution, Density, Growth and Composition	
5	II	I	Chapter 2: Migration: Types, Causes and Consequences	

6	I	II	Chapter 4: Human Development	
7	II	I	Chapter 3: Human Development	
8	I	IV	Chapter 10: Human Settlements	
9	II	II	Chapter 4: Human Settlements	
10	I	III	Chapter 5:Primary Activities	
11	II	III	Chapter 5: Land Resources and Agriculture	
12	II	III	Chapter 6: Water Resources	
MID TERM ASSESSMENT / HALF YEARLY EXAMINATION				
13	II	III	Chapter 7: Mineral and Energy Resources	
14	I	III	Chapter 6: Secondary Activities	
15	II	III	Chapter 8: Manufacturing Industries	
16	I	III	Chapter 7: Tertiary and Quaternary Activities	
17	I	III	Chapter 8: Transport and Communication	
18	II	IV	Chapter 10: Transport and Communication	
19	I	III	Chapter 9: International Trade	
20	II	IV	Chapter 11: International Trade	
21	II	V	Chapter 12: Geographical perspective on selected issues and problems	
22	II	III	Chapter 9: Planning and Sustainable development in the Indian context	

In the teaching sequence outlined above, teaching proceeds from a conceptual base towards a deeper understanding of the same within the Indian context. This enables learners to reflect upon the concepts discussed in the light of their own experiences in contexts familiar to themselves. Students are therefore more easily able to construct and assimilate their knowledge of human geographical issues.

The subject matter of both human geography textbooks are grouped around four main themes. The first among these is that of the 'Nature and Scope of Human Geography' (book I). Following this is the theme of population. The distribution, quality, composition and development of the population follow logically from this point and are dealt with in both textbooks.

The discussion on population leads on to an enquiry into the wide range of human activities including settlements. This forms the next core

theme and can be easily linked up with the previous discussion on various aspects of the population.

From this a discussion on selected issues from a geographical standpoint can very easily be introduced. Since the issues under discussion have arisen largely due to human activities and their negative impacts on the environment, this theme too can be linked up with the one previous to it. Planning for sustainable development forms a logical conclusion to the discussion.

The transaction of the textbooks can be greatly simplified if the proposed sequence in teaching is maintained and the books are treated as complementary to each other rather than discrete. An added advantage is that the load of comprehension on the child is also suitably minimised by allowing the child to assimilate concepts whist relating them to her own contexts, first at the country level (through the textbook *India: People and Economy*) and later at the level of her region and community (to be introduced by the teacher through activities and examples).

Planning the Lesson

In transacting the textbooks in the classroom the teacher could plan the lesson by defining for herself the lesson objectives and outcome, overview, activities and local examples. Lesson objectives for both textbooks are presented below. The teacher should aim at meeting these objectives in her transaction of the lesson.

Teaching Objectives for Class XII Human Geography Textbooks			
Book I: Fundamentals of Human Geography		**Book II: India: People and Economy**	
Unit I	**Overview:** This unit familiarises the learner with the field of human geography.	Unit I	**Overview:** Drawn from the subfield of population geography,

			this unit deals with the patterns and processes of population distribution, growth and development within India.
Chapter	**Teaching Objectives**	**Chapter**	**Teaching Objectives**
1	(i) to define the subject matter and scope of Human geography (ii) to trace its development until the present period. (iii) to describe its sub fields and relationship with other social sciences. **Outcome:** i) Understands man-nature relationship. ii) Learns about the development of the discipline. iii) Know about the sub fields of the subjects and its relationship	1	(i) to discuss the uneven distribution of population over the country. (ii) to highlight the pattern of population growth for the country as a whole and the regional differences in these. (iii) to deepen the concept of population composition and attune the learner to positive and negative implications of same.
Unit II	***Overview:*** *This unit aims at discussing basic concepts and themes related to population geography. The last chapter of the unit is drawn from the field of welfare geography.*	2	(i) to clarify the concept of migrant. (ii) to discuss the causes and consequences of human migration.
2	(i) to introduce the concepts of density and distribution of population (ii) to explain the factors influencing population	3	(i) to discuss the various components of human development with reference to India. (ii) to explain the

	distribution. (iii) to explain the components of population change and its impact on an area and its surroundings.		regional variations in levels of human development in India.
3	(i) to explain different aspects of population composition such as age, sex, place of residence, literacy (ii) to enable learners to interpret age- sex pyramids and understand the implications of different aspects of population composition	Unit II	***Outcome:*** (i) learn about the population ***Overview:*** *The unit consists of a single chapter focusing on different aspects of human settlements in India. The subject area falls into the realm of settlement geography.*
4	(i) to introduce the concept of human development as the ultimate goal of development. (ii) to acquaint learners to the components and approaches to human development (iii) to enable learners to interpret human development scores ***Outcome:*** i) Learns about the world population patterns and the factors responsible for it. ii) Understand the importance of human development.	4	(i) to differentiate between rural and urban settlements. (ii) to explain the different types of rural settlement based on spacing of dwelling units (iii) to explain types of urban settlement based on function and size.
Unit III	***Overview****: The unit familiarises the learner with the concept of different economic activities and their spatial patterns. The subject matter of this unit is drawn from the field of Economic Geography*	Unit III	***Outcome:*** (i) Learn about different settlement patterns in India and their types. ***Overview****: The initial three chapters deal with*

			the distribution of important resources while the last two chapters discuss a particular category of economic activity and the concept of planning for sustainability. The subject matter of this unit is drawn largely from the field of Economic Geography.
5	(i) to describe types and spatial patterns of important primary activities.	5,6,7	(i) to discuss the distribution and utilisation of land, water, mineral and energy resources in India.
6	(ii) to deepen the concept of secondary activities. To present a classification of industries based on different factors, to describe spatial factors affecting secondary activity	8	(i) to classify industries according to ownership, raw material and end product. (ii) to present the factors involved in industrial location. (iii) to provide an overview of major existing and emerging industries and industrial regions in India.
7,8,9	(i) to deepen the concept of tertiary activity. (ii) to introduce the concept of quaternary and quinary activities (ii) to describe different types	9	(i) to introduce the concept of planning for economic development. (ii) to introduce the concept of planning for

	and spatial patterns of tertiary and quaternary activities. ***Outcome:*** (i) Learn about the major transportation routes and their importance. (ii) Learn about WTO, international trade & problems associated with it. (iii) Learn about various activities and their contribution to economy.		sustainable development.
Unit IV	***Overview:*** *Drawn from the field of settlement Geography, this unit aims to describe types and patterns of rural and urban settlements.*	Unit IV	***Overview:*** *The unit focuses on the patterns of transport and communication and the processes of international trade as important linkages.*
10	(i) to describe the types and patterns of rural and urban settlements and the geographical factors influencing these. (ii) to initiate discussion on problems of both rural and urban settlements ***Outcome:*** Understands the patterns of settlement & the geographical factors which govern them.	10	(i) to enlist the different means of transport and communication as important means of linking up the country. (ii) to demonstrate the variation and diversity in the above. ***Outcome:*** Understand the role of transport & communication in the development of country.

			Overview: *The unit focuses on the patterns of transport and communication and the processes of international trade as important linkages.*
		12	(i) to heighten awareness about contemporary issues and encourage a geographical perspective on these.

Initiating Activities and Assigning Projects

The teacher should make every effort to assign projects and initiate activities that allow the child to relate the concepts discussed in the classroom to her world outside the school. Human geography is perhaps that branch of geography that is best suited to this. The textbooks are prepared with box information and activities that allow the child to relate and apply the knowledge acquired in the classroom with the "real" world outside it. For instance in chapter 1 of book I, on page 3, the box containing the stories of Benda and Kari; similarly in chapter 8 on page 66, the box on pack animals and on page 79, the box on satellite communication. In book II chapter 7, page 78, the box on the canaries at Singareni, and in chapter 12, on page 139, the box on Daurala. In addition to those already in the textbook, the teacher could provide additional inputs drawn from the local context.

Discussions and activities could be group based rather than individual and exploratory rather than didactic. Further, it is felt that projects that involve verbal presentations should be preferred to written assignments. The former are better suited to comprehension and encourage a greater involvement. Discussions need not always be planned for the teaching periods, but may be assigned for other time

periods such as recess time, time the children spend commuting etc. Similarly many drama or debate based activities can be planned as part of the children's co curricular activities. A small time slot in the school assembly could also be used to make presentations related to themes discussed in the classroom.

News items relating to hazards, disasters, plans, policies or other events of importance could be immediately related to any one of the core themes of the textbooks and students could be asked to discuss and asses the same, particularly on its impact, however distant, on the region in which the child lives. The underlying idea is for the teacher to be able to demonstrate the linkages in the present day world and the impact that each and every event could have on not just its immediate vicinity but across the world. Further, this would eventually also demonstrate that as a social science the scope of (human) geography is unsurpassed and nearly all encompassing. For example a news item on hunger due to food spiral appearing in Times of India, July 5th, page 21 can be used as a discussion piece in the chapter dealing with human development, primary activities as well as international trade. The same can also be used in the chapter on planning for sustainable development in book II. Similar news items can be compiled from the local and even vernacular publications. Above all, why a particular event occurred over or how it impacted a particular place needs to be discussed in order to habituate the learners into using the geographical perspective. Chapter 12 in book II provides ample scope and is ideally suited to this. As far as possible the teacher should encourage the use of maps in such discussions.

The teacher must constantly encourage the children to identify examples of the concepts taught from within their own area. Knowledge of the same is thus a prerequisite. For this the teacher needs to be aware of the children's life worlds and familiar with the region itself. An interesting way to do this would be to initiate a discussion followed by a

presentation on the specific topic/chapter studied with special reference to the particular region/state/city within which the school is sited.

In addition, techniques explained in the textbook for practical geography can be applied in small exercises and activities customised to each chapter/unit. Some examples to this end could be as follows:

(i) Calculation of population density and growth of the state and district within which the school is located. This exercise would include sourcing the data from census volumes, calculation of the population density and growth rates as well as appropriate graphical representation of the same.

(ii) Survey involving collection of data regarding migrants within the colony followed by graphical representation of causes of migration (i.e. marriage, economic factors, cultural reasons, political reasons and so on).

(iii) Sourcing data on life expectancy, literacy rates and per capita incomes for all the districts in the state the school is located. Comparison and compilation of the same to arrive at a conclusion about the state of human development in the state.

(iv) Exercises involving an understanding and representation of the types of economic activities practiced in the town or locality and a classification of the town based on the nature of functions.

Resources Needed

Resources required to efficiently transact the textbooks would include teaching aids as well as data sets.

a) Teaching Aids

- Wall mounted physical and political maps of the world and India would be an important teaching aid in the transaction of the books
- In addition the teacher could compile relevant newspaper articles, and features to support the different chapters in the textbooks.

- District Census handbook and gazetteers

A series of maps depicting the district and state within which the school is located with reference to the topics covered in the textbook such as population patterns, economic activities, human development etc would also be a useful resource. The involvement of students in the preparation of the same would greatly enhance their understanding of their local contexts in relation to the larger state country or global contexts.

b) Data Sets

Data sets will consist primarily of:

(i) Relevant volumes of Census of India

(ii) National Sample Survey

ILLUSTRATIVE LESSON 1

Title: Population: Distribution, Density, Growth and Composition

[Unit II, Chapter 2 and 3 in *Fundamentals of Human Geography* and Unit I, Chapter 1 in *India: People and Economy*

Overview of contents

The subject matter of these chapters is drawn from the field of population geography. The main themes are the uneven distribution of population, its density, growth and composition. The text articulates the factors responsible for the uneven distribution of population and enquires into factors influencing population density. Further, the main components of population growth, viz births, deaths and migrations are discussed. Finally, different aspects of population composition such as age, sex, literacy are discussed along with the implications of the same for the country's growth and development.

The scale of enquiry and bandwidth of discussion differs in both books. Book I deals with these themes in a generalised manner broadly tracing global patterns with emphasis on the conceptual base. In book II these themes find a more in-depth and detailed description with specific reference to the Indian context.

Lesson Objectives

The lesson objectives for the selected chapters have been summarised below:

(i) Concepts of population distribution, density, growth and composition are to be clarified and differentiated

(ii) Spatial patterns of population distribution and density are to be explained with reference to the geographical factors that influence these

(ii) Trends in population growth are to be discussed

(iv) Aspects of population composition are to be discussed

(iii) Age sex pyramids are to be interpreted

In order to operationalise these objectives, the teacher could supplement the text with additional information from other sources such as newspaper reports, articles etc.

In the case of objective (i) a discussion on the finer nuances followed by a neat tabulation of the concepts would be helpful. The teacher could also initiate critical questions such as whether population distribution and density mean the same thing. If not then how do they differ? Can a densely populated area have a slow growth of population? Are the density of population and its composition related in any way? The child may be encouraged to seek answers to these by delving into examples and instances from within her own region/ city/village. In fact each aspect of these concepts may be discussed additionally in this context.

The question of population composition could be discussed in a similar fashion and the teacher could ask the child to map these using cartographic techniques learnt in the practical section.

Suggested Activities

The activities initiated must enhance the understanding of key concepts and values transacted in the chapter, sharpen the analytical skills and add to an understanding of the local context in relation to country level and global patterns. To meet this end, the following activities are suggested for this unit/chapter.

(i) Mapping of population density and distribution of the state within which the school is located.

(ii) Comparison of population density of the district within which the school is located with that of the state and country. Discussion of whether the district and state conform to the patterns or are exceptions and the reasons for the same.

(iii) Survey of the locality to identify migrants and the reasons for their migration. Graphical representation of the findings. Role play of a migrant's story.

ILLUSTRATIVE LESSON – 2

Topic: Secondary Activities, Manufacturing Industries

[Unit III, Chapter 6 in *Fundamentals of Human Geography* and Unit III, chapter 8 in *India: People and Economy*]

Overview of Contents

The subject matter of these chapters is drawn from the field of economic geography. The main themes are the factors that influence industrial location, the many bases on which industries can be classified as well as the importance of specific industries and industrial regions. As mentioned earlier, the treatment of these themes differs in both books. Book I deals presents a generalised picture broadly tracing global patterns with emphasis on the conceptual base. In book II these themes find a more in-depth and detailed description with specific reference to the Indian context.

Lesson Objectives

The lesson objectives for the selected chapters have been summarised below:

(i) to deepen the concept of secondary activities and locate manufacturing as an activity in this group.

(ii) to highlight the factors influencing the location of manufacturing industries and the changing relative importance of these.

(iii) to present a classification of industries based on different parameters.

(iv) to discuss the location and importance of specific industries and industrial regions within the global and country level context.

To meet objective (i) a chart differentiating between the three types of economic could be displayed along with a detailed discussion with examples. For objective (ii) the changing importance of each factor due to an increase in the level of technology, enhancement in means of

transport and communication, rising transport and labour costs in the present day context can be discussed with suitable examples and pictorial representations. The teacher can demonstrate the classification of industries using a chart but should stress that the present schema is not exhaustive and newer ways of classifying industries could be possible with a change in context and a broadening of parameters. Similarly, while transacting objective (iv) the teacher should emphasise the changing importance of specific industries and industrial regions with change in context (for example with the development of synthetic fibres does cotton textile industry still retain its importance?)

Suggested Activities

(i) Classify the population of your state into different categories of workers according to the economic activity they pursue. What does this tell you about your state?

(ii) From maps showing the distribution of industries, identify the most important industry in your region. Compare your findings with a map showing the distribution of minerals. Is there is any co relation between the two?

(iii) Imagine you live in a sparsely populated district of the country with low levels of human and economic development. A team of exploration geologists have discovered reserves of oil and natural gas in the district. Write a report evaluating the type of industries that are likely to develop and the positive and negative consequences of this activity on the people of the district.

3C: Practical Work in Geography

Introduction

The purpose of this part of the manual is to give some ideas to the teachers about teaching Practical work in Geography- though each of them may be imparting training in their own unique way, which may be perfectly suitable for their students. Teaching Practical Work in Geography is important as it is supposed to be a 'hands on' training which, if well taught awakens creative interest about what the students have learnt in theoretical geography. It is based on teaching Geography "in the field", and/or "learning by doing" and is usually assessed through a combination of fieldwork and project reports in both written and oral form.

The aim of the Practical Work in Geography subject is to develop, from a geographic point of view, knowledge of the patterns and processes which operate in a cognizable area. This can be done by relating the techniques taught in Practical Geography to the topics taught in theoretical portion in Physical or Human Geography for the World or for India, and applying these skills to a local area, with which the students are familiar.

Objectives

Practical Geography aims to develop:

1. ***Concepts:*** Developing geographic understandings of the natural and cultural environment and patterns of change and movement, by concentrating on the local area. The selection of the local area is at the teacher's discretion. At this age of globalization, a teacher of a school located in a metropolitan city may well select comparisons of Indian and world cities, while better results would be achieved among the students of a school in a rural setting if the selected area is one that the students are conversant with and can relate to. The final aim is however the same in both cases- enhance

comprehension of different concepts taught in geography in the theory papers.

2. ***Skills***: The skills necessary to enquire about understand and represent geographic concepts, such as finding and using information from both primary and secondary sources, and developing mapping, graphical, mathematical, social, practical, laboratory and field skills.

3. ***Attitudes, values and active citizenship***: A concern for the well-being of place, and sufficient knowledge of decision-making processes to enable the student to contribute to them if desired.

Teaching practical geography is a matter of great deal of responsibility. It has the potential to make the issues taught in the theoretical component "come alive" through practical experiences. Thus the vision of teaching this course is far more than making the students aware of a few techniques only.

Transacting the Textbook

The teacher can achieve the larger vision by choosing an example of a particular region/ sub-region as suggested above, for which information is easily available. While teaching the different methods in the practical geography textbooks of Class XII, for example, a good idea would be to plan out the field survey in the beginning of the year, and generate data about the region from primary survey (and possibly some from secondary sources about the district or the block where the village/ urban area is located in). This data then can be used for teaching applications of data processing (both manually by making master sheets and in the computer wherever possible) and doing graphical representation of data (once again both manually and using the computer). The work done by the individual students can then be presented in the class in an interactive mode to

increase their involvement in the 'project'. All this would serve well in realizing the following outcomes, other than the direct goals of learning the methods and techniques.

1. Understand of the characteristics of the natural environment in the surveyed area.
2. Understand of the characteristics of the cultural environment in the surveyed area.
3. Understand the changing nature of the surveyed area over time.
4. Understand patterns of movement in the surveyed area.
5. Use a range of fieldwork techniques to collect information about geographical patterns and processes.
6. Use a range of geographic techniques to organise, analyse, synthesise and present data.
7. Communicate ideas and information.
8. Use mathematical ideas and techniques to quantify and analyse geographical patterns.
9. Work effectively as a member of a team.
10. Individually plan, organise and carry out an extended investigation, based on fieldwork.

Lesson: 'Data Processing' in Practical Work in Geography, Part II

Chapter 2 'Data Processing' in the Class XII textbook, Practical Work in Geography, Part II is being taken here as a case for this teaching manual. This chapter lays the foundation for chapters 3 and 4, and can be linked with chapter 5 also.

Measures of Central Tendency and Measures of Dispersion are primarily restricted to **descriptive statistics**. Correlation is the only topic that is included in the syllabus that falls in the category of **inferential statistics**. It may be useful to make a reference here to the difference in descriptive and inferential statistics. While **descriptive statistics** are used to reveal patterns through the analysis of numeric data, **inferential statistics** are used to draw conclusions and make predictions based on the analysis of numeric data.

One cannot deny the importance of statistics in interpreting geographical facts. Geography on its own misses the detail required to target interest. Although topographical maps are selective representations of the real world and imagery is a true reflection of the same world but they do not reflect the socio-economic attributes of that world. Their application vests in orientation, locality determination and feature - and pattern recognition. Adding statistics to geographical maps gives a fuller sense of why one area is different than the other and captures interest. However, static geographies do not reflect the dynamic nature of demography and the actual situation on the ground.

Even though many of us may not have realised it, but we do make some statistical statements in our everyday conversation or thinking. Statements like "On an average I sleep for about eight hours every night" and "You are more likely to gain good marks in the exam if you start preparing earlier" are actually statistical in nature. So are everyday observations that are relevant geographically like “This year it has rained more than normal”. It may be more appealing to the students to explain the rationale of statistics using an example from everyday life.

Statistics is a discipline which is concerned with:

- designing experiments and other data collection,
- summarizing information to aid understanding,
- drawing conclusions from data, and
- estimating the present or predicting the future.

Resources for Teaching

Data relating to geographical phenomenon preferably from published sources, e.g. year book, statistical abstract, census can be used for explaining.

a. Data on population-density, literacy, heights of mountain peaks, are useful for illustrating examples of averages.
b. Rainfall data is extremely useful for explaining modal distribution, standard deviation and coefficient of variations.
c. For teaching correlation in the class, calculations can be carried out in the class using data abut two variables that are causally related. For example, agricultural productivity and percentage of irrigation area, electricity consumption and percentage of urban population, share of tribal population and percentage of area under forest etc. could be taken to illustrate causal relationships.
d. News items e.g. oil prices in different cities, crime rates in cities, composition of IPL teams etc. can be used as statistical data in the classroom.

A blackboard and chalk has no substitute- the degree of interaction is probably the best with this medium. An overhead projector or a LCD can be used effectively for showing various types of examples, but are entirely optional resource. LCD can be effectively used to show some of the interactive exercises available on the net.

Use of simple calculators in the classroom would make calculations faster and give the students time to practice different types of examples in the class. Simultaneous use of computers to show how a method can be computed using simple soft wares like Excel would not only cover chapter 4 simultaneously, but save a lot of time. A word of caution, though. The students must attempt exercises manually before using the computer, or preferably even the calculator. The computer is an add-on device, and should be treated as such.

Teaching Hints

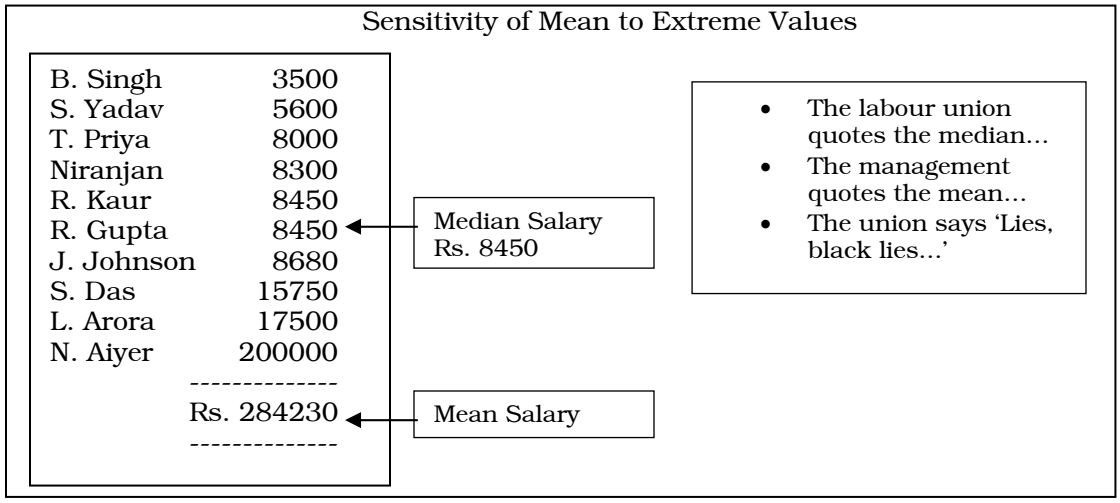
1. Teaching statistics in the class sometimes could become uninteresting and dry to students, particularly to those to whom

numbers do not appeal. The trick is to link the numbers to interesting examples, may be an issue which has been in news lately (oil prices, crime rates in cities, composition of IPL teams etc.). It is desirable that the teachers take some examples from the textbooks *Fundamentals of Human Geography* and *India: People and Economy* to answer some of the questions relevant to those topics (e.g. How far behind is India from world average Human Development Index; What is the difference between the highest and the average, and lowest and the average wheat productivity in India at the state level; What is the median age at marriage for women if you look at the state level data in India, etc).

2. Displaying graphs on the blackboard to explain frequency distribution, scatter plots for showing different kinds of correlation (positive, negative, no correlation) helps the students to comprehend the problem better.
3. For explaining the concept of numerical variables, all the students can relate to simple examples like sex (categorical), age (continuous), number of siblings (discrete).
4. Frequency Distribution is a key topic that is taught while teaching the first chapter. Though apparently simple to those teaching it, it needs to be remembered that it is often confusing to the students and can be mixed up with other sorts of bar graphs.
5. Means and medians can be taught with the same examples that has been used in the class to teach distribution. For example, if the example of rainfall has been taken to explain its distribution in a region, average or median rainfall can be explained using the same set of data. It is often a good idea to ask the students to collect the data from a particular source. This way they learn the source of the data, and also feel involved in the class if their data is used in the class. Needless to say, it would be preferable to take

data from all the students who show enough interest to bring it to the class, by turn.

6. While teaching mean, median and mode, it is useful to use the same data set- this enables the student understand the concept better. The teacher then can explain the reason the three values are different and compare it with a data set where these values are identical. The following example may appeal to the students:



7. While teaching the methods of dispersion, it is important to make a distinction between standard deviation and coefficient of variation. It is required for the conceptual understanding. For example, two students can be asked to get the rice productivity data of Punjab and Madhya Pradesh for about ten consecutive years. They may be asked to calculate both standard deviation and coefficient of variation for both data sets and then compare the results. The teacher then can interpret the results for the students and point out the concept of absolute and relative dispersion.
8. During acquainting the students with the concept of correlation, it would be worthwhile to give them an example of spurious correlation. An example of spurious correlation could be demonstrated with the data of population of USA and India in any ten years. It can then be explained that though the correlation

coefficient is high as both are increasing with time, there is no causal relationship between them.

A Note on Variables

Quantities such as sex and weight are called variables, because the value of these quantities varies from one observation to another. Broadly there are two types of variables: Qualitative and Quantitative (or Numeric). Qualitative data always have a limited number of alternative values; such variables are also described as Discrete. All Qualitative data are Discrete, while some Quantitative data are Discrete and some are Continuous. Qualitative and Quantitative data are broken down into two sub-types: Qualitative data can be Ordinal or Nominal, and Quantitative data can be discrete or Continuous.

Qualitative Data: Qualitative data arise when the observations fall into separate distinct categories. Examples are:

- Height of ethnic groups: short tall medium etc.
- Socio-economic status: low, middle or high.

Such data are inherently discrete, in that there are a finite number of possible categories into which each observation may fall.

It may be noted here that the process of data collection is different for discrete (counting) and continuous (measuring) data are different.

Qualitative data are classified as:

- **nominal** if there is no natural order between the categories (e.g. eye colour), or
- **ordinal** if an ordering exists (e.g. exam results, socio-economic status).

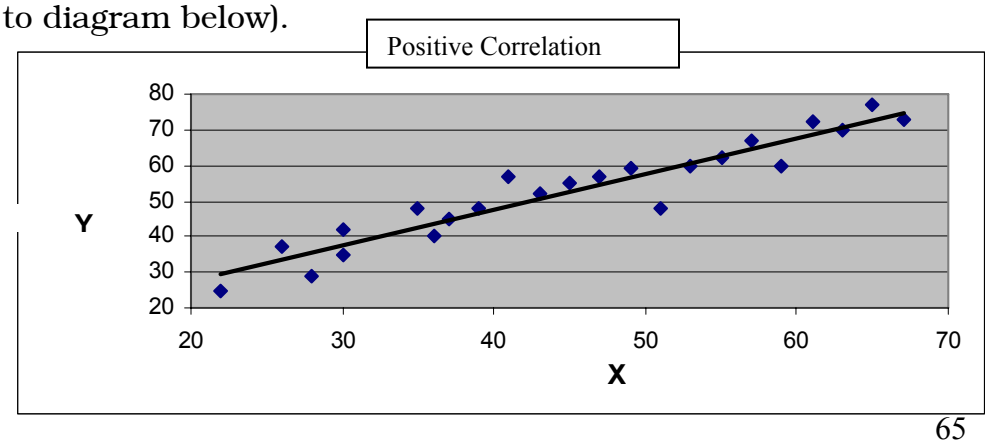
Quantitative Data: Quantitative or numerical data arise when the observations are counts or measurements. The data are said to be discrete if the measurements are *integers* (e.g. number of people in a household) and *continuous* if the measurements can take on any value, usually within some range (e.g. productivity of a crop).

A note on Scatter Plots: Scatter Plots (also called scatter diagrams) are used to investigate the possible relationship between two variables that both relate to the same "event." A straight line of best fit (using the least squares method) is often included.

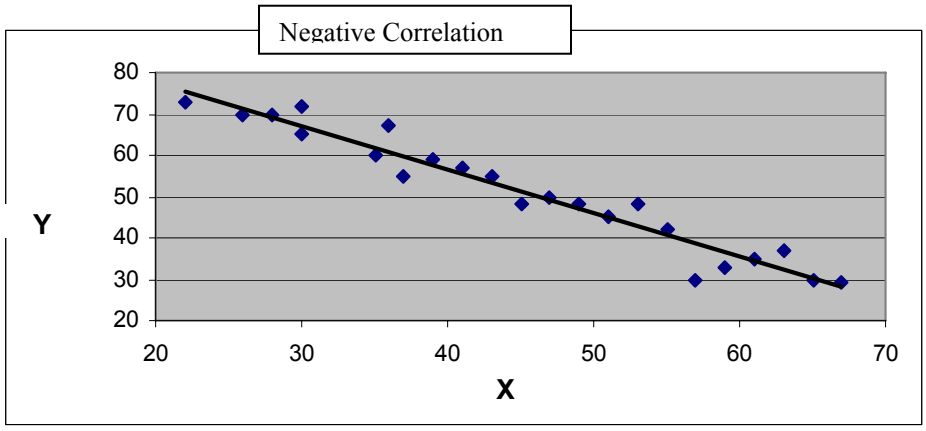
Things to look for:

- If the points cluster in a band running from lower left to upper right, there is a positive correlation (if x increases, y increases) (refer to diagram below).
- If the points cluster in a band from upper left to lower right, there is a negative correlation (if x increases, y decreases) (refer to diagram below).
- Imagine drawing a straight line or curve through the data so that it "fits" as well as possible. The more the points cluster closely around the imaginary line of best fit, the stronger the relationship that exists between the two variables.
- If it is hard to see where you would draw a line, and if the points show no significant clustering, there is probably no correlation (refer to diagram below).

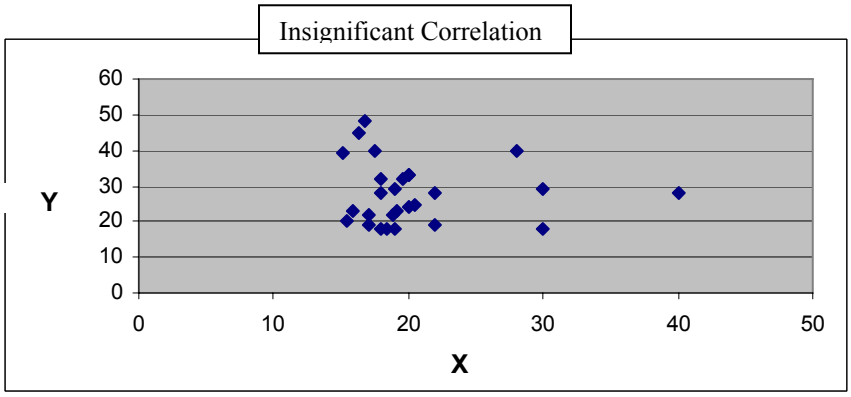
(a)



(b)

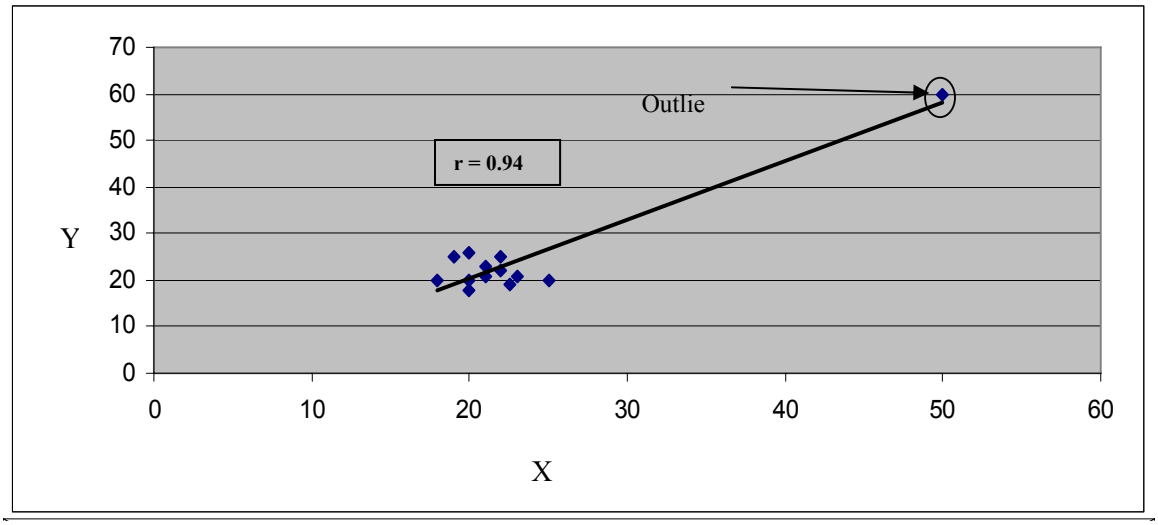


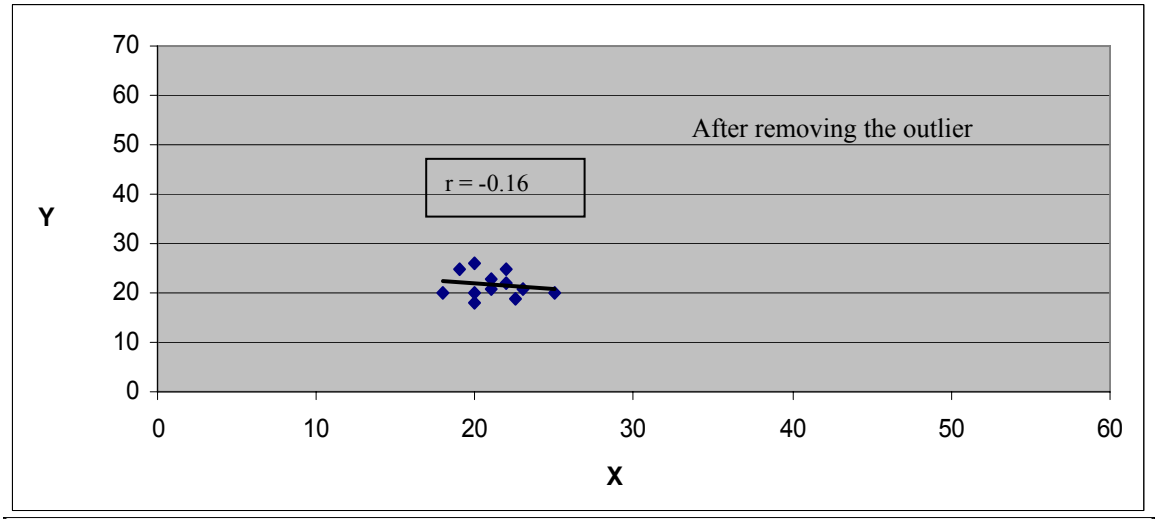
(c)



A note on Outliers or Extreme Values

Outliers are atypical, infrequent observations. Very simply, they can be called as extreme values. Outliers have a profound influence on the measures of central tendencies and the trend-line showing the relationship between two variables. A single outlier is capable of considerably changing the value of the correlation, as demonstrated in the following example. Note, that as shown on that illustration, just one outlier can be entirely responsible for a high value of the correlation that otherwise (without the outlier) would be close to zero. Needless to say, one should never base important conclusions on the value of the correlation coefficient alone (i.e., examining the respective scatter plot is always recommended).





Typically, we believe that outliers represent a random error that we would like to be able to control. Unfortunately, there is no widely accepted method to remove outliers automatically thus what we are left with is to identify any outliers by examining a *scatter plot* of each important correlation. Needless to say, outliers may not only artificially increase the value of a correlation coefficient, but they can also decrease the value of a "legitimate" correlation.

What should your students know after you teach them Descriptive Statistics?

1. Know the meaning of the following terms:

statistics	sample	population
variable	constant	measurable
product	quotient	ratio

2. Be able to tell what is studied in descriptive statistics and in inference.
3. Be able to distinguish between population and sample.
4. Be able to distinguish between qualitative and quantitative variables and to give examples of each type.
5. Be able to distinguish between discrete and continuous variables and to give examples of each type.
6. Be able to read information from a graph and to identify the shape of a distribution.
7. What is an outlier in a data?
8. Be able to judge if a graph is misleading.
9. Be able to find the mean, median, mode, range, standard deviation, variance of a variable from raw data.
10. Be able to group data into a frequency distribution table (from a list of data or from a histogram).
11. Be able to find the approximation for the mean, median, mode, range, standard deviation, variance of a variable from grouped data.
12. Use the mean and median as a tool to identify the shape of a distribution.
13. Be able to find and interpret percentiles, quartiles for raw and grouped data. Be able to calculate the interquartile range.

Relating Theoretical Components of the Syllabus with the Skills Learnt in Practical Work in Geography

In Practical Work in Geography, students learn the tools which help them to analyse or understand the issues they learn in theory. In this section we will relate the Unit I of *India: People and Economy* with the *Practical Work in Geography.* The teacher can develop similar exercises for other sections taught in the theoretical part. These exercises can be

expanded, given the interest of the students in the class. The aim is to develop a greater understanding of the students on issues tackled in the class through application of techniques taught under Practical Work in Geography. These exercises should aim at making the students aware of his/her surroundings by way of analyzing the information of their own state/district/city/village.

Note: For each of the suggested exercises, the teachers can ask the student to find out whether the pattern in their state/district/city conforms to the general pattern of the country/state, as the case may be, or is an exception to the general pattern. If it is an exception, the student may be asked to find out the reasons for this.

Suggested Exercises Relating to Unit 1 of *India: People and Economy*

1. Calculate of density of population using tables 2 and 5 using Excel software. Calculate the population density of India and find out where this value lies between the maximum and minimum densities of states. Collect the population density data of the district within which the school is located. (The same exercise can be done for the district in which the school is located by collecting the information from Census of India).
2. Use the calculated value of population density to map it with a suitable technique. Analyse the map and comment on the position of your state with respect to the rest of the country. (Use categories that are different from the one given in your Class XII book *India: People and Economy* in Figure 1.2). In what way is this map different from Figure 1.1 that is given in your Class XII book *India: People and Economy*?
3. Compare the population growth and density (Table 14 and your calculation from q1). Analyse this in a suitable manner

and comment on whether states with high density of population have experienced high growth (hint: xy scatter; form category and cross tabulate). What is the position of the state in which your school is located in? (The same exercise can be done for the district in which the school is located by collecting the information from Census of India).

4. Construct a table similar to Table 1.3 in *India: People and Economy* for your state and district (Source of Data: Census of India, 2001; the teacher may help the students to obtain this information). Compare these with Table 1.3 using suitable cartographic technique.
5. Work out the rates of urbanisation in different states of India (percentage of urban population to the total population). What is the rate of urbanisation in India? How different is it from the state and district in which you come from (Delhi students can do this comparison for Haryana and Gurgaon, or Uttar Pradesh and Faridabad, which they may have visited)? Construct a map of urbanisation using the data you have calculated and analyse it.
6. Work out the rural and urban work force participations (example: rural workforce participation=rural worker/rural population *100) (Use the data provided in Tables 2 and 3). The chances that a person is working are more in which locality- rural or urban? What is the status of the state in which your school is located? (The same exercise can be done for the district in which the school is located by collecting the information from Census of India).
7. Work out the male and female work force participations (example: female workforce participation=female worker/female population *100). (Use the data provided in Tables 2 and 3). If you are a female/male, is the chance that

you would work more or less compared to the other sex? What is the status of the state in which your school is located in terms of male and female work force participation? (The same exercise can be done for the district in which the school is located by collecting the information from Census of India). Calculate the mean and coefficient of variation for male and female work force participation. For which variable is the disparity across states higher? After this analysis, can you add to the information that is given in page 13 of *India: People and Economy*?

8. Using Tables 9 to 14, can you compare the nature of migration of four states that are located in four different parts of your country, with that of the country as a whole, using suitable cartographic techniques? In which of these states is mobility to other states the highest? Can you offer an explanation for this? After this analysis, what can you add to what you have learnt in Chapter 2, *India: People and Economy*?

9. What is the nature of difference between male and female literacy? Map these two variables and analyse. Which are the two states where the gender disparities are the maximum and minimum? Where do your state stand in terms of gender disparity of literacy rates. (The same exercise can be done for the district in which the school is located by collecting the information from Census of India).

10. Compare the literacy rates and per capita incomes of different states in India (Tables 1 and 4); what is the relationship of these two variables? (Hints: any one or two of these activities may be suggested- correlation, xy scatter, mapping the two variables and comparing in a descriptive manner- the use of computer would make the task easy and

fast). Comment on the characteristics of these two parameters of your state with respect to the rest of the state. Try and relate Unit 1, Chapter 3.

11. Can you construct a similar diagram for your state and district to Fig. 5.1 and compare them with it? (Data for the state and the district would be available in statistical abstract of India and the state respectively).

12. Using Tables 6-8, create area profiles for a developed and developing state of India and compare their characteristics to that of India. Students can do the same for their own state and district (data is available online in the website of Census of India). Use suitable cartographic techniques to compare the different variables of the two states and India. Try and relate this analysis to what has been learnt in chapter 9 (unit III).

Data for Suggested Exercises

Table 1: Per Capita State Domestic Product in India

S.No.	State\UT	2004-05 Rs. Per capita
1	Andhra Pradesh	23153
2	Arunachal Pradesh	19724
3	Assam	13633
4	Bihar	5772
5	Jharkhand	13013
6	Goa	58677
7	Gujarat	28355
8	Haryana	32712
9	Himachal Pradesh	27486
10	J & K	16190
11	Karnataka	23945
12	Kerala	27048
13	Madhya Pradesh	14069
14	Chattisgarh	15073
15	Maharashtra	32170
16	Manipur	14901
17	Meghalaya	19572
18	Mizoram	22207
19	Nagaland	20746
20	Orissa	13601
21	Punjab	30701
22	Rajasthan	16212
23	Sikkim	24115

24	Tamil Nadu	25965
25	Tripura	20357
26	Uttar Pradesh	11477
27	Uttaranchal	19652
28	West Bengal	22497
29	A & N islands	28340
30	Chandigarh	67370
31	Delhi	53976
32	Pondicherry	56034

Source: Central Statistical Organisation, Government of India.

Table 2: State-wise Rural/Urban and Male/ Female Population in India

S No.	State	T/R/U	Persons	Males	Females
1	Andaman & Nicobar Islands	Total	356,152	192,972	163,180
2	Andaman & Nicobar Islands	Rural	239,954	128,961	110,993
3	Andaman & Nicobar Islands	Urban	116,198	64,011	52,187
4	Andhra Pradesh	Total	76,210,007	38,527,413	37,682,594
5	Andhra Pradesh	Rural	55,401,067	27,937,204	27,463,863
6	Andhra Pradesh	Urban	20,808,940	10,590,209	10,218,731
7	Arunachal Pradesh	Total	1,097,968	579,941	518,027
8	Arunachal Pradesh	Rural	870,087	454,680	415,407
9	Arunachal Pradesh	Urban	227,881	125,261	102,620
10	Assam	Total	26,655,528	13,777,037	12,878,491
11	Assam	Rural	23,216,288	11,939,945	11,276,343
12	Assam	Urban	3,439,240	1,837,092	1,602,148
13	Bihar	Total	82,998,509	43,243,795	39,754,714
14	Bihar	Rural	74,316,709	38,594,996	35,721,713
15	Bihar	Urban	8,681,800	4,648,799	4,033,001
16	Chandigarh	Total	900,635	506,938	393,697
17	Chandigarh	Rural	92,120	56,816	35,304
18	Chandigarh	Urban	808,515	450,122	358,393
19	Chhattisgarh	Total	20,833,803	10,474,218	10,359,585
20	Chhattisgarh	Rural	16,648,056	8,307,443	8,340,613
21	Chhattisgarh	Urban	4,185,747	2,166,775	2,018,972
22	Dadra & Nagar Haveli	Total	220,490	121,666	98,824
23	Dadra & Nagar Haveli	Rural	170,027	91,832	78,195
24	Dadra & Nagar Haveli	Urban	50,463	29,834	20,629
25	Daman & Diu	Total	158,204	92,512	65,692
26	Daman & Diu	Rural	100,856	63,606	37,250
27	Daman & Diu	Urban	57,348	28,906	28,442
28	Delhi	Total	13,850,507	7,607,234	6,243,273
29	Delhi	Rural	944,727	522,087	422,640
30	Delhi	Urban	12,905,780	7,085,147	5,820,633
31	Goa	Total	1,347,668	687,248	660,420
32	Goa	Rural	677,091	340,545	336,546
33	Goa	Urban	670,577	346,703	323,874

34	Gujarat	Total	50,671,017	26,385,577	24,285,440
35	Gujarat	Rural	31,740,767	16,317,771	15,422,996
36	Gujarat	Urban	18,930,250	10,067,806	8,862,444
37	Haryana	Total	21,144,564	11,363,953	9,780,611
38	Haryana	Rural	15,029,260	8,052,988	6,976,272
39	Haryana	Urban	6,115,304	3,310,965	2,804,339
40	Himachal Pradesh	Total	6,077,900	3,087,940	2,989,960
41	Himachal Pradesh	Rural	5,482,319	2,756,073	2,726,246
42	Himachal Pradesh	Urban	595,581	331,867	263,714
43	Jammu & Kashmir	Total	10,143,700	5,360,926	4,782,774
44	Jammu & Kashmir	Rural	7,627,062	3,977,652	3,649,410
45	Jammu & Kashmir	Urban	2,516,638	1,383,274	1,133,364
46	Jharkhand	Total	26,945,829	13,885,037	13,060,792
47	Jharkhand	Rural	20,952,088	10,679,596	10,272,492
48	Jharkhand	Urban	5,993,741	3,205,441	2,788,300
49	Karnataka	Total	52,850,562	26,898,918	25,951,644
50	Karnataka	Rural	34,889,033	17,648,958	17,240,075
51	Karnataka	Urban	17,961,529	9,249,960	8,711,569
52	Kerala	Total	31,841,374	15,468,614	16,372,760
53	Kerala	Rural	23,574,449	11,451,282	12,123,167
54	Kerala	Urban	8,266,925	4,017,332	4,249,593
55	Lakshadweep	Total	60,650	31,131	29,519
56	Lakshadweep	Rural	33,683	17,191	16,492
57	Lakshadweep	Urban	26,967	13,940	13,027
58	Madhya Pradesh	Total	60,348,023	31,443,652	28,904,371
59	Madhya Pradesh	Rural	44,380,878	23,031,093	21,349,785
60	Madhya Pradesh	Urban	15,967,145	8,412,559	7,554,586
61	Maharastra	Total	96,878,627	50,400,596	46,478,031
62	Maharastra	Rural	55,777,647	28,458,677	27,318,970
63	Maharastra	Urban	41,100,980	21,941,919	19,159,061
64	Manipur	Total	2,293,896	1,161,952	1,131,944
65	Manipur	Rural	1,590,820	808,953	781,867
66	Manipur	Urban	575,968	286,681	289,287
67	Meghalaya	Total	2,318,822	1,176,087	1,142,735
68	Meghalaya	Rural	1,864,711	946,999	917,712
69	Meghalaya	Urban	454,111	229,088	225,023
70	Mizoram	Total	888,573	459,109	429,464
71	Mizoram	Rural	447,567	232,726	214,841
72	Mizoram	Urban	441,006	226,383	214,623
73	Nagaland	Total	1,990,036	1,047,141	942,895
74	Nagaland	Rural	1,647,249	859,716	787,533
75	Nagaland	Urban	342,787	187,425	155,362
76	Orissa	Total	36,804,660	18,660,570	18,144,090
77	Orissa	Rural	31,287,422	15,748,970	15,538,452

78	Orissa	Urban	5,517,238	2,911,600	2,605,638
79	Pondicherry	Total	974,345	486,961	487,384
80	Pondicherry	Rural	325,726	163,703	162,023
81	Pondicherry	Urban	648,619	323,258	325,361
82	Punjab	Total	24,358,999	12,985,045	11,373,954
83	Punjab	Rural	16,096,488	8,516,596	7,579,892
84	Punjab	Urban	8,262,511	4,468,449	3,794,062
85	Rajasthan	Total	56,507,188	29,420,011	27,087,177
86	Rajasthan	Rural	43,292,813	22,426,640	20,866,173
87	Rajasthan	Urban	13,214,375	6,993,371	6,221,004
88	Sikkim	Total	540,851	288,484	252,367
89	Sikkim	Rural	480,981	255,774	225,207
90	Sikkim	Urban	59,870	32,710	27,160
91	Tamil Nadu	Total	62,405,679	31,400,909	31,004,770
92	Tamil Nadu	Rural	34,921,681	17,531,494	17,390,187
93	Tamil Nadu	Urban	27,483,998	13,869,415	13,614,583
94	Tripura	Total	3,199,203	1,642,225	1,556,978
95	Tripura	Rural	2,653,453	1,363,638	1,289,815
96	Tripura	Urban	545,750	278,587	267,163
97	Uttar Pradesh	Total	166,197,921	87,565,369	78,632,552
98	Uttar Pradesh	Rural	131,658,339	69,157,470	62,500,869
99	Uttar Pradesh	Urban	34,539,582	18,407,899	16,131,683
100	Uttaranchal	Total	8,489,349	4,325,924	4,163,425
101	Uttaranchal	Rural	6,310,275	3,144,590	3,165,685
102	Uttaranchal	Urban	2,179,074	1,181,334	997,740
103	West Bengal	Total	80,176,197	41,465,985	38,710,212
104	West Bengal	Rural	57,748,946	29,616,009	28,132,937
105	West Bengal	Urban	22,427,251	11,849,976	10,577

Source: Census of India 2001

Table 3: State-wise Rural/Urban and Male/Female Workers in India

No.	State	TRU	Persons	Males	Females
1	Andaman & Nicobar Islands	Total	136,254	109,162	27,092
2	Andaman & Nicobar Islands	Rural	94,052	73,350	20,702
3	Andaman & Nicobar Islands	Urban	42,202	35,812	6,390
4	Andhra Pradesh	Total	34,893,859	21,662,192	13,231,667
5	Andhra Pradesh	Rural	28,172,888	16,287,101	11,885,787
6	Andhra Pradesh	Urban	6,720,971	5,375,091	1,345,880
7	Arunachal Pradesh	Total	482,902	293,612	189,290
8	Arunachal Pradesh	Rural	402,010	230,320	171,690
9	Arunachal Pradesh	Urban	80,892	63,292	17,600
10	Assam	Total	9,538,591	6,870,960	2,667,631

11	Assam	Rural	8,396,769	5,899,204	2,497,565
12	Assam	Urban	1,141,822	971,756	170,066
13	Bihar	Total	27,974,606	20,483,003	7,491,603
14	Bihar	Rural	25,752,569	18,544,822	7,207,747
15	Bihar	Urban	2,222,037	1,938,181	283,856
16	Chandigarh	Total	340,422	284,419	56,003
17	Chandigarh	Rural	40,203	36,293	3,910
18	Chandigarh	Urban	300,219	248,126	52,093
19	Chhattisgarh	Total	9,679,871	5,531,859	4,148,012
20	Chhattisgarh	Rural	8,377,674	4,495,979	3,881,695
21	Chhattisgarh	Urban	1,302,197	1,035,880	266,317
22	Dadra & Nagar Haveli	Total	114,122	75,835	38,287
23	Dadra & Nagar Haveli	Rural	91,542	56,255	35,287
24	Dadra & Nagar Haveli	Urban	22,580	19,580	3,000
25	Daman & Diu	Total	72,791	60,569	12,222
26	Daman & Diu	Rural	52,480	45,018	7,462
27	Daman & Diu	Urban	20,311	15,551	4,760
28	Delhi	Total	4,545,234	3,960,101	585,133
29	Delhi	Rural	301,064	258,032	43,032
30	Delhi	Urban	4,244,170	3,702,069	542,101
31	Goa	Total	522,855	375,218	147,637
32	Goa	Rural	274,452	185,648	88,804
33	Goa	Urban	248,403	189,570	58,833
34	Gujarat	Total	21,255,521	14,477,286	6,778,235
35	Gujarat	Rural	14,993,312	9,049,438	5,943,874
36	Gujarat	Urban	6,262,209	5,427,848	834,361
37	Haryana	Total	8,377,466	5,715,526	2,661,940
38	Haryana	Rural	6,451,587	4,085,621	2,365,966
39	Haryana	Urban	1,925,879	1,629,905	295,974
40	Himachal Pradesh	Total	2,992,461	1,686,658	1,305,803
41	Himachal Pradesh	Rural	2,772,351	1,506,711	1,265,640
42	Himachal Pradesh	Urban	220,110	179,947	40,163
43	Jammu & Kashmir	Total	3,753,815	2,679,941	1,073,874
44	Jammu & Kashmir	Rural	2,924,686	1,968,549	956,137
45	Jammu & Kashmir	Urban	829,129	711,392	117,737
46	Jharkhand	Total	10,109,030	6,659,856	3,449,174
47	Jharkhand	Rural	8,569,591	5,302,143	3,267,448
48	Jharkhand	Urban	1,539,439	1,357,713	181,726
49	Karnataka	Total	23,534,791	15,235,355	8,299,436
50	Karnataka	Rural	17,127,803	10,254,252	6,873,551
51	Karnataka	Urban	6,406,988	4,981,103	1,425,885
52	Kerala	Total	10,283,887	7,765,645	2,518,242
53	Kerala	Rural	7,671,110	5,732,387	1,938,723

54	Kerala	Urban	2,612,777	2,033,258	579,519
55	Lakshadweep	Total	15,354	13,204	2,150
56	Lakshadweep	Rural	8,007	6,984	1,023
57	Lakshadweep	Urban	7,347	6,220	1,127
58	Madhya Pradesh	Total	25,793,519	16,194,368	9,599,151
59	Madhya Pradesh	Rural	20,900,226	12,205,916	8,694,310
60	Madhya Pradesh	Urban	4,893,293	3,988,452	904,841
61	Maharastra	Total	41,173,351	26,852,095	14,321,256
62	Maharastra	Rural	27,261,431	15,348,636	11,912,795
63	Maharastra	Urban	13,911,920	11,503,459	2,408,461
64	Manipur	Total	945,213	527,216	417,997
65	Manipur	Rural	723,087	398,374	324,713
66	Manipur	Urban	222,126	128,842	93,284
67	Meghalaya	Total	970,146	568,491	401,655
68	Meghalaya	Rural	822,531	468,095	354,436
69	Meghalaya	Urban	147,615	100,396	47,219
70	Mizoram	Total	467,159	263,008	204,151
71	Mizoram	Rural	256,044	138,855	117,189
72	Mizoram	Urban	211,115	124,153	86,962
73	Nagaland	Total	847,796	488,968	358,828
74	Nagaland	Rural	741,439	406,859	334,580
75	Nagaland	Urban	106,357	82,109	24,248
76	Orissa	Total	14,276,488	9,802,006	4,474,482
77	Orissa	Rural	12,586,969	8,373,695	4,213,274
78	Orissa	Urban	1,689,519	1,428,311	261,208
79	Pondicherry	Total	342,655	258,670	83,985
80	Pondicherry	Rural	127,766	88,986	38,780
81	Pondicherry	Urban	214,889	169,684	45,205
82	Punjab	Total	9,127,474	6,960,213	2,167,261
83	Punjab	Rural	6,360,351	4,589,049	1,771,302
84	Punjab	Urban	2,767,123	2,371,164	395,959
85	Rajasthan	Total	23,766,655	14,695,802	9,070,853
86	Rajasthan	Rural	19,856,423	11,379,536	8,476,887
87	Rajasthan	Urban	3,910,232	3,316,266	593,966
88	Sikkim	Total	263,043	165,716	97,327
89	Sikkim	Rural	239,002	147,560	91,442
90	Sikkim	Urban	24,041	18,156	5,885
91	Tamil Nadu	Total	27,878,282	18,100,397	9,777,885
92	Tamil Nadu	Rural	17,559,768	10,360,726	7,199,042
93	Tamil Nadu	Urban	10,318,514	7,739,671	2,578,843
94	Tripura	Total	1,159,561	831,346	328,215
95	Tripura	Rural	982,447	687,482	294,965
96	Tripura	Urban	177,114	143,864	33,250

97	Uttar Pradesh	Total	53,983,824	40,981,558	13,002,266
98	Uttar Pradesh	Rural	44,675,952	32,770,685	11,905,267
99	Uttar Pradesh	Urban	9,307,872	8,210,873	1,096,999
100	Uttaranchal	Total	3,134,036	1,996,177	1,137,859
101	Uttaranchal	Rural	2,498,842	1,436,711	1,062,131
102	Uttaranchal	Urban	635,194	559,466	75,728
103	West Bengal	Total	29,481,690	22,388,044	7,093,646
104	West Bengal	Rural	21,889,642	16,019,881	5,869,761
105	West Bengal	Urban	7,592,048	6,368,163	1,223,885

Source: Census of India 2001

Table 4: Literacy Rates in Different States of India

S No.	State	Persons	Males	Females
1	Andaman & Nicobar Islands	81.3	86.3	75.2
2	Andhra Pradesh	60.5	70.3	50.4
3	Arunachal Pradesh	54.3	63.8	43.5
4	Assam	63.3	71.3	54.6
5	Bihar	47	59.7	33.1
6	Chandigarh	81.9	86.1	76.5
7	Chhattisgarh	64.7	77.4	51.9
8	Dadra & Nagar Haveli	57.6	71.2	40.2
9	Daman & Diu	78.2	86.8	65.6
10	Delhi	81.7	87.3	74.7
11	Goa	82	88.4	75.4
12	Gujarat	69.1	79.7	57.8
13	Haryana	67.9	78.5	55.7
14	Himachal Pradesh	76.5	85.3	67.4
15	Jammu & Kashmir	55.5	66.6	43
16	Jharkhand	53.6	67.3	38.9
17	Karnataka	66.6	76.1	56.9
18	Kerala	90.9	94.2	87.7
19	Lakshadweep	86.7	92.5	80.5
20	Madhya Pradesh	63.7	76.1	50.3
21	Maharastra	76.9	86	67
22	Manipur	66	75	56.8
23	Meghalaya	62.6	65.4	59.6
24	Mizoram	88.8	90.7	86.7
25	Nagaland	66.6	71.2	61.5
26	Orissa	63.1	75.3	50.5
27	Pondicherry	81.2	88.6	73.9
28	Punjab	69.7	75.2	63.4
29	Rajasthan	60.4	75.7	43.9
30	Sikkim	68.8	76	60.4

31	Tamil Nadu	73.5	82.4	64.4
32	Tripura	73.2	81	64.9
33	Uttar Pradesh	56.3	68.8	42.2
34	Uttaranchal	71.6	83.3	59.6
35	West Bengal	68.6	77	59.6

Source: Census of India 2001

Table 5: Geographical Area of the States in India

S No.	State	Area in Sq Km.
1	Andaman & Nicobar Islands	8,249
2	Andhra Pradesh	275,045
3	Arunachal Pradesh	83,743
4	Assam	78,438
5	Bihar	94,163
6	Chandigarh	114
7	Chhattisgarh	135,191
8	Dadra & Nagar Haveli	491
9	Daman & Diu	112
10	Delhi	1,483
11	Goa	3,702
12	Gujarat	196,024
13	Haryana	44,212
14	Himachal Pradesh	55,673
15	Jammu & Kashmir	222,236
16	Jharkhand	79,714
17	Karnataka	191,791
18	Kerala	38,863
19	Lakshadweep	32
20	Madhya Pradesh	308,245
21	Maharastra	307,713
22	Manipur	22,327
23	Meghalaya	22,429
24	Mizoram	21,081
25	Nagaland	16,579
26	Orissa	155,707
27	Pondicherry	479
28	Punjab	50,362
29	Rajasthan	342,239
30	Sikkim	7,096
31	Tamil Nadu	130,058
32	Tripura	10,486
33	Uttar Pradesh	240,928

34	Uttaranchal	53,483
35	West Bengal	88,752

Source: Census of India 2001

Table 6: Area Profile of Bihar

Number of Households	13,744,130	Average Household Size(per Household)	6
Population-Total	82,998,509	Proportion of Urban Population (%)	10.5
Population-Rural	74316709	Sex Ratio	919
Population-Urban	8681800	Sex Ratio(0-6 Year)	942
Population(0-6Years)	16,806,063	Sex Ratio (SC)	923
SC Population	13,048,608	Sex Ratio (ST)	929
ST Population	758,351	Proportion of SC (%)	16
Literates	31,109,577	Proportion of ST (%)	1
Illiterates	51,888,932	Literacy Rate (%)	47
Total Workers	27,974,606	Work Participation Rate (%)	34
Main Worker	21,052,875	% of Main Workers	25
Marginal Worker	6,921,731	% of Marginal Worker	8
Non Worker	55,023,903	% of non Workers	66
CL (Main+Marginal)	8,193,621	Proportion of CL (%)	29
Al (Main+Marginal)	13,417,744	Proportion of AL (%)	48
HHI (Main+Marginal)	1,100,424	Proportion of HHI (%)	4
OW (Main+Marginal)	5,262,817	Proportion of OW (%)	19

Note: CL= Cultivators; Al= Agricultural workers; HHI= Household industry; OW = other workers
Source: Census of India 2001

Table 7: Area Profile of Gujarat

Number of Households	9,691,362	Average Household Size (per Household)	5
Population-Total	50,671,017	Proportion of Urban Population (%)	37.4
Population-Rural	31740767	Sex Ratio	920
Population-Urban	18930250	Sex Ratio(0-6 Year)	883
Population(0-6Years)	7,532,404	Sex Ratio (SC)	925
SC Population	3,592,715	Sex Ratio (ST)	974
ST Population	7,481,160	Proportion of SC (%)	7
Literates	29,827,750	Proportion of ST (%)	15
Illiterates	20,843,267	Literacy Rate (%)	69
Total Workers	21,255,521	Work Participation Rate (%)	42
Main Worker	17,025,074	% of Main Workers	34
Marginal Worker	4,230,447	% of Marginal Worker	8
Non Worker	29,415,496	% of non Workers	58
CL (Main + Marginal)	5,802,681	Proportion of CL (%)	27
Al (Main + Marginal)	5,161,658	Proportion of AL (%)	24
HHI (Main + Marginal)	429,682	Proportion of HHI (%)	2

OW (Main+Marginal)	9,861,500	Proportion of OW (%)	46

Note: CL= Cultivators; Al= Agricultural workers; HHI= Household industry; OW= other workers
Source: Census of India 2001

Table 8: India Area Profile

Number of Households	193,579,954	Average Household Size (per Household)	5.3
Population-Total	1,028,610,328	Proportion of Urban Population (%)	27.8
Population-Rural	742490639	Sex Ratio	933
Population-Urban	286119689	Sex Ratio(0-6 Year)	927
Population(0-6Years)	163,819,614	Sex Ratio (SC)	936
SC Population	166,635,700	Sex Ratio (ST)	978
ST Population	84,326,240	Proportion of SC (%)	16.2
Literates	560,687,797	Proportion of ST (%)	8.2
Illiterates	467,922,531	Literacy Rate (%)	64.8
Total Workers	402,234,724	Work Participation Rate (%)	39.1
Main Worker	313,004,983	% of Main Workers	30.4
Marginal Worker	89,229,741	% of Marginal Worker	8.7
Non Worker	626,375,604	% of non Workers	60.9
CL (Main+Marginal)	127,312,851	Proportion of CL (%)	31.7
Al (Main+Marginal)	106,775,330	Proportion of AL (%)	26.5
HHI (Main+Marginal)	16,956,942	Proportion of HHI (%)	4.2
OW (Main+Marginal)	151,189,601	Proportion of OW (%)	37.6

Note: CL= Cultivators; Al= Agricultural workers; HHI= Household industry; OW= other workers
Source: Census of India 2001

Table 9: Migration Characteristics of India

S No.	Migrants	Persons	Males	Females
1	Intra-district migrants	193,592,938	47,337,924	146,255,014
2	Inter-district migrants	74,626,322	24,241,706	50,384,616
3	Inter-state migrants	41,166,265	19,098,082	22,068,183
4	International migrants	5,155,423	2,683,914	2,471,509
5	Unclassifiable	402	183	219
	Total migrants	**314,541,350**	**93,361,809**	**221,179,541**

Source: Census of India 2001

Table 10: Migration Characteristics of Andhra Pradesh

No.	Migrants	Persons	Males	Females
1	Intra-district migrants	17,646,908	5,443,618	12,203,290
2	Inter-district migrants	4,758,919	1,981,981	2,776,938
3	Inter-state migrants	1,032,753	400,238	632,515
4	International migrants	23,315	13,624	9,691
5	Unclassifiable	0	0	0

	Total migrants	**23,461,895**	**7,839,461**	**15,622,434**

Source: Census of India 2001

Table 11: Migration Characteristics of Assam

S No.	Migrants	Persons	Males	Females
1	Intra-district migrants	5,090,650	1,875,534	3,215,116
2	Inter-district migrants	1,164,069	478,780	685,289
3	Inter-state migrants	407,141	224,189	182,952
4	International migrants	130,966	70,254	60,712
5	Unclassifiable	0	0	0
	Total migrants	**6,792,826**	**2,648,757**	**4,144,069**

Source: Census of India 2001

Table 12: Migration Characteristics of Maharastra

S No.	Migrants	Persons	Males	Females
1	Intra-district migrants	22,137,959	7,237,350	14,900,609
2	Inter-district migrants	12,087,122	5,248,824	6,838,298
3	Inter-state migrants	7,313,139	4,178,677	3,134,462
4	International migrants	177,478	99,086	78,392
5	Unclassifiable	13	6	7
	Total migrants	**41,715,711**	**16,763,943**	**24,951,768**

Source: Census of India 2001

Table 13: Migration Characteristics of Punjab

S No.	Migrants	Persons	Males	Females
1	Intra-district migrants	4,667,609	1,375,748	3,291,861
2	Inter-district migrants	2,454,312	583,946	1,870,366
3	Inter-state migrants	1,749,122	828,260	920,862
4	International migrants	318,391	182,886	135,505
5	Unclassifiable	4	2	2
	Total migrants	**9,189,438**	**2,970,842**	**6,218,596**

Source: Census of India 2001

Table 14: Population Growth in States in India

Country/ State	Annual Exponential Growth Rate	
	1981-91	**1991-2001**
INDIA	2.14	1.93
1 Jammu & Kashmir	2.65	2.55
2 Himachal Pradesh	1.89	1.62
3 Punjab	1.89	1.8
4 Chandigarh	3.52	3.39

5 Uttaranchal	2.17	1.76
6 Haryana	2.42	2.47
7 Delhi	4.15	3.81
8 Rajasthan	2.5	2.49
9 Uttar Pradesh	2.28	2.3
10 Bihar	2.1	2.5
11 Sikkim	2.51	2.85
12 Arunachal Pradesh	3.14	2.33
13 Nagaland	4.45	4.97
14 Manipur	2.57	2.63
15 Mizoram	3.34	2.56
16 Tripura	2.95	1.46
17 Meghalaya	2.84	2.62
18 Assam	2.17	1.73
19 West Bengal	2.21	1.64
20 Jharkhand	2.15	2.09
21 Orissa	1.83	1.48
22 Chhatisgarh	2.29	1.66
23 Madhya Pradesh	2.41	2.18
24 Gujarat	1.92	2.03
25 Daman & Diu	2.52	4.42
26 Dadra & Nagar Haveli	2.89	4.65
27 Maharashtra	2.29	2.04
28 Andhra Pradesh	2.17	1.3
29 Karnataka	1.92	1.59
30 Goa	1.49	1.39
31 Lakshadweep	2.51	1.59
32 Kerala	1.34	0.9
33 Tamil Nadu	1.43	1.06
34 Pondicherry	2.9	1.87
35 Andaman & Nicobar Is.	3.97	2.39

Source: Calculated from Census of India 1981, 1991 and 2001

Chapter 4 : Evaluation

Evaluation is very often understood to be almost synonymous with examination. We are concerned about the ill effects that examination have on efforts to make learning and teaching meaningful and joyous for

the children. It has, however a wider connotation in so far as it attempts to test more and in varied ways than what the present examination does. It also attempts to diagnose the points of strengths and weakness.

Evaluation is an integral part of teaching learning process. It is concerned with finding out how far students have learned as a result of teaching. It provides students, parents/guardians and teachers with valid information concerning student's progress and their attainment of the expected curriculum. It should always be viewed as information to improve student's achievement. A teacher cannot and should not move ahead unless he/she has assessed how much student has gained or learnt. The next step of a teacher's teaching should be governed by the student's understanding of the content till that time. The following can be considered as the general principles of evaluation:

1. Evaluation must be an integral part of teaching.
2. A variety of techniques should be employed for the evaluation.
3. Evaluation must provide all pupils with an opportunity to demonstrate their achievement.
4. Evaluation should be enjoyable so that student does not feel stressed.

The Purpose of Evaluation

Evaluation is concerned with preparing citizens for a meaningful and productive life, and evaluation should be a way of providing credible feedback on the extent to which we have been successful in imparting such an education. Evaluation fulfil the following purpose-

1) It assesses the extent of learning by students and gives them the feedback about their performance.
2) It gives the feedback to the teacher about the learning gaps of the students.
3) It provides feedback to the teachers about their teaching procedures.

4) It provides the students an opportunity to show their worth.

5) It serves as a screening tool for selecting student's special purposes.

Kinds of Evaluation

1. Placement Evaluation: This type of evaluation finds out the level of previous knowledge of the pupil. If the teacher does not know about it, then he/she cannot deliver the complete benefits of curriculum transaction. Hence, before proceeding further, teacher should ask some questions from the students and test their previous knowledge and accordingly prepare their lesson plans.

2. Formative Evaluation: This type of evaluation is inbuilt in the teaching-learning process. Thus, when a part of the lesson/unit has been completed, this evaluation can be used to test the level of understanding of the students. It can be done through class tests, assignments etc.

3. Diagnostic Evaluation: This type of evaluation is done to learn about the shortcomings of the learning process. The problem area is diagnosed and then steps are designed to overcome them.

4. Summative Evaluation: This type of evaluation is done at the end of the course/term. It is done to provide grade/rank to the students and to promote them to the next level.

Teachers need to be clear of the learning outcomes and accordingly do the evaluation. There should be different strategies for those who progress at different rates, either faster or slower than the majority of the class. Evaluation help teacher to gain knowledge about their student's need, achievement and abilities. One of the most important elements of evaluation is to provide information for improved student performance. It is important for a teacher to know how students can improve their learning. It is a challenging experience that involves giving students a

question; task, project and then observing and examining their answer presentation assess what they have learnt.

Any meaningful report on the quality and extent of a child's learning needs to be comprehensive. In addition to the learner's achievements in specific subject areas that lend themselves to testing easily, evaluation need to encompass attitudes to learning, interest and the ability to learn independently.

Maintaining a daily diary based on observation helps in continuous and comprehensive evaluation (learning activities themselves provide the basis for such ongoing observational and qualitative evaluation of children).

The role of evaluation is to gauge the progress that both learner and teacher have made towards achieving the aims that have been set appraising how this could be done better.

Evaluation may be based more on tests, examinations and project reports for the knowledge-based areas of the curriculum, along with self assessment. Other areas would be assessed through observation and also through self-evaluation.

Reports could include much more analysis about the students, various skills/knowledge areas and percentiles, etc. this would assist them by pointing out the areas of study that they need to focus on, and also help them providing a basis for further choices that they make regarding what to study thereafter.

Strategies and Purpose of Assessment in Geography

Term	**Assessment Strategies**	**Purpose of Assessment**
Short term (Weekly/fortnightly)	• Observation of work being carried out in the class • Oral questioning • Regular marking	**Formative** • To inform interventions and planning • To give feedback to students so

	of work assignments • Activity related to the topic/Group discussion • Written self assessment by students	they can set short term targets • To correct errors and misconceptions • To monitor short term progress
Medium term (over a term or on completion of a topic)	• End of unit assessment task • End of term progress test • Assessment of geographical enquiries • Activity/Project related to the topic (individual or group) • Debate, Group discussion • Written self assessment by students	**Formative/Summative** • To give feedback to students and agree criterion-related targets for improvement • To monitor and judge progress
Long Term (at the end of the year)	• End of year examinations • Assessment of portfolio of a variety of work assignments against criteria • Assessment of completed coursework or individual study • Attainment summary using professional judgement •	**Summative** • To inform next year's teacher • To inform parents • To evaluate, monitor and exemplify standards and attainment • To select and monitor departmental targets for improvement • To obtain recognised qualification

Check whether your students know the concepts well!

1. A person's highest educational level is which type of variable?

    a. continuous
    b. discrete numeric
    c. ordinal
    d. nominal

Answer: c

2. Nominal data are often analysed in the form of:

    a. counts
    b. averages
    c. ranks

Answer: a

3. The total of the Relative Frequency column in a frequency distribution tables is

    a. the sample size N
    b. one
    c. a hundred

Answer b

4. A histogram is constructed for a large data set. Which of the following are true statements? (a) the median divides the area of the histogram into two equal parts (b) the data are continuous numeric (c) the mean is found under the tallest column

    a. a and b
    b. a and c
    c. b and c

Answer a

5. In a histogram, what property of each rectangle represents the frequency of observations in the range it covers?

    a. its height
    b. its width
    c. its area

Answer c

6. A symmetric distribution has

   a. mean equal to zero
   b. variance equal to zero
   c. skewness equal to zero

Answer c

7. In a symmetric distribution, which are equal?

   a. the mean and median
   b. the mean and mode
   c. the median and mode
   d. all three

Answer a

8. The median of a distribution is

   a. a measure of its dispersion
   b. a measure of its location
   c. its centre of mass

Answer b

9. It is easier to find the mean of a large set of data than the median because

   a. the median has one formula for even n and one for odd n
   b. it is not necessary to sort the data to find the mean
   c. the mean gives equal weight to all observations

Answer b

10. The main advantage of the median over the mean is that

    a. the result is always one of the data values
    b. the median is closer to the mode of the distribution
    c. it is less sensitive to errors in the data
    d. it is more sensitive to important values in the data

Answer c

11. Find the interquartile range of the following 6 numbers: 11, 15, 16, 17, 24, and 34.

    a. 9
    b. 11
    c. 16.5
    d. 23

Answer a

12. Which is numerically larger, the variance or the standard deviation?

    a. the variance
    b. the standard deviation
    c. could be either

Answer c

13. The times in minutes taken by group of labourers to complete irrigating the fields are recorded, and the variance is calculated. The units of the variance are:

    a. pure numbers
    b. square-root minutes
    c. minutes
    d. minutes squared

Answer d

3.6 Multiple Choice Questions for A Few Sections other than Statistics

3.6.1 Multiple Choice/ Objective Questions on Map-making

1. Which of the following are considered key elements of a paper map? (Check the correct answers).

    a. Annotation.
    b. Pictures and anecdotal evidence.
    c. Map features (points, lines, areas, surfaces).
    d. Projection information.
    e. Scale bar or ratio.

Answer: a, c, d and e

2. Which of the following list are appropriate definitions of scale? (Check the correct answers).
   a. The lines on a map representing north-south and east-west directions.
   b. An indication of how big an object represented on the map is on the ground.
   c. The ratio of a distance on a map to the corresponding distance on the ground.
   d. A conversion factor used to transform map projections.

Answer: b and c

3. What does 1mm on a map drawn at a scale of 1:50,000 represent on the ground?
   a. 50 centimetres.
   b. 5 metres.
   c. 50 metres.
   d. 500 centimetres.

Answer: c

4. How is a large city most likely to be represented on a 1:25,000 scale map?
   a. As a line.
   b. As a collection of points
   c. Lines and areas.
   d. As a single point.
   e. As a collection of points.
   As an area.

Answer: b

5. Generalization is the process by which:(check those that apply)
   a. real-world features are selected or not selected for inclusion on a map.
   b. the cartographer communicates the spatial pattern and organization of real-world objects on a map.
   c. point, line and area symbolism is chosen.
   d. misleading or erroneous information is added to a map.
   e. real-world features are simplified to allow them to be drawn on a map at reduced scale.

Answer: a, b and e.

6. Which of the following is an example of map generalization?

a. Coordinate transformation
b. Polygon overlay.
c. Buffering.
d. Polygon coordinate thinning

Answer: d.

7. Which of the following is not a type of map projection?

a. Conic.
b. Azimuthal.
c. Cylindrical.
d. Geographic.

Answer: d.

8. The Survey of India toposheet uses which type of projection?

a. Polyconic
b. Azimuthal
c. Conic.
d. Cylindrical

Answer: a.

9. Resolution may best be defined as: (check those that apply)

a. the smallest unit or measurement into which data can be disaggregated
b. the accuracy and precision of the data.
c. the smallest feature that can be mapped or measured.
d. the size of the smallest recording unit.
e. the overall quality of a dataset

Answer: c and d.

10. A map at a scale of 1:2,000 would be suitable for planning street engineering works such as repairs to gas or water pipes.
a. True
b. False

Answer: a.

11. A map at a scale of 1:250,000 would be suitable for navigation whilst on a mountain trek.
a. True
b. False

Answer: b.

12. The mercator projection is an example of a cylindrical projection.
    a. True
    b. False

Answer: a.

13. Select the most correct statement.
    a. An 8.5" x 11" map of India large-scale map because it illustrates a large geographical area in great detail.
    b. A map with a scale of 1:10,000 is a large-scale map because it illustrates a small geographical area in large detail.
    c. A map of 4" x 34" of Sehore, Madhya Pradesh, is a small-scale map because it illustrates a small geographical area in sparse detail.
    d. An 8' x 12' map of the world is a large-scale map because it illustrates a large geographical area and is a large map.
    e. none of the above is a correct answer

Answer: b.

14. You need to find the scale of a map have been given for a class project. In order to do so, you decide to measure a distance between two real world features and relate that to the distance shown on the map. You find that the distance between two buildings is 400 feet. On the map that same distance is 3 inches. What is the scale of the map?

    a. 1:1,200
    b. 1:16,000
    c. 1:1,600
    d. 1:100
    e. 1:133.33

Answer: c.

15. Using the latitude and longitude system (degrees, minutes, seconds), 20 minutes is equal to what?

    a. 1/3 hour
    b. 0.20Ţ
    c. 200 seconds
    d. 1/20Ţ
    e. 1/3Ţ

Answer: e.

16. You need to create a map where the size ratio of of any area on the map to the corresponding area on the ground is the same all over the map. You decide to choose
    a. a conformal projection
    b. an equivalent projection

Answer: b.

17. You measure the length of a particular stream section on a topographic map with a scale of 1:24000 is 3.2 inches. The real-world length of the stream is
    a. 1.45 miles.
    b. 14.55 miles.
    c. 1.21 miles.
    d. none of the above choices

Answer: c.

18. The largest scale of the following is
    a. 1:24000.
    b. 1:62500.
    c. 1:100000.
    d. 1:500000.

Answer: a.

3.6.2 Multiple choice/ objective questions on Remote Sensing and Geographical Information System

1. Which three of the following questions may be best answered using a GIS?

    a. What geographical patterns exist?
    b. Where is a particular feature found?
    c. How does a process operate?
    d. Where do certain conditions apply?
    e. What is the relationship between two variables?

Answer: a, b and d.

2. Which of the following are key application disciplines for GIS?

   a. Astronomy.
   b. Civil engineering.
   c. Physics and chemistry.
   d. Environmental sciences

Answer: b and d.

3. Which of the following are essential components of a GIS?

   a. Spatial data.
   b. A visual display unit capable of high resolution colour graphical display as well as text.
   c. A computer with sufficient memory and processing power to run the software.
   d. Data input and output devices such as digitizers/scanners and printer/plotters.
   e. Appropriate GIS
   f. A fast Internet connection. Software.

Answer: a, b c, d and e.

4. Which of the following is not an example of spatial data?

   a. Lines showing the route of linear objects.
   b. Polygons showing the area occupied by a particular land use or variable
   c. Times of particular events.
   d. Points showing location of discrete objects.

Answer: c.

5. Spatial referencing is the process of which of the following?
   a. Combing attribute values with locational information.
   b. Establishing the topology of spatial objects.
   c. Computing the reference between items in databases
   d. Referencing geo-relational tables.
   e. Computing the reference between items in databases.

Answer: a.

6. Geographical Information Science (GIS) can be defined as:

a. the use of GIS to solve physical problems.
b. the science behind GIS.
c. the application of GIS to a range of scientific disciplines
d. the epistemological study of GIS.

Answer: b.

7. Performing the same analysis in two different GIS software packages will always give the same results.

a. True
b. False

Answer: b.

8. Human factors influence the success of GIS as a decision support tool.

a. True
b. False

Answer: a.

9. Reality can be represented in GIS as a series of layers or as objects

a. True
b. False

10. Attribute data are one type of spatial data.

a. True
b. False

Answer: b.

11. What does the abbreviation GPS stand for?

a. Global Positioning System.
b. Geographical Positioning System
c. Geographical Point Software
d. Global Point Selection.

Answer: a.

12. Deforestation is occurring in many countries and it is therefore difficult to detect the ongoing damage. Which of the following types of remote sensing would be best suited for locating deforestation?

a. thermal infrared
b. microwave
c. radar
d. sonar
e. colour infrared

Answer: e.

13. Multispectral remote sensing allows researchers to obtain data about Earth in areas of the electromagnetic spectrum beyond what the eye can see. If you were studying the effects of drought on vegetation, which portion of the electromagnetic spectrum would provide the most pertinent data?

a. thermal infrared
b. middle infrared
c. near infrared
d. blue spectrum
e. red spectrum

Answer: c.

14. To compare, overlay, or cross-analyze two maps in a GIS

a. both maps must be in digital form.
b. both maps must be in the same map projection.
c. both maps must be at the same equivalent scale.
d. both maps must be on the same coordinate system.
e. all of the above.

Answer: e.

15. Living vegetation appears _____ on false-colour IR images.

a. white
b. black
c. blue
d. red

Answer: d.

16. Precise measurement of Earth features can be obtained from

a. high-oblique photographs
b. Low-oblique photographs.

c. Vertical aerial photographs.
d. All the above types of aerial photographs.
e. Only high- and low-oblique aerial photographs.

Answer: c.

17. Which of the following remote sensing technologies uses sound?
a. radar
b. colour infrared imaging
c. thermal infrared imaging
d. sonar
e. microwave sensing

Answer: d.