UNIVERSITY GRANTS COMMISSION

GEOGRAPHY CODE: 80

UNIT-8: GEOGRAPHICAL THOUGHT

SYLLABUS

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3.	The Age of Exploration
4.	The New Geography of the 18th Century
5.	Geography of the 19th Century
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Section-1: Unit at a Glance

SUB UNIT-1

CONTRIBUTIONS OF THE ANCIENT GREEKS AND ROMANS

References to descriptive writings about lands and peoples in different parts of the earth's surface are found in the oral traditions of classical Greece and are reflected in the writings of Homer, whom the Greek geographers had themselves referred to as the father of geography. *Odyssey*, Homer's epic poem written sometime in the ninth century B.C., presents geographical accounts of the lands and peoples located on the margins of the world then known to the Greeks. The poem records the wanderings of Odysseus on his return journey to Ithaca after the fall of Troy, when he was own off-course by a storm so that it had taken him twenty years to reach home. The poem contains geographical account of the distant places visited by the hero of the epic in course of his long journey. In it there are references to a land of continuous sunshine, and later of Odysseus's visit to an area of continuous darkness. Apparently a Greek poet could not have imagined these scenes. Somehow accounts about nature of the earth in the far north of Europe during the long summer days and the continuous winter darkness had filtered back to Greece, and were woven with other geographical threads into an enchanting adventure story. As in the case of *Meghdoot* of Kalidas, many have tried to identify the many places referred to in the epic poem.

GEOGRAPHY IN THE MIDDLE AGES

During the fifth century AD, the Roman empire suffered demise. The central administration had greatly weakened and consequently the constituent territories gradually became independent. As trade and commerce declined, the geographic horizons of the people rapidly narrowed down so that, with passage of time, the geographical horizon of most people in Christiandom became confined to their immediate surroundings. Given the extremely narrow world-view of contemporary European societies, it was natural that the hold of religious orthodoxy should increase. Before long, scriptures had begun to be regarded as the ultimate repository of knowledge of every kind so that an impression was created that there was no need to learn anything outside the Holy books. Anything that did not conform with the ”truth” of the scriptures was regarded as the product of a perverse mind and had, accordingly, to be rejected. Under these conditions, science (and, therefore, geography) could not develop so that the Middle Ages represented the Dark Age in the history of scientific knowledge in Europe. During this period, scientific concepts developed by the ancient Greeks were reshaped with a view to make them conform with the ”truth” preached by the Church. For example, the idea of a spherical earth was abandoned in favour of the old concept of the earth as a flat disc, with Jerusalem as its centre. This dismal state of affairs had continued almost until the end of the twelfth century A.D.

GEOGRAPHY IN THE ARAB LANDS

The fall of the Roman empire, and the decline of scientific learning in Europe was followed by a period of great ascendancy in the Muslim world which, under the influence of Prophet Mohammed, had been transformed from a multitude of tribes divided by intertribal feuds into integral components of a larger all-inclusive identity based on adherence to a common set of religious beliefs and practices. The followers of Islam soon embarked upon a course of conquest of the world outside Arabia with a view to spreading the new religious ideology to the farthest corners of the world. Persia and Egypt were conquered in 641-642 A.D., and by AD. 732 the whole of the West Asian desert region was under their control. They soon overran the Iberian peninsula so that Spain and Portugal had remained under Muslim rule for almost nine hundred years. Muslim influence also extended eastward into India and parts of south-east Asia. The act of holding on to such a huge politico-cultural empire had, in itself, become a major stimulant to the rise of interest in geographical learning. The Arabs now held a monopoly over the spice trade between India and Europe. This trade required a great deal of travel over land and sea. Travels between places spread over such a large expanse of territory became the source of considerable extension of knowledge about geographical environment in tropical regions.

DEVELOPMENTS IN FRANCE

The immediate cause for the revival of geography as a university level subject of study in France was the country's defeat in the Franco-Prussian war of 1870-1871. Soon after the war there was great demand for better quality geography education in the French schools, with a view to stimulating interest in the knowledge about peoples and places in far- off lands so that the pursuit of colonization could be attended to more effectively. The country's defeat, and the loss of territory, had made it urgent that France should look to Africa and elsewhere for commercial opportunities and politico-cultural colonization (Freeman, 1971, p. 46). The development of French colonial power after 1871 owed a great deal to the influence of the French geographical societies (McKay, 1943)

DEVELOPMENTS IN GREAT BRITAIN

In the nineteenth century British geography had suffered from maladies similar to the ones that had beset it in France. Much of what was taught in British schools in the name of geography was uninteresting and dull; and the students were required to commit to memory large mass of unorganized facts. As in France, courses in geography in the universities were handled by geologists on the physical side, and the courses meant to provide geographical background to history were taught by historians. The overall scene was extremely confusing. In the midst of this confusion **Mary Somerville** (1780-1872) appeared as a bright star on the path to development of geography as an autonomous field of scientific enquiry in its own right. Her famous book on *Physical Geography* was published in 1848 It went through seven editions over the next thirty years. This book started with a physical description of the earth's surface—continents, oceans, atmosphere, plants and animals—and included the study of man as an agent of change in the physical landscape. The author kept on updating the book with each edition by incorporating new facts as they became available. Its sound methodology and approach received praise even from Humboldt (Freeman, 1971, p. 28) but irrespective of its sound method and the author's erudition, the book failed to create a stir in British geographical circles since it was published at a time when physical geography was claimed by geologists, and Humboldt's books were supposed to have said everything that needed to be told about geography. Ironically enough, the book became highly influential in North America through George Perkin Marsh who found her observations about man's destructive use of the earth very stimulating. (For short appraisal, see: Livingstone, 1992, pp. 272-274).)

DEVELOPMENTS IN RUSSIA

The vast expanse of the Russian empire was a most potent factor in the development of geography as an institutionalized discipline. Peter the Great (who ruled Russia from 1682 to 1725) appreciated the need for accurate geographical information to facilitate the eastward march of the empire. State supported expeditions were sent to the east and the north to explore the vast uninhabited stretches of territory; and generous funding was provided to prepare maps of the explored regions. The main objective of these explorations was to chart out the topography, and to identify places where valuable merchandise, such as furs and precious metals could be found. Later on M.V. Limonosov (who became head of the world's first officially named Department of Geography at the Russian Academy of Sciences in 1758) pursuaded the state authorities to charge the exploring parties with the task of collecting systematic information about the physical character of land, population, and economic condition. The recognition of geography as a department in the Russian Academy of Sciences gave considerable academic prestige to geography as a useful field of scientific learning. Under the patronage of the Academy, the Department of Geography launched several schemes of regional surveys and mapping of data.

SUB UNIT-2

THE DARWINIAN THEORY OF EVOLUTION:

Charles Darwin was greatly excited about the idea of biological evolution. He was attracted by the mounting evidence in support of the central idea about progressive and cumulative changes in life, from the simple to the most complex. He engaged himself in amassing all available information on this subject, which appeared to him to offer irrefutable proof that life upon the earth had evolved through a long-drawn process of gradual change spread over millions of years. This encouraged and inspired him to delve deeper into the hitherto unresolved process through which evolution of life had taken place. Through many years of tireless work, Darwin succeeded in finding the answer. The detailed account of his findings was published in his monumental book *The Origin of Species by Means of Natural Selection*, first published in 1859. Although many finer points of Darwin's original thesis have since been revised as a result of later advances in knowledge in the filed of genetics, the basic theory remains intact. The fundamental ideas in Darwinian theory of evolution included.

Selection and Struggle:

Among geographers who used the concept of struggle and selection in the course of environmental adaptation by human communities the names of Fleure, Huntington and Griffith Taylor stand out most prominantely. Fleure (1919,1937,1952) stresses the need for physiological stusy to assess environmental effects on man. To facilitate such studies he devised a typology of human regions-regions of difficulty, of effort, and of increment. However, the theme, as it has developed since the time of Fleure, is far too technical in approach, and therefore, goes beyond the competence of the average student of geography. Elsworth Huntington, on the other hand, had focused on the theme of natural selection, environmental influences and human populations on a worldwide scale, so that it had required little expert knowledge of the biological sciences. Griffith Taylor used this concept in his studies on races, states, and towns, but the questions that Huntington and Taylor asked could not be meaningfully answered in terms of the generalized approach they had adopted, so that the whole determinist- possibilist controversy had moved on to a philosophical rather than an empirical level. This theme was, howver, most effectively developed in Ratzel's political geography.

SUB UNIT-3

The Roots of Indian Geography

'Geography' in Hindi is called "*Bhugol*"; '*bhu*' meaning 'the Earth' and '*gol*' meaning 'round', i.e. 'the study of round earth'.

Indian astronomers propounded the theory that the earth is a sphere. The ancient Indian scholars were adepts in all fields known to humanity. Some of these scholars are listed below with their major field of study (Table 1)[3]. This interdisciplinary knowledge lies at the root of geographic development.

Paradigmatic Shifts

From the very beginning, modern geography as a field of scientific learning has occupied an anomalous status between natural and physical sciences- focussed on particular types of natural processes or circle of facts on the one hand, and the social sciences – focussed on particular types of societal functions and phenomena on the other.[35] Thus, as a discipline focused on the study of man's relationships with nature in particular segments of the earth surface, geography represented a cross-breed discipline that belonged neither to one nor to other. The result was that geography remained completely isolated from the mainstream intellectual discourse both in natural and social sciences, since the intellectual climate of the 18th and 19th century Europe was dominated by a fragmented perspective on a natural vis-à-vis social reality. The German philosopher Immanuel Kant (1724-1804) had fully appreciated this epistemological difficulty regarding the status of geography in the classification of the fields of knowledge – so that he presented a two-fold grouping of the ways of acquiring knowledge – one logical and the other physical. The former grouped the individual items into separate classes on the basis of morphological similarities in the processes of their origins. Such a scheme of classification ignored consideration of place and time of occurrence of the concerned phenomena or processes. This aspect was taken care of in Kant's Physical classification, which grouped phenomena that belonged to the same place and / or to the same time. Grouping of phenomena in terms of time is history (or historical science, of which geology is the other example); and that in terms of space is

geography (spatial science, of which astronomy is the other example). Thus, while history is narrative, geography is descriptive in approach. The two together fill up the entire circumference of human experience. By virtue of their conceptual structure, both geography and history focus on the study of phenomena of diverse origins existing together: in terms of periods (time) in the case of history, and in terms of spatial segments (regions) in the case of geography.

SUB UNIT-4

Friedrich Ratzel (1844-1904)

Described as the greatest single contributor to the development of geography of man, Friedrich Ratzel was born in a middle class German family in 1844. He pursued advanced study in zoology, first at Heidelberg and then at Jena. Ratzel's youth passed through a period of great intellectual upheaval in the world of science in the wake of the publication of Darwin's concept about the origins of species. Ratzel had written a dissertation on Darwin's theory in 1869. He was, however, more interested in field studies of plants and animals than in the laboratory. He took employment as an assistant to a French naturalist on his trip to countries around the Mediterranean, but as war broke out between France and Prussia in 1870, Retzel quit the job to join the Prussian army. After the war, he went to Munich to register as a student. There he came in touch with the famous naturalist and ethnographer Moritz Wagner and was introduced to his theory about the importance of migration in the evolution of species.

Areal Differentiation and its Critique

Peet and Thrift view the 30 years period between 1920s and 1950s as the period of conventional geography's retreat from its position as the "science of the origins of human nature" in the face of mounting criticism of environmental determinism both from within and outside the discipline. The possibilist perspective in geography that had followed was so vague a formulation on environmental causation that it virtually precluded systematic theoretical generalizations. Thus, environmental geography was replaced by geography as the study of areal differentiation focused on the description of particular places and areas as unique entities. Dissatisfaction with this turn of the discipline had started surfacing in the 1940s but the criticism was muted in view of the rampant anti-communism of the postwar period. Thus Schaefer's critique of Hartshornean-Hettnerian geography was only a mild methodological criticism of the chorological position against theory and generalization in geography by underlining that geography explains particular phenomena as instances of general laws.

The Region

The Whittlesey Committee on regional geography which drafted the document on regional geography published in James and jones (1954) clarifying the concept of region in geography observed that:

Any segment or portion of the earth's surface is a region if it is homogeneous in terms of such an areal grouping. Its homogeneity is determined by criteria formulated for the purpose of sorting from the whole range of earth phenomena the items required to express or illuminate a particular grouping, areally cohesive, So defined, a region is not an object, either self-determined or nature-given. It is an intellectual concept, an entity for the purpose of thought, created by the selection of certain features that are relevant to an areal interest or problem and by disregard of all features that are considered to be irrelevant (Whittlesey in James and jones, 1954, p.30, italics added).

"Compage": A Kind of Uniform Region

In a paper entitled "Southern Rhodesia: An African Compage", Whittlesey (1956) put forward the idea of "*compage*" as a kind of uniform region defined in terms of all the features, natural and man-made, that are related to the human occupance of the area. This represented an important conceptual progress in the study of regional geography. As Minshull (1970) wrote: those who suggest that the study of specific regions is beyond the powers of one man may well have the ill-defined total-topic region in mind; the fact is that most successful regional geographers have been concerned with what Whittlesey named as compage.

SUB UNIT-5

Oscar Peschel (1826-1875)

For about twenty years before his death in 1875, Oscer Peschel had been the leading academic geographer in Germany. He had raised some fundamental questions concerning the nature of geography, and was critical of the approaches of both Humboldt and Ritter. Peschel is described by some as the last great geographer before the discipline was finally overtaken by the impact of Darwinian ideas. Although most of Peschel's own works had appeared in print after the publication of Darwin's *The Origin of Species* (1859), the implication of Darwinian ideas in the interpretation of earthbound phenomena and human societies had as yet not been fully realized.

SUB UNIT-6

BEHAVIOURAL GEOGRAPHY

The approach to man-environment relationships that many geographers adopted in the late 1960s as part of the movement towards behaviouralism in geography, had four distinguishing features: First, it started with the premise that the environmental cognitions upon which people act may differ markedly from the true nature of the real world. This implied that space possesses a dual character, one as the *objective environment* (or reality as it exists in nature), and the other as a *behavioural environment* (that is, reality as it is perceived by the decision-maker). The behavioural geographer focused attention on the environment as perceived. Secondly, behavioural geographers asserted that the individual shapes, as well as responds to his physical and social environments. Such an assertion implied that behaviour is not just the end product of a chain of events but also the start of new sequences. Thirdly, behavioural geographers tended to focus upon individual behaviour rather than to approach problems at the level of the social group. This was with a view to comprehending the mental processes involved in reaching decisions. A large number of such studies focused on the behaviour of individuals could provide the raw material for inductive generalizations. Lastly, behavioural geography was "multidisciplinary" in outlook in that as a relative newcomer to behaviouralism, behavioural geography looked to the other behavioural sciences to provide insights into the behavioural processes involved (Gold, 1980, pp. 4-5).

The Radical (Marxist) Stream

Owing to the absence of a Marxist tradition in American social science, the rise of a genuinely radical perspective in that country was a delayed process. This was all the more true of the discipline of human geography wherein political awareness was at a particularly low ebb, so that:

> Even the call for more social relevancy was at first greeted with scepticism and hostility…. Therefore, in this conservative, self-protective little corner of science, "radical" geography took a liberal form for a time, with interest focused on bringing the discipline back into the form of crucial events and applying geographic skills to the immediate practical problems faced by the oppressed groups (Peet, 1977, pp. 15 – 16).

Section 2: key Statements

Basic key statements:

Ges Periods(8.1), Guide to Geography(8.1),Cosmos(8.1),Erdkunde(8.1),Ved and Upanisad (8.3),Bhugol(8.3)

Standard key statements:

Ibn –Hakul (8.1),Ibn Khaldun(8.1),Humbolt(8.1),
Ritter(8.1),Ratzel(8.1),Kropotkin(8.1),Schaefer(8.3),

Advanced key statements

Geographic Generalis(8.1), Anthropogeography(8.1), Possibilism (8.1), La-Geographien Humaaine(8.1),
Influnec of Geographical Environment(8.1), New worald(8.1), History and its Geographical conditions(8.1), Nature of Geography(8.1), Cultural landschaft(8.1), The origin of species by means of Natural Selection (8.3), Darwinism (8.3), Paradigm (8.3), Exceptionalism (8.4), Models of Geography (8.4), Compage Region (8.4), Dualism (8.5), Geography as chorology (8.5.4), Quantitative Revolution(8.5.8), Behavioral Geograhy (8.6.1), Huministic Geography (8.6.2), Mental Map (8.6.1), Radical Geograaphy(8.6.2.1) Feminist Geography (8.6.3), Modernity (8.6.4), Positivism(8.6.5),

Section -3: Key Facts and Figure

SUB UNIT-1:

Contributions of Scholar and Geographer

8.1 Introduction

In its wider connotation as a branch of knowledge concerned with the satisfaction of human curiosity about the lands and peoples away from one's home base, speculation regarding mysteries of the physical environment, and the role it plays in shaping the destiny of man upon the earth, geography is as old as human civilization. As such, each major cultural realm has had its own historiography of geography. Modern geography as practiced all the world over today, represents, however, an outgrowth of the Europeans geographic tradition so that the historiography of modern geography is essentially an account of the conceptual developments among Europeans regarding the nature of the earth and its environment and the way it influences man and his pursuit for livelihood. Thus, the roots of modern geography areb traced back to the thought of the ancient Greeks.

CONTRIBUTIONS OF THE ANCIENT GREEKS AND ROMANS

References to descriptive writings about lands and peoples in different parts of the earth's surface are found in the oral traditions of classical Greece and are reflected in the writings of Homer, whom the Greek geographers had themselves referred to as the father of geography. *Odyssey*, Homer's epic poem written sometime in the ninth century B.C., presents geographical accounts of the lands and peoples located on the margins of the world then known to the Greeks. The poem records the wanderings of Odysseus on his return journey to Ithaca after the fall of Troy, when he was own off-course by a storm so that it had taken him twenty years to reach home. The poem contains geographical account of the distant places visited by the hero of the epic in course of his long journey. In it there are references to a land of continuous sunshine, and later of Odysseus's visit to an area of continuous darkness. Apparently a Greek poet could not have imagined these scenes. Somehow accounts about nature of the earth in the far north of Europe during the long summer days and the continuous winter darkness had filtered back

to Greece, and were woven with other geographical threads into an enchanting adventure story. As in the case of *Meghdoot* of Kalidas, many have tried to identify the many places referred to in the epic poem.

However, Thales of Miletus- a town located near the mouth of the Menderes river on the eastern side of the Aegean Sea (which was both a prominent centre of learning and flourishing centre of commerce)- who lived in the seventh and sixth century B.C., is regarded as the first Greek to have devoted focused attention to the measurement and location of places on the surface of the earth. Thales himself was a very successful businessman. In the course of a business trip to Egypt, he had been greatly impressed by the geometrical tradition of the Egyptians in the measurement and computation of areas. He introduced some of these ideas among the Greeks. Anaximander, a contemporary of Thales and a few years his junior, is created with having first introduced the idea of the sundial consisting of a pole set vertically over a flat surface to measure the varying position of the sun by measuring the length and direction of the shadow cast by the –pole. The shadow was shortest at noon and provided an exact north- south line for determining the correct longitude of the relevant place. Anaximander is also said to have produced a map of the known world with Greece as its centre. Thales and Anaximander have jointly been regarded as the originators of the mathematical tradition in Geography in ancient Greece. The literary tradition in the writing of geography had also developed around the same time. Hecataeus, a resident of the town of Miletus, and born around 475 B.C.-about the time that Thales and Anaximander had passed away- originated the literary tradition, and his book *Periods Ges*(Description of the earth) is regarded as the first known attempt to synthesize available knowledge about the world in a usable form. Hecataeus is also one of the earliest writer of prose in classical Greece literature.

The next great name in this context is that of Heredotus (circa 485-425 B.C.) who is widely known as the father of history, but is also generally regarded as one of the founder of geography. His history of Greek struggle with the “barberians” included (as digressions) descriptions of various places visited by the author/. Herodotus firmly believed that all history must be treated geographically and also that all geography must be studied historically. For him geography provided the stage, or the setting that gives meaning to historical events.

Herodotus had travelled a great deal. Throughout his travel he had retained a keen interest in the nature of landscape so that he not only described geographical phenomena but also tried to explain them. Examples include his attempt to explain the annual fluctuations in the flow of the Nile, and his the processes involved in the origins of Delta's occurring at the mouth of the Meander(Menderes) river at Miletus. Herodotus had no interest in the mathematical tradition and showed no interest in problems like measurement of the earth's circumference. He accepted the Homeric view of the earth as a flat disc over which the sun was believed to travel in an arc from east to west.

Plato (428-348B.C.) also made an important contribution to the development of geographical ideas. Plato was a great proponent of deductive reasoning. He insisted that the observable phenomena on the earth's surface represent poor copies of ideas from which these observable phenomena had degenerated. By way of illustration he referred to the case of Attica (the ancient territory of which Athens was the capital). According to Plato,the area was originally very fertile and capable of supporting a large population of men and animals. He wrote that compared to its original state,the Attica of his time was "like the Skelton of a sick man, all the flesh and soft earth having been wasted away, and onek bare framework of the land being left" (cited in Blacken,1967, p.121). Contemporary philosophers in Greece generally accepted the idea that symmetry of form is one of the essential attributes of perfection, and that the most completely symmetrical form was a sphere. It was argued that since the earth had been created to serve as the home of man, it must have a perfect form, and therefore it muat be a sphere. Plato is regarded as the first scholar who put forward the concept of a spherical earth located in the centre of the universe, and the sun and all the other celestial bodies moving round it. Plato offered no other argument or evidence as proof that the earth is round. Providing the proof for the spherical shape of the earth was left to Aristotle (384-32 B.C.), who was a student and a member of Plato's academy for twenty years.

Aristotle is regarded as the pioneer of inductive reasoning and the inductive approach to acquiring knowledge. He was convinced that the best method of building a reliable theory was to start with the observation of facts. This required reasoning from the particular to the general, in contrast to Plato's deductive approach which required the student to proceed from the general to the particular. Aristotle laid the foundation of what has been regarded as the world's first paradigm to guide research procedures. He laid down four fundamental principles of scientific explanation: First, it is necessary to establish the essential characteristics (i.e, the nature) of the phenomenon being investigated; Second, it is necessary to identify the substance of which it is composed; Third, it is necessary to identify the process through which the phenomenon has attained it's present form; and lastly, it is necessary to identify the purpose that the phenomenon concerned fulfills in the overall "scheme of nature". This last principle makes Aristotle stand out as teleologist in that he believed that everything was changing in accordance with a preexisting plan.

Aristotle argued his propositions so convincingly that his research methodology appeared irrefutable at the time it was presented. His intellectual status in the contemporary world of scholarship was so high that for a long time his ideas were accepted without question. (Some of his ideas were patently false, however. One such was the idea that habitability on the earth surface is a function of distance from the equator,and that areas around the equator are too hot for human survival.)

Although Plato and Aristotle gave intellectual leads that contributed to the development of knowledge about the earth as the human habitat, to this, Eratosthenes (276-194 B.C.) is often referred to as the father of geography as a branch of knowledge. He is said to have coined the word geography. The term is derived from ge, meaning the earth, and grapje, meaning description. Thus was born geography as a field of study which specialized in presenting reasoned description of the Greek ecumne (the world known to the ancient Geeks) and speculated about the nature of peoples and places beyond the range of knowledge in contemporary Greece. He wrote the first formal text on geography entitled *Geographica*. His estimate of the earth's circumference was remarkably accurate, and, therefore had proved a major step forward in the development of knowledge about the earth. Eratosthenes was the

chief librarian at the famous museum at Alexandria-a post that he occupied for about forty years until his death in 194 B.C. Under his leadership, the museum had developed into a major centre of astronomical research, a field of knowledge that was at that time viewed as closely associated with geography. Eratosthenes identified five climates zonee one torrid zone, two temperate zones, and two frigid zones. He also improved upon the Aristotelian idea on this subject by giving latitudinal boundaries to the five climatic zones. The *torrid zone* extended 24 north and south of the equator, and the *frigid zones* extended equlorward 2r from either pole. The areas in between were the two *temperate zones.*

After the death of Eratosthenes the post of chief librarian of the museum at Alexandria went to Hipparchus who was the first to divide the circle into 360 degrees. He also defined a grid of latitudes and longitudes for the earth, and identified the equator as a great circle that divides our spherical planet into two equal parts. Hipparchus pointed out that since the earth makes one complete revolution in 24 hours, it covers a journey of 360 degrees in a day and so covers fifteen degrees of longitude in one hour. He also made a significant contribution to the development of map projections by suggesting ways for overcoming the difficulty of representing the spherical earth on a flat sheet of paper.

The cartographical cosmographical traditions set by Erastothenes and Hipparchus were further advanced by the succeeding generation of students at the museum. The cumulative knowledge gained through these exertions culminated in Ptolemy's (90-168 A.D.) eight volume work entitled *Guide to Geography*. Ptolemy was a great astronomer of his time and was the author of the famous text on classical astronomy entitled *Almagest* which had for long remained the most standard reference on the movement of celestial bodies. His *Guide to Geography* was also of related interest. By adopting the system of latitudes and longitudes based on the division of the circle into 360 degrees, he attempted to give precise location for all the known places in precise mathematical terms. Six out of the eight volumes of his *Guide to Geography* consisted of tables of latitudes and longitudes. The first volume was devoted to a discussion on map projections, and the eight volume contained maps of different parts of the world showing all the places that had been included in volumes two to seven. It is true that from the perspective of present, Ptolemy's book would appear as a monumental collection of errors. It was, however,

a piece of great scholarship at the time when it was originally presented. Ptolemy's calculations of latitudes and longitudes are found to be wrong since these calculations had been based on estimated lengths of journeys between places; and these could never be accurate. Another major source of error was that Ptolemy had rejected Eratosthenes's almost correct estimate of the earth's circumference in favour of Posidonius's (which gave a figure that fell short of the actual by a little over one-fourth). (Erastothenes had estimated the earth's circumference at 252,00p stadion, and Poisonous at 180,000 stadii- one stadium being equal to 157.5 meters.)

Strabo (64 B.C. to 20 A.D.), born a century-and-a-half before Ptolemy, he carried forward the tradition of topographical work of Greek geography as started in the works of Herodotus. His seventeen-volume work named *Geography* was largely an encyclopadic description of the world known to the Greeks. Unlike the works of most other Greek scholars, Strabo's book was found almost intact. The first two volumes of his book contain a review of the work of other geographers since the time Homer. They give a fair idea of the nature of geographical writing in ancient Greece. The next eight volumes were devoted to Europe, six to Asia, and one to Africa.

Strabo's book was written to cater to the needs of a specific group of readers, namely the officers of the administration, statesmen, and commanders of the Roman empire. The purpose was to provide a handbook of information about places and people to help the imperial officers in better appreciation and accomplishment of their tasks. Strabo's book had laid down a clear foundation for choto logical writing in geography. Explaining the method of writing geography, Strabo wrote:just as the man Who measures the earth gets his principles from the astronomer and the astronomer his from the physicist, SO too, the geographer must in the same way take his own point Of departure from the man Who has measured the earth as a whole, having confidence in him and in those in whom he, in his turn, had confidence, and then explain in thefirst instance. our inhabited world, its size, shape and character, and its relation to earth as a whole; for this is the particular task of the geographer. Then, secondly, he must discuss in a fitting manner the several parts of the inhabited world, both land and sea, noting in passing where the subject has been treated inadequately by those of our predecessors whom we have believed to be the best authorities on the matters (Strabo, trans., Jones, 1917, pp. 429-431;cited in James, 1972, p. 47).

Both Strabo and Ptolemy had lived at a time when the Roman empire was at its zenith. It was the largest centralized empire in history till that time. The state needed to have exact description of its territories as well as the other territories it interacted with. This knowledge was necessary both for effective administration and trade as also for the training of the younger generation from among whom the future crop of administrators was to be recruited. The work of the hive Greek scholars, besides extending the frontiers of knowledge, was designed to meet a definite need of society. Geography was flourishing because it served a useful purpose.

GEOGRAPHY IN THE MIDDLE AGES

During the fifth century AD, the Roman empire suffered demise. The central administration had greatly weakened and consequently the constituent territories gradually became independent. As trade and commerce declined, the geographic horizons of the people rapidly narrowed down so that, with passage of time, the geographical horizon of most people in Christiandom became confined to their immediate surroundings. Given the extremely narrow world-view of contemporary European societies, it was natural that the hold of religious orthodoxy should increase. Before long, scriptures had begun to be regarded as the ultimate repository of knowledge of every kind so that an impression was created that there was no need to learn anything outside the Holy books. Anything that did not conform with the ”truth” of the scriptures was regarded as the product of a perverse mind and had, accordingly, to be rejected. Under these conditions, science (and, therefore, geography) could not develop so that the Middle Ages represented the Dark Age in the history of scientific knowledge in Europe. During this period, scientific concepts developed by the ancient Greeks were reshaped with a view to make them conform with the ”truth” preached by the Church. For example, the idea of a spherical earth was abandoned in favour of the old concept of the earth as a flat disc, with Jerusalem as its centre. This dismal state of affairs had continued almost until the end of the twelfth century A.D.

By the end of the eleventh century A.D., overland travel of Christian pilgrims to Jerusalem across Turkey and Syria had been made very difficult on account of Muslim domination over these territories. This aroused the religious sentiments of Christian Europe. A series of military campaigns were organized with a view to rescue the Holy Land of Jerusalem from the control of Muslims. Between 1096 and 1270 A.D., eight different crusades were organized for this purpose. These crusades (religious wars) played a major role in broadening the geographical horizon of Christian Europe. Men from different parts of Europe had come together to participate in them. These participants went back to their homes with new knowledge and information about the landscapes and customs of many areas beyond the range of the familiar. This stimulated interest in, and the urge to gain knowledge about unfamiliar places. The religious wars, therefore, had led to a new beginning-a revival of interest in geography as a

branch of knowledge. Expeditions began to be organized to distant places. The most famous of such expeditions was Marco Polo's voyage to China, the Far East, and the Indian Ocean undertaken between 1271 and 1295. The Crusades proved a stimulant to the revival of interest in the study of peoples and places in far-off lands in another way also. Owing to the "religious" wars the Muslims had closed the overland routes to India and beyond to European merchants who had until then participated in the highly profitable spice trade between India and Europe. Attempts were, therefore, directed to finding an alternative route to the Indies. Two such attempts led to the glorious discoveries of Columbus and Vasco de Gama.

GEOGRAPHY IN THE ARAB LANDS

The fall of the Roman empire, and the decline of scientific learning in Europe was followed by a period of great ascendancy in the Muslim world which, under the influence of Prophet Mohammed, had been transformed from a multitude of tribes divided by intertribal feuds into integral components of a larger all-inclusive identity based on adherence to a common set of religious beliefs and practices. The followers of Islam soon embarked upon a course of conquest of the world outside Arabia with a view to spreading the new religious ideology to the farthest corners of the world. Persia and Egypt were conquered in 641-642 A.D., and by AD. 732 the whole of the West Asian desert region was under their control. They soon overran the Iberian peninsula so that Spain and Portugal had remained under Muslim rule for almost nine hundred years. Muslim influence also extended eastward into India and parts of south-east Asia. The act of holding on to such a huge politico-cultural empire had, in itself, become a major stimulant to the rise of interest in geographical learning. The Arabs now held a monopoly over the spice trade between India and Europe. This trade required a great deal of travel over land and sea. Travels between places spread over such a large expanse of territory became the source of considerable extension of knowledge about geographical environment in tropical regions.

Following the widening of its geographical horizon, the Arab world became fired with a new zeal for scientific learning. Baghdad (founded in 726 AD.) became a major centre of leaming. Its rulers (the Caliphs) employed learned men of different faiths to make authentic translations of the major scientific works of their respective languages. Included in these works were books on astronomy and geography. Scholars were also employed to calculate the circumference of the earth, and to fix latitudes intheplainoftheEuphrates.Themethodemployedwastheoneusedby Erastosthenes about a thousand years earlier. Available texts on geography written by the ancient Greeks (including Ptolemy) were translated into Arabic, and new texts were got written after duly incorporating the new knowledge derived from the records of observations made by Arab merchants and explorers.

Thus, as a result of Ibn-Hakul's voyage to the south of the equator (made between 943 to 973 AD), the wrong notion regarding the inhabitability of the torrid zone (as perpetuated by Aristotle) was abandoned Around the same time, in course of his travels down the east coast of Africa upto the Mozambique, Al-Masudi had reported the phenomenon of monsoonal winds. Another contemporary named AlMaqdisi had established (in 985) the general truth that the climate of any place is a function not only of its latitude but also of its position on the east or west side of a landmass. He is also credited with the knowledge that most of the earth's landmass lies north of the equator. Al-Idrisi (around 1099-1180 AD.) made many corrections to Ptolemy's book. On the basis of the new information collected by Arab explorers, and some collected from other sources, he produced his own book on geography (in 1154) in which the Greek idea about the Indian Ocean as a closed sea was corrected. Also corrected were the positions of many rivers including the Danube and the Niger.

Another great Arab explorer was Ibn Batuta (1304-1368 A.D.). He extensively explored regions of North Africa and West Asia, sailed along the Red Sea, and travelled south along the east coast of Africa to Kilwa, a point about 10 degrees south of the equator. He had reported that an Arab trading post was located in the latitude of 20 degrees south thereby confirming the habitability of the torrid zone. Ibn Batuta had also travelled overland from Mecca to Persia, Bukhara and Samarkand, and from there across Afghanistan to Delhi. He had visited several islands, including Ceylon (Sri Lanka), Sumatra, and the Maldives. He also visited China and

returned to Fez, the capital of Morocco, in 1350 AD. From there he travelled across the Sahara to Timbuktu on the Niger, gathering valuable information about Black Muslims on the way. He settled down in Fez in 1353 AD. after travelling an estimated 75,000 miles, a world record for his time. On the request of the king of Morocco, he put down a detailed account of his travels for posterity.

The last great Muslim scholar who contributed significantly to the development of geographical knowledge was Ibn-Khaldun (1342-1405 AD.) who wrote (in AD. 1377) a detailed introduction to world history published under the title Muqaddimah. In his introduction to the book he identified two sets of influences on man's progress (i.e., history): One, the physical environment, and two, the social environment derived from culture and belief rather than the natural environment. This distinction between the two sets of environmental influences on man was a remarkable intellectual achievement for his time so that Kimble (1938) was prompted to remark that Ibn-Khaldun had "discovered...the true scope and nature of geographical inquiry".

Ibn-Khaldun had concentrated on the study of the tribe and the city-the two most important elements in the political organization of desert society in the Arab world. He identified the tribe and the city as two distinct stages in the evolution of social organization in a desert environment. While the nomads represented an earlier (primitive) stage of social organization, the city dwellers represented the last stage in the development of social life, almost the point where decay sets into the social organization owing to the sedentary lifestyle of the urban community. Many credit Ibn-Khaldun with having presented in this way one of the earliest concepts of the life cycle of states. Surprisingly however, Ibn-Khaldun had clung to the Aristotelian idea about the inhabitability of the equatorial regions. To the great credit of Ibn-Khaldun is the fact that he was the first scholar to direct attention specifically to the study of the man-environment relationships.

The significance of Arab contribution to the historiography of modern geography lies in that the development of geographical knowledge in the Arab world represented, in some ways, a further development over the original base provided by the geographers of ancient Greece, Whose works had been translated into Arabic, and were widely used by Arab scholars. Thus, while Eur0pe itself had forgotten the Greek heritage in geography, the Arabs had held the banner aloft and it was largely through contact with the Arab world, and the translation of their books (including retranslation of Greek works from their Arabic translations) that geography got revived as a living science in fifteenth century Europe. Indeed, it were the countries having had the closest contacts with the Arab world, such as Spain and Portugal, that spearheaded the series of exploratory voyages that ultimately opened the way to the revival of interest in geographical learning. Large parts of Spain and Portugal had remained under Muslim rule since the eighth century AD. While Portugal had become free in the middle of the thirteenth century, the Spaniards pushed out the Muslims gradually from the peninsula thrmmh a series of efforts lasting over a century from 1391 to i492.

Both the Portuguese and the Spaniards had mastered the art at shipbuilding and navigation, and had launched ambitious pmgrnmmeu of voyages of exploration with a view to promoting trade and cnmmerte with the outside world, particularly the spice trade with the incite», and trade in gems and precious stones with parts 0! Africa south 0! the Sahara. Since the overland routes in each case were then under the control of the Arabs, it was necessary to find alternative sen mutes, Whit h contemporary science had shown to be well within the pale uf ptmuibility in view of the round shape of the earth, and the continuity of the ocean bodies.

The importance of the spice trade for contemporary Europe lay in that owing to the inadequate supply of sugar, spices were required to make food palatable. Besides, in the absence of refrigeration, meat had to be stored in dried and salted form. Such meat required spices in order to be made reasonably palatable. Genoa and Venice which had earlier been flourishing centres of trade in spices from India and beyond, now iay deserted, as the Arabs had blocked direct contact between Europe and the regions of supply lying further east in Asian

THE AGE OF EXPLORATION

ortugal's Prince Henry "The Navigator" who had (in 1415) succeeded m capturing the Muslim base at Ceuta on the southern side of the Strait of Gibraltar, took the first initiative toward wider exploration across the high seas. From his Muslim prisoners, the Prince had learnt that many of the most valuable items of merchandise traded in European markets by the Arabs were brought from areas in Africa to the south of the Sahara. This inspired him to sponsor voyages of exploration along the western coast of Africa. Around this time-in 1410-two important publications had appeared in geography. One was the Latin translation of Ptolemy's Geography made from a copy preserved in Byzantium (Istanbul), and the other was a book called imagine M undi authored by Pierre d'Ally in which the author presented a summary of various geographical writings then existing in the countries of Christian Europe. The two works proved very influential in promoting interest in geographical knowledge and created a favourable climate for launching of the voyages of exploration, and for developing better techniques of cartography and map design.

Prince Henry was responsible for establishing a broad-based institute of geographic research at Segre near the port of Lagos where a rich library of all the available literature in geography, cartography, astronomy and related subjects was stocked, and scholars (including linguists) from all parts of Europe were invited to teach Portuguese students the art of navigation, and to inform them about the existing knowledge regarding the earth and its environment in different parts of the world so that suitable preparations could be made to meet the contingent situations likely to be encountered in the process of exploratory voyages then being planned for the exploration of the western coast of Africa, with a View to find an alternative sea route to the spice islands beyond India. These explorations initiated by the Prince had laid firm foundations for the larger ventures by subsequent explorers under the patronage of the royal house of Portugal, culminating in the great voyage of Christopher Columbus (who discovered the new World in 1492) and the discovery of an alternative sea route to India by Vasco da Gama in 1498.

Columbus had studied at Sagre, and he had been greatly influenced by Pierre d'Ally's Imagine Mundi which had suggested that since the earth was round, a route to China and India could be found by sailing west from the Canary Islands. It is a different matter though that in the process of finding an alternative route to the Indies, Columbus landed in America rather than Asia, his intended destination. Columbus died in 1506 still believing that he had discovered a part of Asia. The task of finding an alternative sea route to Asia by sailing west and then north along the coast of South America was accomplished by another great Portuguese explorer three decades later in October 1520. This voyage was performed by Magellan whose name the Strait of Magellan, connecting the Atlantic with the Pacific, now bears.

Voyages across the sea required maps and charts to guide sailors in course of their travels. Ptolemy's map was used in the beginning. It was the task of the royal cartographers to correct the old maps in the light of new information then available. Venice and Genoa soon emerged as great centres of cartographic learning. European sailors and merchants departed from either of the two port towns for their journeys to the eastern Mediterranean to pick up the cargo brought by Arab ships from the East. The first globe showing the earth as a sphere was produced by Martin Behain in 1490, and map projections tackling the problem of representing round earth on a flat sheet of paper had begun to receive attention of scholars soon after. In 1530, Peter Apian produced a heartshaped map of the earth in which both latitudes as well as longitudes were shown as curved lines. Neither distance nor direction was represented correctly, and the map showed only one hemisphere. Apian's student, Gerhard Kramer (who later adopted the name Gerhard Mercator) made a world map in 1538 by joining two heart-shaped projections-one for each hemisphere. Mercator earned celebrity in 1569 when he succeeded in designing a projection that showed the whole of the earth surface on a single network of latitudes and longitudes. This was the famous Mercator Projection-the orthomorphic cylindrical projection. As we know, even though theoretically an orthomorphic projection, it greatly distorted the shapes of continents, but its great advantage lay in that on it compass bearings could be shown by straight lines so that navigators could plot their course without being required to draw cumbersome curves.

The projection could not be easily used until English geographer Edward Wright (1558-1615) produced the trigonometric table to reproduce the projection. This improvement made the Mercator projection universally accepted for maps on Which to base navigators' charts.

Focus on improvements in cartographic techniques had continued through the sixteenth and seventeenth centuries. New projections were devised and old map projections were improved upon. Map makers remained busy revising old maps in the light of new information obtained from travellers and explorers. From the time of Magellan (who explored the outlines of South America between 1518 to 1521), and James Cook (1728-1779) (who through his three different voyages, performed between 1768 to 1779, drew the outlines of the Pacific Ocean and eliminated the possibility of the existence of Ptolemy's Southland), scholars were directly addressing the task of drawing correct outlines of landmasses and water bodies. They were also busy devising techniques of surveying and cartography to be able to present true-to-scale reality of the earth's surface on their maps and charts. The task of drawing continental outlines was almost complete by the time of James Cook's death in 1779 and a good deal of new information about world climates, wind regimes, distribution of flora and fauna, and patterns of human civilization over the earth surface had been obtained. Incorporating the ever increasing information and data with a view to presenting a correct and meaningful description of the earth surface had become a formidable scientific endeavour. The challenge posed by the problem attracted a number of leading scientists to the study of geography and the task of classification and analysis of the accumulated data.

While explorers were busy fixing the outlines of continents and oceans, and cartographers remained busy in drawing more accurate representations of the earth surface on maps, the world was experiencing a great revolution in knowledge about the nature of the universe and the earth's position in it. The old-time concept of the earth as the centre of the universe was abandoned in favour of the concept of a heliocentric universe first put forward by the Polish scholar Nicolaus Copernicus in 1543. The concept was further refined by Kepler (1571-1630) in 1618 and Galileo (1564-1642) in 1623. Galileo had revolutionized scientific thinking by formulating the concept of mathematical order in the universe-i.e./ an order in which relationships between phenomena could be described in terms of mathematical laws rather than

verbal logic. A further scientific advance was made in the form of Newton's law of gravitation in 1686. Thus in the course of a century and a half, seeds of scientific revolution had been sown. These heralded the beginning of the rise of a series of specialized branches of knowledge, each focusing on some particular aspect of the environment and the processes involved therein. The rise of specialized systematic sciences, each focusing on a particular category of facts or relationships, signalled the demise of the era of universal scholarship and of the old style cosmographies in which scholars had attempted to bring together all that was known about the earth and its parts in single volume works in the style set by Strabo.

In view of the rapid flow of new information derived from the increasing stream of explorations and scientific research, compilation and synthesis of knowledge in a meaningful manner became an increasingly challenging task that required a high degree of scholarship. Thus the cosmographers of that period were far from mere popularizers. The first great cosmographer of the age of exploration was the German scholar Sebastian Munster (1489-1552) who had been engaged, in collaboration with 120 other authors and artists, in writing a broad-based cosmography incorporating the latest information on every important aspect of the universe for over eighteen years. The outcome was a six-volume work entitled Cosmographie Universalis published in 1544. Written in the tradition of Strabo's Geography, the book earned its author the popular title of "the German Strabo". The first volume of Munster's cosmography presented a general picture of the earth on the lines of Ptolemy's Geography, while the remaining five volumes were devoted to providing descriptive accounts of the major divisions of the earth's surface.

Munster's work was a combination of tradition (imaginative stories about people and places which were part of popular belief) and science (incorporating new information derived from explorations and scientific investigations). Thus, his account of America and Africa had included stories of men with heads on their chests, and having a combined part animal and part human form. Such beliefs were part of contemporary scholarship and consequently, Munster's volumes were avidly read necessitating several editions between 1544 and 1550. The book had remained a popular reference for about a century thereafter. Another leading cosmographer was the German scholar Cluverius (1580-1622) who had published a six-volume compendium

on universal geography which followed the general plan of Munster's work but was better informed. The first universal geography to appear in the English language was written by Nathanael Carpenter (1589-1628), a scholar at Oxford, who had benefited from his association with Cluverius during the latter's frequent visits to Oxford. Carpenter's book had appeared in 1625, a year after the publication of Cluverius's work.

From Cosmography to Scientific Geography: Contribution of Bernard Varenius

In the course of time, the tradition of writing cosmographies had got concretized into a coherent body of knowledge that came to be described as "general geography." Geographic: Generalis (1650) of Bernard Varenius (1622-1650) (a Dutch scholar) was an outgrowth from the cosmographic tradition even though it stood out as a major step forward toward laying the foundation of geography as a scientific discipline. Varenius'sbook was, according to Dickinson (1969), the first work "which sought to combine general, mathematical, and physical geography and chorology". VareniuS set forth clearly the distinction between two forms of geographical scholarship-the one concerned With the description of particular places (i.e., regional description or chorology), and the other concerned With developing general concepts and hypotheses of wider applicability. He termed the first as Special or Particular Geography (i.e., geography of particular places etc.) and the second as General Geography.

Varenius was writing at a time when voyages of exploration Were pouring in a flood of new information and data so that one of the major problems facing contemporary scholars was how to relate specific pieces of information to general principles. Among geographers, Varenius was the first to focus attention on this problem; and the solution that he offered through his Geographic: Generalis was to become the basic tenet of geography as a branch of knowledge which has ever since retained a two. fold division into Regional and Systematic (or General) geography-the former focused on the study of particular places, and the latter devoted to the study of the nature, and pattern of spatial distribution of particular items of geographical interest over the earth surface and its parts.

The most creditable part of Varenius's contribution lay in that he underlined the relationship between the two streams of geographical scholarship: Special geography provided the results of in-depth study of particular places and regions Which provided the raw material (the data) on the basis of Which General geography could pursue the task of depicting spatial patterns of distribution, and inferring therefrom general hypotheses and general concepts explaining why they occur Where they do, and thereby providing valuable inputs for better work in the area of Special (i.e., Regional) studies. Varenius pointed out that while Special geography was of great practical value in the pursuit of government and commerce, General geography provided information about the principles governing the distribution of particular phenomena over the earth surface so that the administrators and the businessmen may be suitably informed about the nature of the environment they are likely to encounter in particular parts of earth's surface. To Bernard Varenius, therefore, General and Special geography did not suggest any dichotomy or separation of ways between the two branches of geography. To him the two represented mutually interdependent parts of geography as a unified field of scientific learning. In such a vision of geography, Varenius was far ahead of his peers. This explains Why he had so greatly influenced the concept and scope of geography in Europe for well over a century.

In the foreword to his book, Varenius had set out a plan for writing Special geography, according to which the description of particular places should be based on celestial conditions, including climate; terrestrial conditions, including relief, vegetation and animal life; and human conditions including trade, settlements and forms of government in each country being studied. It is true though, that Varenius was none too enthusiastic about human geography since its subject matter could not be put to exact mathematical analysis for purposes of generating laws of behaviour (Gettfried Lange, 1961, paraphrased in Holt-Jensen, 1980, p. 14).

Like most other great works of scholarship, Varenius's Book had been inspired by the demands of his time. In 1647, Varenius had accepted the position of a private tutor in a family in Amsterdam, then the commercial hub of the Netherlands. Here he came in contact with merchants engaged in international trade. Many of the merchants needed information about Japan Where the Dutch had established a trading post in Nagasaki. This is what had inspired his first book entitled Regional Description of japan and Siam published in 1649. The experience gained in writing a regional geography of Japan gave Varenius the idea that descriptions of particular places "could have no standing as contribution to science so long as these are not related to a coherent body of general concepts". His Geographic: Generalis was written with a view to promoting the search for and the building of this much-needed conceptual coherence in geographical scholarship. His book went through several editions in Latin-two of these (published in 1672 and 1681) were edited by no less a person than Sir Isaac N ewton. An English edition was published in 1693 (Baker, 1955a and 1955b).

Varenius passed away in 1650 at the tender age of 28 so that the world of geographical scholarship was deprived of many more conceptual leads. Underlining the methodology of Special vis-a-vis General geography, Varenius pointed out that while in General geography (dealing mostly with phenomena of physical origin), most things can be proved by mathematical laws, in the case of Special geography, with the exception of celestial features (i.e., climate etc.), things must be proved by experience that is, by direct observation through the senses (James, 1972, p. 226).

THE IMPACT OF DISCOVERIES

New Answers to Questions about the Origin of the Earth and Its SurfacegFeatures, and Man's Place in Nature

‘Speculation about the origin of the earth, and man’s place in the web of nature, had for long remained constrained by theocratic domination of thought in medieval Europe. Intellectual thinking had continued to be conditioned by traditions inherited from ancient Greece as well as from biblical accounts. All this began to change during the seventeenth century when steps were initiated to cut the thought process loose from the strangle hold of biblical beliefs, and to start experimenting with rational methods, so that geographical explorations had ”immense significance in the history of science and of thought” (Parry, 1981, p. 3). By the end of the seventeenth century, a good deal of speculation on the origin of the earth had led to the belief that the earth is a physical phenomenon that has acquired its present form though natural processes of change spread over millions of years, and that it was wrong to regard it as a divine creation. This marked the beginning of the end of tele010gy. Inspired by the theory of comets given by Edmond Halley (1656-1742) in 1682, William Whiston (1667-1752) developed the theory that the earth was made from the debris of a comet, and that the gravitational pull of a second approaching comet had caused the elliptical orbit of the earth around the sun, and had also led-through the tidal waves caused by its gravitational pull-to the creation of the continental masses and ocean basins. While the crests of the waves were occupied by landmasses (continents), the troughs became the ocean basins. Later the German' scholar Abraham Gottlob Werner (1749-1817) developed the theory that the great flood that had been caused by the cooling of the earth’s atmosphere, had led to dissolution of the materials of the earth’s crust. The dissolved materials of the crust were deposited on the surface in the form of a series of layers so that large parts of the earth surface are covered with sedimentary strata.

Simultaneously, a good deal of speculation had begun on the origin of landforms. In 1719, John Strachey (1671-1743) showed that landforms reflected the rock structure lying underneath them. Subsequently, in 1777 Simon Pallas (1741-1811) published geological maps to show that the cores of most mountain ranges are made of granite. Alongside, ideas about the mechanics of river flows and valley development were being developed at a rapid pace. The French scholar Louis Gabriel Comte Du Buat (1734-1809) mathematically explained (in 1786) how the flowing water of a river can establish equilibrium between velocity and the load of sediment being transported by it. This had led to the idea of ”graded river profiles”. During the 18th century James Hutton (1726-1797) popularized the concept of uniformitarianism, according to which the processes that shape the earth surface indicate a perpetual process of change ”with no vestige of a beginning and no prospect of an end”.

New methods of scientific classification of plant and animal life were also influential in shaping geographic thought and practice. The most influential figure in this field was Swedish botanist Carolus Linnaeus (1707-1778). He developed a system of Classification based on classes, orders, genera, and species. French naturalist Lamarck (1744-1829) drew attention to the need for a system of classification of plants and animals in accordance with their natural characteristics. He challenged the Widely believed notion that plants and animals were created in their present form. Thus, he presented the rudiments of a theory of evolution that was later advanced and refined in a big way by Darwin and others Who laboured to explain the mechanism through which the process of evolution of life forms had taken place. Coupled with the idea of uniformitariam'sm of Hutton, the theory of biological evolution had greatly impressed geographers about the role of time in the evolution of landforms.

The early part of the eighteenth century also witnessed the first beginnings of scientific study of man. The German scholar].P. Sussmilch (1707-1767), in a book published in 1741, had demonstrated the existence of statistical regularities in population data. His research showed that the ratios between the sexes had remained nearly balanced, and that birth and death rates could be predicted on the basis of past trends. (However, the idea that numerical information about individuals tends to group around averages (in accordance with the theory of probability) was put forward by Lambert Quetelet (1796-1874) only much later in 1848).

As knowledge about the lands and peoples over the earth's surface increased, so did speculation about the role of the environment in shaping patterns of human behaviour. French philosopher Jean Bodin (15291596) was one of the first to present a major work on this theme in 1566. Placing belief in the Greek concept of climatic zones, Bodin formulated the theory that people in the southern parts of the world (being under the influence of Saturn) are religious by nature; those living in the northern regions (living under the influence of Mars) were endowed with martial characteristics; and only people living in the middle regions (owing to the influence of Jupiter) were able to evolve a civilized way of life and live under the rule of law. English geographer Nathanael Carpenter in his Cosmography (1625) further advanced Bodin's idea regarding climatic zones and their influence in shaping human behaviour.

From these early beginnings of what may appear to us today as unscientific speculation about the man-nature relationships, progressively evolved the more rational scientific analyses based on detailed observations and comparative case studies. In a piece published in 1719, the French scholar Abbe de Bos established a definite relationship between the change of weather and suicide rates in the cities of Paris and Rome. His analysis showed that in Paris, suicides were most common in the period before the onset of winter and just after the end of winter. In Rome on the other hand, most suicides had occurred in the two hottest months in summer (Glacken, 1967, pp. 556-558). Until the 19th century the most influential scholar who worked on this theme was Charles Louis Montesquieu (1689-1755). In line with the scientific ideas current in his time, Montesquieu wrote that warm Climates favoured growth of dESpotlsm and slavery, whereas colder climates encouraged democracy and freedom so that, according to him, democracy tended to increase in Cllrect proportion to increase in distance from the equator. Despite these crude observations on the relationship between man and the environment, Montesquieu was far from a crude determinist (Kriesel, 1968); in his Writings he gave due allowance to human initiative and technology in reducing environmental constraints to human progress.

The progress in scientific thought through the newly acquired habit of questioning everything in sight represented a new tradition in scholarship. As James (1972) wrote, all these efforts were ”new” in the sense that they offered new hypotheses, new methods of classification, and new ways of making use of mathematical principles of explanation, In the development of this new way of thinking, the ground breaking work was performed by the French scholar Count Buffon (George Louis Leclerc, Comte de Buffon, 1707-1788), Who was director of the Jardin du Roi botanical garden in Paris from 1739 to 1788. By Virtue of the position that he held, Buffon had access to a large collection of specimens of plants and animals, and to the relevant descriptions provided by travellers and explorers. His forty-four volume work on Histoire Naturelle, Generale et Particulz'ere (1749-1804) (written in active collaboration With a large number of specialist scholars) ”represents one of the first works resulting from the reports of voyages of discovery in which attention was turned from oddities and marvels to a search for regularities and for the laws governing processes of change. His approach was nonmathematical and strictly inductive aimed at finding some kind of order in the flood of new information” (James, 1972, p. 136).

While Buffon subscribed to the general idea of a divinely created earth, he rejected the theory that the final plan of creation was in the mind of the creator and as such there was no need to look for causes of earth phenomena. Indeed, Buffon was the first to focus attention on man as an agent of geographic change. He developed the idea that the earth has been cooling gradually, and that part of the warmth on the earth surface was derived from its hot interior. Buffon subscribed to the theory of climatic determinism inherited from the ancient Greeks but he was positive that man was hot a passive agent, and that he was capable of adjusting to any climate through his technology and culture.

Inclusion of panels of trained scientists in the voyages of discovery, beginning around the last quarter of the seventeenth century, had greatly contributed to promotion of scientific knowledge about the earth. The first such scientific traveller during 1698-1708 was the English astronomer Edmund Halley (1656-1742), the great scientific genius at deriving order out of complex data. He was the originator of the mortality tables in 1693, as also of many graphic methods for showing geographical distribution of physical features of the earth. His maps and discussions of the trade Winds of the Atlantic (1686) provided the first illustration of wind directions and wind shifts. He also prepared the first map of magnetic variations using isogonic lines in 1701.

The father-son term of trained botanists Johann (1729-1798) and George (1754-1794) Forster had accompanied Captain James Cook on his second voyage to the Indian and the Pacific oceans. In the course of this voyage, the two made detailed botanical observations. It was in the course of this voyage that George Forster found out that the patterns of temperature on the eastern and western margins of landmasses are very different so that there was similarity between the climates of Western Europe and the western coast of North America. George Forster had later played a pivotal role in attracting Alexander von Humboldt to geography. Another great scientific traveller of this period was Major James Rennel (1742-1830). He was one of the founders of the science of oceanography, and had served as the Surveyor General of India during 1767-1777. His Atlas of Bengal (1779) had gone through several editions, and it had remained a standard work of reference until around 1850.

The growing spirit of inquiry had, by the last quarter of the eighteenth century, egged on many scholars to seek scientific answers to the age old questions regarding man and his life upon the earth. A most prominent name in this regard was that of Thomas Robert Malthus (1760-1834) Who published his famous essay on population in 1798 in which he set out his theory about the interdependent relationship between increase in population and food supply. He maintained that population increases in geometrical progression whereas food supply grows only in arithmetical progression. As a result, population keeps on increasing until subsistence level is reached, so that its further increase is checked by famine and epidemics. At one place in his essay Malthus had used the phrase ”struggle for survival”, a term which, several decades later,

was to inspire Charles Darwin (1809-1882) in his explorations toward the theory of evolution of species through the process of natural selection. In his studies Malthus had showed that increase in agricultural production could not cope with the natural increase in population, irrespective of technological inputs. He was also the first to formulate the economic law of diminishing returns from increased employment of capital and laboua

THE NEW GEOGRAPHY OF THE 18TH CENTURY

The greatly increased information about the lands and peoples around the world that had accumulated by the middle of the eighteenth century, called for a new style of geographical writing. Around this time the old descriptive geographies (cosmographies) were being replaced by more scientifically informed ”universal geographies”. Of several such universal geographies the two best known titles were authored by the French geographer Philippe Buache (1700-1773) and the German philosopher Anton Friedrich Busching (1724-1793). In a book published in 1752, Buache developed the hypothesis that the earth surface is marked off into a series of major basins bordered by continuous ranges of mountains forming drainage divides between adjoining basins. This concept was greatly popularized through the effort of another German geographer Johann Christoph Gatterer (1727-1799) who identified these drainage basins as ”natural regions” and used them as the basic framework for writing new geography texts. This hypothesis became so popular in Britain that river basins were adopted as the preferred units for the study of areal integrations. (Buache is also said to have been the first to identify the existence of a land hemisphere with Paris as its centre.)

Busching had published a six-volume work on Europe in 1792. The work was organized in terms of political units, in the style of Munster, but was based on updated information. He died in 1793 so that his plan to write geographical accounts of the remaining continents remained incomplete. Busching was the first scholar to have used population density as a geographical factor.

Of the many universal geographies to appear in the eighteenth century perhaps the most influential was the one authored by the Denmark-born (but banished from that country in 1800) French geographer Conrad Malte-Brun (1775-1826). His universal geography was an eight-volume work that was published over the 1810-1829 period. Malte-Burn's work was far better organized than the works of his predecessors. His first volume had started with a discussion of the history of geography. The second volume contained discussions on general concepts including the origin of the earth, types of map projections, catastrophism, and uniformitarianism. He rejected the theory of climatic determinism. The most creditable feature of Malte-Brun's book was that throughout it he had incorporated the latest information derived from the accounts of various voyages of discovery, including that by Captain Cook.

PLACING GEOGRAPHY IN THE CLASSIFICATION OF SCIENCES: THE CONTRIBUTION OF IMMANUEL KANT

German philosopher Immanuel Kant (1724-1804) was a contemporary of Malt-Brun. He was professor of logic and metaphysics at the University of Konisberg. He had lectured there since 1755 on a variety of subjects, and since 1756 had regularly offered a course of lectures on physical geography every year until 1796. His attraction to geography was by way of his interest in explorations for the acquisition of empirical knowledge, as part of his general philosophical research.

Kant's lasting contribution to geography lies in that he provided a philosophical foundation for the subject as a field of scientific enterprise. It was Kant's practice to expose in his introductory lecture the place of geography among the fields of scientific learning. He pointed out that there are two different ways of classifying phenomena for purposes of academic study. In the one, phenomena are grouped according to their nature (ie, their inherent characteristics), and in the other, according to their position of occurrence in time or space. The first type of classification of the fields of learning was called logical classification, and the second was termed as physical classification. Logical classification gave us a series of systematic sciences, each devoted to the study of particular kinds of henomena or activities. Fields of study like the various branches

of natural and physical sciences such as botany, zoology, physics, chemistry etc., as also economics, political science, and sociology, derived their lace as autonomous branches of study on this basis. On the other hand, physical classification provided a scientific basis for the historical and spatial sciences-the former concerned with the arrangement (or positioning) of phenomena in the time dimension, and the latter with arrangement of phenomena in the space dimension. Grouping things of diverse character and origins together on the basis of areal association in a horizontal space provided the subject matter of geography (in relation to the earth surface) and astronomy (in relation to celestial space). Grouping of phenomena of diverse origin and nature in terms of their arrangement in a time sequence provided the subject matter of history. In short, geography studies phenomena which lie side by side on the earth surface, and is, therefore, preeminently a chorological (i.e., areal or spatial) science. History, on the other hand, studies phenomena which are arranged in a sequence of time periods and is, as such, a chronological science. As Kant pointed out, both history and geography are essentially descriptive in approach, history being a description in a time dimension, whereas geography is description in a space dimension.

In Kant's scheme of division of fields of knowledge, geography occupied an important place. Owing to this, Kant is repeatedly cited by geographers in regard to justification of the status of their discipline as a field of scientific learning. Hettner's exposition of geography as chorology in the beginning of the twentieth century had closely followed the line of argument pioneered by Kant (even if he actually came to know about the existence of Kant's lectures at a later date). Hartshorne's Nature of Geography (1939) also followed the line of thought first formalised by Kant. Through Hartshorne's book chorology became the dominant concept of geography as a field of learning until around 1960 (May, 1970). Contemporary scholarship in geography has been critical of Kant's view in that it is "impossible, and to some extent philosophically untenable, to draw such sharp divisions between the 'sciences' as Kant did. The systematic sciences study phenomena with reference to time and space and it is very difficult to separate time and space in studies of human geography" (Holt-Jensen, 1980, p. 15). Geographers are quite often required to study areal phenomena in terms of their transforma tion OVer time, and persistence of the past into the present. Likewise, historians cannot neglect spatial patterns in their study of time sequences and Past periods. However, Kant cannot be blamed if his logically

sound scheme of classification of sciences, and the place of history and geography in it, was used some scholars in a way that created barriers between fields of learning. As discussed in the Introduction (p. 4) Kant himself did not subscribe to the idea of any such barrier. His was a great pioneerin thought and remains as valid today as it was at the time it was presented.

Geography in the Nineteenth Century

The Age of Humboldt, 1790-1859

8.1 ALEXANDER VON HUMBOLDT:

Universally acclaimed as the father of modern geography, Alexander von Humboldt (1769-1859) was one of the foremost intellectuals of his time. A versatile researcher, he had enriched several branches of science through original research. Humboldt lived at a time when under the impact of the empiricist/positivist view of science, scientific research had started to be treated as a specialized pursuit so that each researcher tended to confine his interest to a given branch of study. The lines dividing the several branches of science were yet to get hardened, however. Besides, knowledge was as yet not so highly specialized that a keen researcher could not master more than one field of science. Given his training and background (and of course his talent), Humboldt was eminently qualified to do so. His versatility as a scientist, and his expertise in several fields of knowledge related to the study of the earth's environment had drawn him to geography—a subject that was subsequently to become his major area of interest, and to which he gave a sound philosophical basis as a field of learning through incremental advances over the work of his predecessors like Varenius and Kant.

Humboldt's stature as a leading figure in several branches of science, and his firm grounding in the philosophy and method of new science, eminently qualified him to play the role of the father figure of modem geography as a scientific enterprise—a synthetic but systematic discipline with a focused regional perspective.

Humboldt’s Career as a Scientist and His Ideas Regarding the Nature of the Universe:

Alexander Humboldt was born in 1769 into the Prussian aristocracy. His father, an officer in the Prussian army, had died when Alexander was only ten years old so that he was brought up and educated under the stem guardianship of his mother who provided the best available education for her two children. Their early education was under the charge of private tutors at home in Tegel and near Berlin. In 1787-1788 Alexander went to study at the University of Frankfurt, but after onlv a six-month stay there, he returned home at his mother's instance, to

study factory management in Berlin only to leave it in 1789 to study physics, philosophy and archaeology at the University of Gottingen. It was here that he met George Forster under whose influence he developed a lasting interest in field observation and the study of plants.

Humboldt accompanied George Forster on a hiking trip down the Rhine to the Netherlands and from there bv ship to England. As he was to acknowledge later in his career, this trip initiated him to the study of the phenomena of nature in relation to each other and to their environment, and thence to the fundamentals of geography George Forster (1754-1794) had accompanied his father Johann Reinhold Forster (1729-1798) on Captain Cook's second voyage lasting from 1772 to 1775, and had translated his father's account of the voyage, first published in 1777 under the title: *Observations Made during a Voyage Round the World.* The German translation had appeared in 1778. As Peschel (1865) wrote, Reinhold Forster was "the first traveller to give a physical survey of the section of the world he had seen, and the first to perform the highest function of a geographer, that of scientific comparisons" (cited in Dickinson, 1969, p. 18). Commenting upon the craze for collecting facts among his contemporaries, the senior Forster wrote: "Facts were collected from all parts of the world, yet knowledge was not increased", because the collection of facts represented "a confused heap of disjointed limbs, which no art could reunite into a whole." He stressed the need for scientific observers "to combine different facts and to form general views from thence, which might...guide him to new discoveries". Many have described him as the first methodological geographer in the modern sense.

George Forster shared his father's views and advanced them in his own writings. Commenting upon his German language book entitled: *Views of the Lower Rhine* (based on travels made in the company of Himboldt in 1789) Plewe wrote that through this book George Forster attempted to give a firmer footing to his father's method of comparative study, and prepared the way forward for systematic development of regional geography. In his *Kosnios,* Humboldt has acknowledged George Forster as his friend ant teacher, and has stated that "Through him began a new era of scientific voyages, whose aim was the comparative study of peoples and regions".

The Study of Plant Organisms in Relation to their Habitat:

Humboldt had left Gottingen in 1790 to pursue research in natural sciences. In accordance with his mother's wishes, he first joined an academy of commerce in Hamburg to prepare for a career in finance. There his subjects of study included (besides commerce) botany, minerology, and geography. After spending only a year at the commerce academy he shifted to the Freiberg Academy of Mines where he studied under the renowned geologist A.G. Werner (1749-1817). Here also, alongside geology and minerology Humboldt continued to pursue botany. From his researches and experiments on underground plant life in mines, resulted a major Latin language work entitled *Florae Fribergensis* "in which he showed a characteristic concern not only with plants themselves but also with the relation of these as organisms to their environment". In the introduction to this book he had suggested that *geography of plants* should form an essential part of what he called *Geognosia* in Latin, which was translated as *Erdkunde* in German (a term that later became the synonym for geography). Defining plant geography, he wrote that it

...traces the connections and relations by which all plants are bound together among themselves, designates in what lands they are found... This is what distinguishes geography from...zoology, botany, geology, all of which form part of the investigation of nature, but study only the forms, anatomy, processes etc. of individual animals, plants, metallic things or fossils.

Thus, as Bowen put it,

in scope and method, Humboldt's *Geognosia* of 1793 can be regarded as providing an important model for modern geography. His idea of plant communities, extended to a study of the distribution and relation of rocks and animals, suggested the basis for a new science, one concerned with the interrelationships of organic and inorganic phenomena on earth. (Bowen, 1981)

Influence of Goethe and Schiller and the Idea of Harmonius Unity in Nature:

In 1794, Humboldt visited Jena to be with his brother. Here he came in contact with Goethe and several other leading lights of the Weimar Society of writers and idealist philosophers, including J.C.E. von Schiller, J.G. Fichte and F.W.J. Schelling. In their *Naturphilosophie* this group favoured the "neoplatonic idea of polar forces in the universe", so that they were opposed to the mechanistic and materialistic view of science. They emphasized, instead, the need to

look for unity and harmony in nature. This fundamental idea of the world of nature as an organic structure struck a sympathetic chord in Humboldt, since he had himself been drawn to similar ideas in his study of nature in the course of his field trip with George Forster, and his subsequent writing on plant geography. However, Humboldt did not share with Goethe and Schiller their distaste for the experimental-empirical approach to science. He saw no contradiction between an organic (anti-mechanistic) view of the world and the empirical/experimental method of acquiring knowledge.

Toward the Development of Universal Science:

Soon after the publication of his research on underground plants in 1793, Humboldt had written to a friend about his plan of a twenty-year project to study plant life on the earth surface "in connection with the whole of the rest of nature, along with its influence on sentient mankind". Two years later, he changed his mind in favour of a still more positive view of the unity of phenomena in nature. As he wrote to his friend Pictet in 17%, in the six years since his travel to England in the company of George Forster, he had made extensive field observations in the mountains of Europe and had studied nature from different points of view; these field observations had led him to conceive the "idea of a universal science *(physique du monde)"*, but "the more 1 feel its need, the more I see how slight the foundations still are for such a vast edifice". His plan was to develop such a study on an experimental basis specifically "to reduce experiments to general laws, to establish harmony among the phenomena" (cited in McPherson, 1972). Thus the basic idea that finally impelled him to write his monumental *Kosmos* half a century later, had already germinated in his mind in the mid-1790s.

The development of universal science had, however, to wait until scientific observations and experiments of different aspects of the physical earth had yielded sufficient insights and material for compilation. With a view to fulfilling his ambition to establish the *physique du monde*, Humboldt plunged into a wide variety of scientific research. His book entitled *Aphorisms on the Chemical Physiology of Plants* was published in 1793. In it he had adopted the latest approaches to empirical research, and had also incorporated Lavoisier's teachings in analytical chemistry and his theory of "exact science". In 1797 were published the results of

his experiments with electricity in the study of animals. He had experimented with the idea of stimulating the nervous system of various animals with the help of electrodes. The results were published in a two- volume German language text on *Experiments with Irritated Muscles and Nerve Fibres.*

During 1792-1796 Humboldt held an appointment in the Prussian ministry of mines. On the basis of his excellent performance, he quickly advanced many rungs on the ladder of promotion, but his heart was not in government service. He yearned for a career as a scientist. When his mother died in 1796 leaving him an estate yielding a high enough income to support his scientific activities, he quit his job to be free to start a career of scientific travel and exploration.

In 1797 he went to Vienna to prepare for an expedition to the West Indies. From Vienna he went to Paris where he met a number of eminent scientists at the *Institute de France*. He met the French botanist Bonpland in consultation with whom he prepared their plan for travel through Spain to Madrid in order to seek permission for a scientific voyage to the Spanish territories in South America. They set off on the journey in June 1799. This was the most ambitious scientific voyage undertaken to that date. The objective was to collect scientific data on all possible aspects of nature including place location and altitude so that his luggage included all kinds of available instruments for making and recording observations. Commenting on the objective of his voyage to a friend he wrote:

I shall collect plants and fossils, and I shall be able to make astronomical observations with some excellent instruments; 1 shall analyze the air by chemical means... but all this is not the principal object of my voyage. My attention will never lose sight of the harmony of concurrent forces the influence of the inanimate world on the animal and vegetable kingdom (cited in Bowen, 1981, p. 221).

Thus, the purpose of the voyage remained the fulfillment of his ambition to lay the foundation of universal science based on the concept of essential unity of organic and inorganic nature.

Return to Berlin and the Writing of *Kosmos* (1827-1859)

Humboldt returned to Berlin in 1827 to take up appointment as chamberlain in the court of the Prussian King. By this time, the personal fortune he had inherited from his mother had been spent in meeting the cost of his travels and scientific research so that a steady income from government employment had become necessary. Two years later, he accepted an invitation from the Czar of Russia for the exploration of Siberia and made many valuable observations on the climate and soils of that region.

Humboldt set out to consolidate his ideas about science, its nature and purpose, and the fruits of his research in illuminating his concept of universal science. The beginning was made in a series of public lectures in the Royal Academy of Sciences in Berlin during 1827-1828 on the subject that he called "Physical Geography and Man's Effort to Understand the Cosmos". His lectures were so popular that a second series had to be delivered in response to public demand. Humboldt declined the offer of publication of these lectures since he wanted to expand the idea into a book on physical geography. These lectures had contained ideas that subsequently crystalized into his monumental *Kosmos* which, according to one author (Kellner, 1963, p. 199), followed fairly faithfully the lectures which he had delivered in 1828.

Humboldt wrote to his friend Varnhagen (in 1834) that he regarded *Kosmos* as "the work of my life" in which he had planned to put together in one unified work all his scientific ideas and researches of a lifetime "representing in a single work, the whole material world—all that is known to us of the phenomena of heavenly space and terrestrial life".

Kosmos had been projected as a five-volume work of which the last volume remained incomplete at the time of Humboldt's death in 1859. It was posthumously assembled and published in 1862 from his assembled notes. The first volume contained a general presentation of the whole picture of the universe'. The second began by discussing the portrayal of nature by landscape painters and poets through the ages, which was followed by the history of man's effort to discover and describe the earth since the earliest time. The third volume was devoted to astronomy and the laws of celestial space; the fourth dealt with the earth; and fifth and final volume was projected to contain a general discussion of plant and animal geography as well as a study of man. Unfortunately Humboldt had not been able to cover these topics before his death in 1859.

CARL RITTER (1779-1859) AND HIS CONTRIBUTION TO GEOGRAPHY AS A DISCIPLINE:

Ritter is generally regarded along side Humboldt as co-founder of modem geography. Junior to Humboldt by ten years, he was born in 1779 in a family of modest means. His father, a physician, had died while young Ritter was only five years old. His mother was faced with great difficulty to educate and support her family of five. By a stroke of good fortune, the German educationist, Christian Salzmann, who was starting a new experimental school, was in search of a child who had never been exposed to traditional methods of education, and he chose Ritter as his pupil.

At that time, rote learning'was the prevalent system of education without any attention to understanding and self-experience. Salzmann founded his school on the new principles of Rousseau and Pestalozzi, which emphasized that in the education of the young, clear thinking should be taught through careful observation of phenomena. Young Ritter was put under the charge of J.C.E. Guts-Muths who was specially interested in teaching geography by the new method. As Hartshorne wrote (1939, p. 50), "Probably no student of his time—and few since—have been so specially trained for geography as was Ritter". In Salzmann's school at

Schnepfenthal, right from the beginning, Ritter was trained to observe man's relationship to his natural surroundings. His teachers encouraged him to formulate for himself the concept of unity of man and nature; and from the richly varied landscape of this region of hills and low mountains he derived the idea of unity in diversity, which became the basic theme of his writing in later years as he matured into a geographer.

After completing his training in the school, Ritter was employed by a wealthy banker, Bethmann Hollweg, as a private tutor for his two sons, and in return he agreed to meet the expenses of Ritter's university education. With the two Hollweg sons, Ritter went to Frankfurt where he read widely in history and geography. After one of his two pupils died, Ritter accompanied the remaining boy to the university of Gottingen where during 1814-1816 he himself took further courses in geography, history, physics, chemistry, botany and minerology.

Ritter's interest in geography had been greatly aroused after a meeting with Alexander von Humboldt in 1807. He published a two-volume work on the geography of Europe to serve as background reading for a better comprehension of the region's history. Six years later he published the first of the two volumes of his famous *Erdkunde* (1817-1818). Ritter had intended to follow it with a third volume on history, but could not do so. As the book's supplementary title made it clear, Ritter had intended *Erdkunde* to serve as a text on "The Science of the Earth in Relation to Nature and History of Mankind; or General Comparative Geography as the Solid Foundation for the study of, and instruction in, the Physical and the Historical Sciences". The book was very favourably received, and it earned Ritter the post of Professor of Geography at the University of Berlin in 1820. His chief interest in the study of geography was to provide a sound basis for the writing of history.

His elevation to the first professorship in geography in Germany changed Ritter's outlook on the subject as an autonomous academic discipline. As professor of geography Ritter devoted himself to a more thorough study of the subject. This he started with the rewriting of his *Erdkunde.* A second edition appeared in 1822-1823 and the idea of a third volume on history was dropped. Between 1832 to 1838, he added six more volumes to the *Erdkunde* series; eleven more volumes were to come between 1838 and 1859. These nineteen volumes together covered only the treatment of Africa and Asia when Ritter breathed his last in 1859. However, through these volumes Ritter had succeeded in laying a firm foundation for the writing of a new style regional geography presenting a complete picture of the area under study and incorporating all available information on every aspect the area concerned.

Ritter had repeatedly emphasized that he was trying to present a "new scientific geography", as contrasted to the traditional lifeless summary of facts about countries and cities mingled with all sorts of scientific incongruities. His scientific geography was guided by the concept of *unity in diversity in nature,* and his purpose was not merely to prepare an inventory of phenomena occurring together in particular parts of the earth surface, but to understand the interconnections and the causal interrelations among the diverse phenomena that made the areal associations cohesive. Like Humboldt, Ritter also used the term *zusammenhang* to refer to the harmonious unity and interconnection among diverse phenomena on the earth's surface. In a much-referred essay entitled "Historical Element in Geographical Science" Ritter defined the task of geography to be: "to get away from mere description to the law of the thing described; to reach not a mere enumeration of facts and figures, but the connection of place to place, and the laws which bind together local and general phenomena of the earth's surface". According to Ritter, the geographer's task was to trace causation and interdependence of the spatially distributed phenomena on the earth's surface.

Ritter named his new scientific geography as *Erdkunde* (literally meaning earth science) in preference to Humboldt's *Erdbeschreibung* (meaning earth description). A close perusal of Ritter's writings shows that there was never any doubt in his mind about the fact that his geography was concerned primarily with the study of the earth as the home of man, and, as such, was focused on the study of the earth's surface. However, the literal meaning of *Erdkunde* as earth science proved a source of confusion in the minds of many geographers in the following decades who were led to extend the study of geography to include every aspect of the earth.

Ritter's concept of unity in diversity of phenomena on the earth surface was derived from the Kantian view of the world as an organic whole rather than as a machine—a view of which Humboldt himself had been a strong supporter. On the concept of organic unity in nature, Ritter wrote: "There is, above all this thought of parts, of features, of phenomena, the conception of the earth as a whole, existing in itself, for itself, an organic thing, advancing by growth, and becoming more...perfect". As Dickinson has noted, Ritter was attracted to the concept of terrestrial units (earth areas) as organic wholes by Humboldt's description of the llanos and the steppes. However, as contrasted to Humboldt's idea of organic unity in nature as a rational scientific principle, Ritter's idea of organic unity was derived from his deep faith in the Christian belief that the earth was a divine creation, and that God had created every little thing on the earth surface to serve some need of man. According to him: "As the body is made for the soul, so is the physical globe made for mankind". To sum up, whereas both Humboldt and Ritter had adopted the concept of organic unity in nature as central to their concept of geography, their reasons for doing so differed greatly. In the case of Ritter the justification for doing so was derived from theology; in the case of Humboldt it was a central epistemological issue in his theory of knowledge about the universe.

According to Hartshorne (1939, pp. 60-61) teleology (faith in a divinely created universe) in Ritter's geography was an attempt to interpret philosophically that which could not be explained scientifically. In Ritter's view, there were three fundamental facts of geography for which science had no explanation. These were: Uniqueness of the earth in the universe; the earth as the home of that unique creature, man; and the fundamental explanation of a host of geographic facts e.g., the differentiation in character among the major land units of the world. However, as Schmidt (1925, cited in Hartshorne, 1939) wrote, irrespective of his teleology, in his study of geography Ritter did not proceed from preconceived ideas and opinions:

his scientific procedure was directed throughout on temperate, purely factual comprehension of the facts and their relations... Ritter strove in the knowledge of the earth for a comprehension of the divine world plan in no other way than the natural scientists pursue the thought of evolution.

Ritter insisted that geography must be an empirical science rather than one deduced from rational principles—i.e., from philosophy or *a priori* theories such as the theory of continuous mountain ranges and the belief that river basins were divided by crestlines of mountain chains. As Ritter wrote in the first volume of *Erdkunde: "We* must ask the earth itself for its laws", i.e., knowledge about the earth should be derived from field observations (even though he himself was—unlike Humboldt— primarily an arm-chair scholar and a teacher rather than a field worker). Observations used in the writing of his books were not obtained directly from the field on his own; they were based on the works of others who had observed the phenomena first hand.

Ritter was a great pioneer of the regional approach in geography, which he conceptualized as the study of earth areas as organic units deriving their special character from the nature of the interrelationships obtaining between the diverse phenomena existing together. His preference for regional geography—study of areal organization in *particular* segments of the earth surface—was in no way opposed to the pursuit of general or systematic geography (i.e., topical studies involving analysis of the distributional patterns of a particular class of objects or phenomena over the earth surface with a view to arriving at general theoretical formulations about them). Ritter acknowledged his indebtedness to Humboldt, whose general studies had made Ritter's own regional studies of particular regions possible (James, 1972, p. 168).

Ritter regarded regional and systematic studies in geography as the two sides of the same coin: General geography dealt with the character, typology, location and extent of different categories of terrestrial pheno- mena (both physical and human) throughout the world; special or regional geography described the content and nature of particular areas as organic (i.e., functionally organized) entities. It is true that Ritter's *Erdkunde* was essentially concerned with particular areas, nevertheless he made frequent statements urging the development of a comparative worldwide approach to the study of areas in his teaching and research: "He exposed the conceptual framework of both regional and worldwide geography. He lacked the data in his time to reach worldwide generalizations about areas, though he urged that they should be the geographer's ultimate goal" (Dickinson, 1969, p. 46).

It is, therefore, a disservice to geography, and a false representation of reality, to try to draw differences between the approaches to geography pursued by Humboldt and Ritter. The two men themselves did not recognize any such distinctions. Ritter (according to Hartshorne) repeatedly asserted that Humboldt was his teacher, and wrote that without the work of Humboldt his own books could never have been produced. Ritter acknowledged that "Alexander von Humboldt has become, by his thorough study of nature in Europe, Asia and America, the founder of Comparative Geography" (Ritter's *Comparative Geography*, Gage translation, p. 24).

Trying to clarify his approach to the study of geography, Ritter had stated:

> My aim has not been merely to collect and arrange a larger mass of materials than any other predecessor, but to trace the *general laws* which underlie all diversity of nature, to show their connection with every fact taken singly, and to indicate... the perfect unity and harmony which exist in the apparent diversity and caprice which prevail on the globe, and which seem most marked in the mutual relations of nature and man. Out of this course of study there springs the science of physical geography, in which are to be traced all the laws and conditions under whose influence the great diversity in things... first springs into existence, and undergoes subsequent modifications (from a letter cited in Gage, *Life of Ritter*, 1867).

Since Ritter's *Erdkunde* was designed to provide a basis for tracing the general laws of physical geography, for him there could be no question of any conflict between the regional and systematic perspectives in, and approaches to, geographical studies. However, Ritter's concept of unity and harmony in nature was essentially teleological in which:

A supreme Being, an all-wise Creator, was identified as the author of the plan for building the earth as the home of man, and all through Ritter's writings and lectures, are words of praise for the divine creation. Even in the arrangement of continents Ritter saw evidence of God's purpose. (James, 1972, pp. 168-169).

According to Ritter, Asia represented the sunrise, since it is here that the early civilizations of man originated. Africa was viewed as representing the noon where, owing to smoothness of relief and *uniformity* of climate, the inhabitants are induced to slumber. Europe was viewed as specially designed to bring out man's greatest accomplishments—the culmination of man's development—so that it represented the sunset, the end of the day. The discovery of America suggested to him the approach of a new sunset and a new culmination of human achievement. Owing to his teleological belief, Ritter's consideration of the earth was principally man oriented. This did not, in any way, lead him to oppose other ways of looking at the phenomena

of the earth surface. He wrote: "Independent of man, earth is also without him, the scene of natural phenomena; the law of its formation cannot proceed from man. In a science of the earth, the earth itself must be asked for its laws" (cited in Hartshorne, 1939, p. 63). This statement should make it clear that any attempt to involve Ritter in any controversy regarding dualism between human *vs.* physical geography is completely without basis. Ritter's concept of teleology in practice was not antiscientific.

Geography after Humboldt and Ritter

DEVELOPMENTS OUTSIDE GERMANY

8.1 DEVELOPMENTS IN FRANCE

The immediate cause for the revival of geography as a university level subject of study in France was the country's defeat in the Franco-Prussian war of 1870-1871. Soon after the war there was great demand for better quality geography education in the French schools, with a view to stimulating interest in the knowledge about peoples and places in far- off lands so that the pursuit of colonization could be attended to more effectively. The country's defeat, and the loss of territory, had made it urgent that France should look to Africa and elsewhere for commercial opportunities and politico-cultural colonization (Freeman, 1971, p. 46). The development of French colonial power after 1871 owed a great deal to the influence of the French geographical societies (McKay, 1943)

Contributions of Vidal de la Blache (1845-1918)

Unlike in Germany (where revival of geography in the last quarter of the nineteenth century had been marked by the rise of several distinct schools of thought), the growth of modern geography in France was shaped by the work of one man, Paul Vidal de la Blache, who founded a new school of thought in human geography that had remained dominant until the Second World War. Writing in 1922, W.L.G. Joerg had noted that "Nearly all occupants of chairs in geography in France are pupils or pupils of pupils of the late Vidal de la Blache. In no other country ... the development of geography centred about one man as in France".

Blache had come to geography via history and literature. After a doctorate in history in 1872, he began teaching geography, first at the university of Nancy (1872-1877), and later as professor of geography at Ecole Normale Superiere in Paris. He became the first geographer to be appointed to the chair of geography at the Sorbonne in 1898. As a contemporary of Ratzel, it was quite natural that Vidal de la Blache should be influenced by his writings. It was not

Ratzel of the first volume of *Anthropogeographie* (1882) but Ratzel of the second volume (published in 1891) that had attracted Vidal. He was drawn to Ratzel's concern with geographical distribution of man, and the role of migration (and inherited traits) in man's adjustment to nature. This basic concept became the central theme in Vidal's own concept of *possibilism*, which held that nature sets limits and offers possibilities for development, but the way man adjusts to the natural conditions of the area of his inhabitance is largely a function of his own tradition and mental structuring. The same environment may carry different meanings to people with different *genres de vie* (ways of living or culture). According to Blache, culture (i.e., inherited traits) is the basic factor in determining which of the many possibilities in the natural environment shall-be selected by a given community.

Blache was opposed to the idea of dichotomy between natural and cultural aspects of geography. To him, consideration of natural and cultural aspects of the earth's surface cannot be separated from one another for the simple reason that in every inhabited part of the earth's surface, the original landscape is significantly transformed as a result of human habitation. Such changes are greater in the case of culturally advanced societies, where, owing to the more developed technology, the degree of man's intervention in nature has been more far-reaching. It is, therefore, impossible to study landscapes meaningfully without due reference to the interlocking roles of nature and culture.

The relationship of a community to the physical landscape of the area of its inhabitance is so intimate that it is difficult to think of the one without the other. As such, each segment of the cultural landscape has, with the passage of time, acquired a unique personality of its own. Such areas were named as the *pays*. According to Blache, the study of such regions constituted the primary task of geography as a professional field. Elaborating upon his idea about the method of geographical enquiry, Blache (1913) stated that geography is "the study of things associated in areas, mutually interacting, characterizing particular segments of the earth space". According to him, the distinguishing feature of geography as a science is its "capacity not to break apart what nature has assembled, to understand the correspondence and correlation of things" existing together in association in particular regions or pays.

Blache's method of study was essentially inductive and historical. It was designed to suit the study of small areas of self-sufficient economies as had existed in the nineteenth century rural France. An agricultural way of life pursued in relative isolation from the outside world, had favoured the development of locally distinctive traditions and ways of life *(genre de vie)*, including agricultural practices, implements, food habits, dress and architecture. Blache recommended that geographers should carry out research in folk cultures with a view to depicting the unique personality of each region.

Commenting on the role of history in the development of *pays*, Blache cited the example of a pond being swept by a gust of wind. As the wind overtakes it, the water of the pond gets disturbed and there is all-round confusion, but after a few minutes the ripples subside, and the old calm is restored. In like manner, war, pestilence, and civil strife can interrupt the forward progress of a region and bring chaos, but with the passage of time the crisis is overcome, and the old pattern of civic life is re-established. This original idea, first formulated in 1903, was illustrated in his 1917 work on the two thousand years of development in Alsace and Lorraine. He demonstrated how the French Revolution of 1789 had produced a great ripple in the placid waters, as it were, but before long the usual processes of development had reasserted themselves.

However, as an honest researcher (who is partial to truth rather than to his own pet theory), Blache did concede that after about 1846 the balance of interplay between man and nature had been fundamentally disturbed as a result of the introduction of new technologies that had enabled man to tame the forces of nature—technologies which enabled the building of canals, and broke the isolation of rural communities through laying of roads and railroads, and above all, through the launching of the industrial revolution. All this posed a serious threat to the maintenance of age-old traditions born out of self-sufficient economies of the individual pays.

This meant that by the end of the nineteenth century the method of regional study in terms of *genre de vie*, as advocated by Blache, was fast losing relevance to the study of European landscapes. Blache was nostalgic about it, but the scholar in him suggested a new approach more suited to the study of the changed scenario. He wrote that "The idea of region in its modern form is a conception to do with industry: it is associated with that of the industrial metropolis". He clearly perceived that the organizing principle of economic life in the future guided by the relationship of an area to the metropolitan centre that dominates its economy rather than the relationship between man and his local environment.

It has been rightly noted that the method of regional study developed by Blache "was a powerful and legitimate vision of the functioning of societies during most of European history. It was, however, ironically, a vision of the things past or about to pass, not a vision of things present or to come" (Wrigley, 1965, p. 9). As such, Blache's method of regional study provided a most appropriate methodology for historical geography of Europe before the Industrial Revolution, and it may still be relevant to the limited but rapidly shrinking areas of the world today whose economies may still be dominated by peasant agriculture and local self-sufficiency in most material requirements of life, but it cannot be applicable to a country which has undergone industrial revolution (Wrigley, *op. cit.).*

Vidal de la Blache passed away in 1918. Around that time, he had been engaged in assembling a definitive book on human geography with a view to concretizing his philosophy and methodology of the geography of man. From his partially completed manuscript his former student (and son-in-law), Emmanuel de Mortonne, prepared the press copy of the book which was published in 1921 under the title *Principes de Geographic Humaine* (translated into English as *Principles of Human Geography).*

In an article published in 1913 in the *Annales de Geographie* (which he had founded and edited until his death) Blache had outlined the "distinguishing characteristics of geography", wherein he wrote that the goal of geographical study was to study the nature and groupings of phenomena of landscapes as the expression of man's interaction with nature. Listing the distinctive characteristics of geography he mentioned the following:

- The concept of terrestrial unity is the starting point in geographical work. Geography pursues a synthetic world view of nature and man. It also studies causes and generic types of groupings of terrestrial phenomena.
- Geography believes that terrestrial phenomena are localized in varied combinations both in nature as well as in the modifications brought about by human intervention.
- Geography seeks to describe, localize, and explain covariations between natural conditions and man-made phenomena.
- Geography seeks to measure the influence of environment (especially climate and vegetation) on man.
- Geography is concerned with developing and refining methods of defining and classifying earth phenomena.
- Geography seeks to measure and localize the part played by man in modifying the face of the earth.

La Tradition Vidalienne: Contributions of Brunhes, de Mortonne, and Vallaux:

for almost half a century French geography had remained a faithful reflection of the Vidalian tradition of thought and methodology perpetuated by his own students and the next generation trained by those students as they spread out to man the various university departments across the country. The essence of the Vidalian tradition was an unswerving faith in the principle of terrestrial unity so that the concept of dualism between man and nature, and between human and physical geography, was alien to the French tradition in geography. French geographers have all through maintained a balance between physical and human components of geography. Thus, of the two leading disciples of Blache (each a leader in his own right), while Jean Brunhes (1869-1930) spread the message and methodology of new geography of man as preached by his master, Emmanuel de Mortonne (1873-1955), was a leading physical geographer.

Jean Brunhes was a leading geographer in his own right. His book *La Geographie Humaine,* first published in 1910, went through several editions over the next quarter of a century. An English translation (edited by Bowman) was published in 1920. The book became so popular in North America that an abridged edition was published in 1952. Brunhes proposed a classification of geographic facts that made Blache's concepts easier to transmit in the classroom. Brunhes wrote that the two basic maps for the study of human geography are a map of water and a map of population. According to him the essential facts of human geography may be classified into three groups namely

- Facts of the unproductive occupation of the soil (houses, roads, and settlements);
- Facts of plants and animal conquest (cultivation of plants, and animal husbandry);
- Facts of destructive exploitation (clearing of forests, hunting, and mining).

The last part of Brunhes's book contained a discussion on different kinds of geographical studies pursued under the headings of human geography, regional geography, social geography, political geography and historical geography.

Emmanuel de Mortonne was a leading physical geographer ot his time. He held physical geography to be an essential part of the scheme of geographical study of areas. He maintained a consistent interest in geomorphology and climatology. He combined this interest with regional expertise in the geography of Central Europe. One of the most influential geographers of the interwar period in Europe, de Mortonne was a strong supporter of Davisian geomorphology which he popularized in the French academic circles. His 1927 study on the identification of arid regions through the use of aridity index, was a major contribution to the study of climate.

Camille Vallaux: An important part of the Vidalian tradition was the recognition that while from one point of view geography is a unitary field, from another it appears to tie together a variety of fields in the natural and human sciences. In a book entitled *Science of Geography* (1925) Camille Vallaux (1870-1945) stated that geography is both a unitary and autonomous field of study, and also an auxiliary aspect of many other fields of scientific knowledge. Thus, not only does geography have a philosophy of its own, "it is almost, in itself, a philosophy of the world of man". This explains how the Vidalian tradition had succeeded in making important contributions to systematic aspects of geography (i.e., topical studies) side by side with its unique contribution to regional geography pursued through the concept of *genre de vie* which had resulted in the justly famous French regional monographs (Harrison-Church, 1951; James, 1972; Livingstone, 1992).

Another distinctive aspect of the Vidalian tradition in geography was that Blache had regarded *field study* of small areas as the best possible way to train geographers. He was convinced of the great practical value of such regional studies to society and government. With a view to fulfilling this need, Vidal had planned a series of books on regional geography covering the whole of Europe—a new series of universal geographies. However, Blache passed away before the plan could be concretized so that the task was taken over by his student and close associate Lucien Gallois (1857-1941). The first volume appearedin1927,and the series had been completed (except for the volume on France) before the outbreak of the Second World War. This series is regarded as a monument to the regional tradition in geography.

DEVELOPMENTS IN GREAT BRITAIN

In the nineteenth century British geography had suffered from maladies similar to the ones that had beset it in France. Much of what was taught in British schools in the name of geography was uninteresting and dull; and the students were required to commit to memory large mass of unorganized facts. As in France, courses in geography in the universities were handled by geologists on the physical side, and the courses meant to provide geographical background to history were taught by historians. The overall scene was extremely confusing. In the midst of this confusion **Mary Somerville** (1780-1872) appeared as a bright star on the path to development of geography as an autonomous field of scientific enquiry in its own right. Her famous book on *Physical Geography* was published in 1848 It went through seven editions over the next thirty years. This book started with a physical description of the earth's surface—continents, oceans, atmosphere, plants and animals—and included the study of man as an agent of change in the physical landscape. The author kept on updating the book with each edition by incorporating new facts as they became available. Its sound methodology and approach received praise even from Humboldt (Freeman, 1971, p. 28) but irrespective of its sound method and the author's erudition, the book failed to create a stir in British geographical circles since it was published at a time when physical geography was claimed by geologists, and Humboldt's books were supposed to have said everything that needed to be told about geography. Ironically enough, the book became highly influential in North America through George Perkin Marsh who found her observations about man's destructive use of the earth very stimulating. (For short appraisal, see: Livingstone, 1992, pp. 272-274).)

Another major figure in the history of nineteenth century British geography was **Francis Galton** (1822-1911) who was a member of the Council of the Royal Geographical Society in London from 1854-1893. He had prepared the first weather map of Britain in 1861, and was the first scholar of demonstrate that weather patterns could be revealed by plotting lines of equal air pressure on the map. He was also the first to identify the nature of air circulation in an anticyclonic formation. He further refined his isopleth technique to prepare the first ever isochronous map showing lines of equal travel-time from London. Commenting upon the nature of geography Galton (1855, p. 81) described it as "a peculiarly liberalizing pursuit, which links the scattered sciences together, and gives each of them a meaning and significance of which they are barren when they stand alone" (cited in James, 1972, p. 257).

While geography was making news through the contributions of individual scholars like Somerville and Galton, until the 1880s the discipline had failed to earn a place as a branch of learning in the British universities. In 1884 the Royal Geographical Society asked its secretary, John Scott Keltie to survey the status of geography in Great Britain in the light of the contemporary status of the discipline in Germany, France, and U.S.A. Keltie reported that the status of geography in Britain compared very unfavourably with its status in other leading European countries and in America where the subject was flourishing as a university-level discipline under the charge of full professors of geography. On the initiative of the society (and induced by a special grant offered by it), the university of Oxford introduced geography in 1887 with Halford J. Mackinder (1861-1947) as reader and chairman of the department. The University of Cambridge followed suit in 1888 under Francis Henry Hill Guillemard (1852-1933) who was succeeded by John Young Buchanan in 1889.

As was the case in Germany and France, in Britain also expansion of geography as a university-level discipline was intimately related to the needs of British imperialism. A memorandum issued by the Royal Geographical Society had urged the promotion of geographical knowledge in Britain since:

The colonies of England, and her commerce, her emigrations, her wars, her missionaries, and her scientific explorers bring her into contact with all parts of the globe, and it is, therefore, a matter of imperial importance that no reasonable means should be neglected of training her youths in sound geographical knowledge (Proceedings of the Royal Geographical Society, 1879, pp. 261-264; cited in Freeman, 1980, p. 35).

Contribution of Halford J. Mackinder (1861-1947)

Mackinder's training as an academic included a first class honours in natural sciences at Oxford in 1883, followed by graduation in history from the same university in 1884. He studied law and was called to the bar in 1886. He was one of the organizers of the Oxford University Extension Movement which aimed at taking university teaching beyond the university campus by means of travelling lecturers. Participating in the extension programme Mackinder had given 600 popular lectures in course of a few years on the theme "the new geography" in cities and towns all over the country. In 1887 he was invited by the Royal Geographical Society to deliver a lecture on "The Scope and Method of Geography". Impressed by his erudition and scholarship, the Society offered him appointment as Reader to organize the first university department in the subject in Britain at Oxford. He continued in that position until 1905. While still at Oxford, he did part-time teaching at the London School of Economics, of which he became the Director in 1903 and continued in that position until 1908.

As a trained historian, Mackinder was convinced that since everything must occur at a specific time in a particular place, history (which specializes in the time dimension) and geography (which is the spatial science of the earth's surface) should never be separated. The concept of geography that he presented before the Royal Geographical Society in 1887 was of a field that is concerned with the study of interactions between man and his environment. However, his geography was less interested in the details of man-land relations than in the development of a world view so that his book *Britain and the British Seas* (1902) was aptly

described as a "regional study in a global context". It is this interest in global perspectives that subsequently got concretized into Mackinder's famous theory of the "Heartland" or "The Geographical Pivot of History", the title under which the theory was originally presented in 1904.

Through his writings and addresses, Mackinder became a major in- fluence in British geography. In his presidential address to the Geography Section (E) of the British Association of Science in 1895 under the title "Modem Geography. German and English", he stated that while British geography could be proud of its contribution to field survey, hydrography, climatology, and biogeography, as regards the "synthetic, philosophical and ... educational side of the subject" the British contribution fell "markedly below the foreign and especially the German standard". The main points in Mackinder's view of geography as a field of learning, as evidenced by his presidential address may be summarized as follows.

On the relationship between systematic and regional studies in geography Mackinder stated that in his view "treatment by regions is a more thorough test of the logic of the geographical argument than is the treatment by types of phenomena". In this regard he commended the effort made by Alexander von Humboldt who "for the first time" made "an exhaustive attempt to [causally] relate ... relief, climate, vegetation, fauna and the various human activities" in particular places.

But Mackinder did not in any way undervalue the contribution of the systematic approach to geographical inquiry. He noted that regional surveys could be made on the basis of systematic geography. Since scientific analysis of the environment depended on geomorphology, "geophysiology" (oceanography and climatology) and biogeography, any one studying human geography in the regional context needed the knowledge of the environment gathered by systematic studies of its different aspects.

Not aware of the concept of cultural borrowings through migrations in contemporary France, Mackinder drew attention to the role of migration as an instrument of geographical change, noting that although human communities were influenced by the geographical environment, their traditions and practices in relation to the use of the environment are derived from cumulative wisdom resulting from past experience so that by exercising ingenuity, human groupsareabletomaintainthemselveseven in the midstofvery unfavourable natural environment: The student of geography must remember, therefore, that man's progress on earth is influenced by two sets of factors—natural environment, and cultural tradition forming an essential part of man's mental equipment.

Mackinder emphasized the need for geographers to pay due attention to the economic aspects of life in particular places as an essential component of human geography. He also laid emphasis on the study of political geography. Mackinder regarded politics as an expression of the corporate spirit of a nation (here the influence of Ratzel's theory of the state is obvious). His political geography was based on economic and strategic considerations (see Freeman, 1980, pp. 51-53; and Freeman, 1971, pp. 65-66).

Referring to what he regarded as the distinguishing traits ot an "ideal" geographer, Mackinder (1895) staled that

[An ideal geographer] is a man of trained imagination, more especially with the power of visualizing forms and movements in space of three dimensions ... he has an artistic appreciation of landforms ... he is able to depict such forms on the map and to read them when depicted by others; ... he can visualize the play and conflicts of the fluids over and around the solid forms; he can visualize an environment, the local resultant of worldwide systems; he can picture the movement of communities ... acting and reacting on the communities around.

The fact remains that as a regional geographer, Mackinder was clearly "outclassed by many people working at his time, particularly by Vidal de la Blache (1845-1918), yet he did a great deal to encourage regional geography in Britain" (Freeman, 1980, p. 52).

Contribution of Patrick Geddes (1854-1934)

Another geographer who made a lasting impact on British geography was Patrick Geddes. In an essay published in 1898 he expressed views about the nature of geography which were comparable to those of Mackinder (1895), but Geddes approached geography from a biological perspective, as contrasted to Mackinder's historical perspective. A botanist by training, Geddes was greatly influenced by the Darwinian idea of "ordered evolutionary unity". He had been attracted to geography with a view to investigating the possible relationships between relief, climate, and natural resources on the one hand and the distribution of various communities, their economic pursuit, and cultural development, on the other. He was deeply interested in finding an answer to the question: How has nature determined, and how has man reacted to his environment? For an answer, Geddes focused attention on the study of human activities (Robson, 1981). Influenced by the ideas of the French sociologist Frederic le Play (1806-1882), Geddes developed a methodology for the study of human communities through focused attention on the "Place-Work- Family (Folk)" progression: The essence of his methodology was that place (i.e., environment) determines the pattern of economic life, which, in turn, determines family norms and social structures. In the case of certain communities of advanced cultures, the steps could be reversed: Folk-Work-Place.

Geddes was a great advocate of learning and imparting education through regional surveys. His famous slogan was "Survey before action". Thus, "Geddes has remained a source of fascination to many people, and his ideas on town planning long survived his death in 1934" (Freeman, 1980, p. 53).

Development of Mapping and Field Work

A distinguishing feature of British geography all along has been a strong tradition of field work as a method of acquiring knowledge through direct contact with reality in and around the locality one lived in. By the end of the nineteenth century, there was general agreement among British geographers that any adequate survey of the world and a proper understanding of its geography could be gained only through local study. This educational method of approaching from "the familiar to the unfamiliar" had been greatly popularised by T.H. Huxley's *Physiography*, first published in 1877. "This work defined for a generation the way in which the earth's physical features were studied in Britain; it defined also the nature of school education" in the country [Stoddart, 1975 (1986), p. 180].

According to Huxley (1825-1895), science was "nothing but trained organized knowledge common sense beginning with observation, facts collected, proceeding to classification, facts arranged, and ending with induction, facts reasoned upon and laws deduced". His objective was "to show young people the fascination of the brook which ran through the village, or the gravel pit from which the road metals were acquired, or the ordnance map which revealed their own neighbourhood. From this basis one could work forward to an understanding of the world; without it the world would be an abstraction" (Freeman, 1980, p. 54). Training in cartographic representation of the surveyed data through sketches, drawings, and maps laid the foundation of the geographic way of analysis, and the art of mapping, in the students' mind.

Tire cartographic tradition in British geography was greatly aided by the mass of data collected by the world expedition of the Challenger, 1872-1876; which had provided so much material that even after 29,000 pages of its reports, and 3000 maps and plates, published in 1895, the publication was not yet complete. The Challenger publications not only laid a firm foundation of mapmaking; they were also responsible for the rise of geographical interest in various fields of environmental research such as oceanography, climatology, and plant and animal geography, besides closer interaction with geology with which geography already shared a common interest in geomorphology. Although the expedition's objective was the study of submarine relief of ocean floors, its contribution to climatology was considerable.

The ingenuity of the late nineteenth century British geographers appropriated oceanography to local field study. H.R. Mill and A.J. Herbertson dealt with observations of water temperature at 9.00 a.m. and 3.00 p.m. at four stations on the west coast and four on the east coast for 1890, 1891, and 1892. They found that water was warmest in August to September, and coldest in February to March. The normal monthly temperature was 15.5 F but the difference in the temperatures of the coldest and warmest months ranged between 20 to 24 F. As this ingenuous experiment showed, even oceanography could be studied by the method of local survey.

At the instance of the Royal Geographical Society, H.R. Mill published a paper on the theme of local study in 1896. In it, he advocated the publication of memoirs for each Ordinance Survey 1:6360 sheet to guide the student. These memoirs could lead to the preparation of regional memoirs. It was recommended that each memoir should include an index of names of streams along with notes on place names, calculation of mean elevation on the basis of the area enclosed between selected contours, commentary on landforms and geological structure, and the stage reached in the geographical cycle of landform evolution, soils, minerals, local magnetic conditions, climate and natural vegetation, and land use. It was also recommended that aspects of history and politics be included. All this was to be correlated from a human geographic perspective with reference to settlement patterns, communication network, population distribution, and industrial development. Although Mill's suggestions were not acted upon owing to cost restraints, they underlined the distinctive spirit of contemporary methodology in British geography. It was this distinguished tradition of field survey as the basic feature of British geography that later led to the conception and successful execution *of* Dudley Stamp's massive programme of land utilization survey of Britain in the 1930s through the association of school-level students on a voluntary basis in a little over ten years.

As Preston James (1972, p. 266) noted, during the period of expansion following the First World War, British geography developed five distinctive characteristics. These were:

- A continuing concern with exploration;
- An emphasis on regional study of various kinds;
- Inclusion of field observation and map interpretation as essential parts of the training programme of geography students;
- An emphasis on studies in historical geography;
- An emphasis on the relevance of geographical study to economic, social, and political problems.

The foundations of each of these had been firmly laid by the end of the 1890s. That explains why Mackinder has sometimes been called the "grand old man" of British geography.

DEVELOPMENTS IN RUSSIA

The vast expanse of the Russian empire was a most potent factor in the development of geography as an institutionalized discipline. Peter the Great (who ruled Russia from 1682 to 1725) appreciated the need for accurate geographical information to facilitate the eastward march of the empire. State supported expeditions were sent to the east and the north to explore the vast uninhabited stretches of territory; and generous funding was provided to prepare maps of the explored regions. The main objective of these explorations was to chart out the topography, and to identify places where valuable merchandise, such as furs and precious metals could be found. Later on M.V. Limonosov (who became head of the world's first officially named Department of Geography at the Russian Academy of Sciences in 1758) pursuaded the state authorities to charge the exploring parties with the task of collecting systematic information about the physical character of land, population, and economic condition. The recognition of geography as a department in the Russian Academy of Sciences gave considerable academic prestige to geography as a useful field of scientific learning. Under the patronage of the Academy, the Department of Geography launched several schemes of regional surveys and mapping of data.

In the beginning, many of the more important projects in exploration and mapping were done under the guidance of experienced experts from Germany and France, but gradually they were replaced by the newly- trained Russian personnel. German geographer Busching was a pastor of a German Lutheran Church in St. Petersburg from 1761-1765. Portions of his *New Geography* dealing with Russia were translated into Russian, and his suggestion that the imperial territory be divided into natural regions in order to facilitate administration was quickly adopted so that by 1800, regional descriptions of a number of the regions had already been published.

By the beginning of the nineteenth century Russian geography had already developed two distinguishing characteristics. The first was emphasis on regions as the basis for organizing geographical work, and the belief that regions are concrete entities that can be objectively defined. Second was the continued use of geography to include a wide variety of specialities. This was sharply contrasted to the contemporary trend in Germany where, in the words of James, classical geography (focused on the study of the earth as a whole) was torn apart as its subject matter was divided into a series of new academic disciplines. In Russia, the classical tradition of geography as a field of study dealing with the physical environment of the earth and its human inhabitants had continued. To formalize this structure of geography, the Imperial Russian Geographical Society was founded in 1845. The Society was charged with promoting work, alongside geography, in geology, meteorology, hydrology, anthro- pology, and archaeology. The several specialities covered under the Society were collectively identified as "the geographical sciences".

Unlike in Germany where the deaths of Humboldt and Ritter in 1859 were marked by a break in the continuity of geographical study, in Russia there was no such break. For this reason, in the case of Russian geography, it is difficult to pick up any single scholar as the "grand old man of Russian geography". However, the continuous growth of the pre- Soviet (before 1917) period suffered a serious jolt, like everything else in the country, after the 1917 revolution. In order to survive the persecution at the hands of the new regime, scholars were required to bring their ideas in line with the ideas of Marx and his followers, who were strong

advocates of economic determinism, and were clearly opposed to any suggestion that natural environment was a potent force in shaping the life of human communities in particular areas. Given this major curb on the exercise of free thought, in the post-1917 period, development of geography as a field of learning in Russia was cut off from the concept and development of geography in the rest of Europe and North America. This isolation became particularly marked owing to the strong linguistic barrier. Owing to this, developments in Soviet geography since 1917 have little bearing on the conceptual development of geography as a science. For this reason, the post-1917 developments in geography in Russia need not detain us. However, as regards the pre-1917 phase in the development of geography in Russia, Petr Kropotkin, whose concept of geography as social ecology, and his concept of "mutual aid" in nature have been the object of special attention in the recent literature (Galois, 1976; Breitbart, 1981), deserves special mention.

Contributions of Petr Kropotkin (1842-1921)

Born into the Russian aristocracy, Kropotkin attended military school, and was trained for a career in the state administration. He served as the personal page of the Tsar for a short duration. The experience of service under the Tsar created a distaste for court life in the young Kropotkin so that he opted out for military service in Siberia. Here he came in direct touch with unspoiled nature. In the course of five years' service in the Siberian region, geographical exploration had formed an important part of his administrative duties. In the course of his service, he came in touch with the various peasant communities living in close contact with nature. He was greatly impressed by the spirit of equality and self-sufficiency among the peasant communities. It was through the close observation of the life of the peasant communities in Siberia that Kropotkin's distinctive concept of "nature" began to take shape. His encounter with the plight of Russian peasants had already aroused his conscience. These two—nature, and socially aroused conscience—were the seminal influences in the making of Kropotkin as a social geographer.

Dissatisfied with his life as a military service administrator, Kropotkin returned to St. Petersburg to enter the university to study geography and mathematics. For some time he worked for the Russian Geographical Society. To begin with, his first love was physical geography, but as time passed his scientific interests were overtaken by social geographic problems. This was not surprising in view of the social conditions prevailing in Russia in the 1860s, which had raised the conscience of many intellectuals who became drawn to the social issues of their times. The critical point in Kropotkin's case came during a visit to the Jura mountains in 1872. The region, at that time, had been one of the leading centres of anarchist activities. While there, Kropotkin came in contact with many activists of the movement and he himself became an anarchist. This led to his joining agitational movements getting arrested, and sentenced to a prison term in Russia (from where he managed to escape to France). A similar fate awaited him there. After release from a prison term in France in 1886, Kropotkin came to England and stayed there until the success of the Russian Revolution in 1917. At the age of 75, Kropotkin returned to Russia where he died in 1921. In course of his long stay in England Kropotkin had served with the Royal Geographical Society in London.

Kropotkin had rapidly shaped into a distinguished physical geographer so that the Russian Geographical Society offered him the prestigeous post of secretary in 1871. Kropotkin rejected the offer, since by this time his enthusiasm for science had waned following his increased fascination for social geography, and his rising concern for social ills. Reminiscing upon his conversion from physical geography to social ecology (or social geography) Kropotkin wrote:

Science is an excellent thing. I knew its joys and valued them—perhaps more than many of my colleagues did. Even now as I was looking at the lakes and hillocks of Finland, new and beautiful generalizations arose before my eyes ... a grand picture was rising and I wanted to draw it... to open new horizons for geology and geography.

But what right I had to these highest joys when all around me was nothing but misery and struggle for mouldy bits of bread; ... all those sonorous phrases about making mankind progress, while at the same time the progress-makers stay aloof from those whom they pretend to push onwards, are mere sophisms made up by minds anxious to shake off a fretting contradiction (Kropotkin, 1899, pp. 237-241).

Kropotkin's views on social geography were largely shaped by his anarchist philosophy. Social anarchism maintained firm belief in the capacity of the people to organize their life without structures of domination and subordination i.e., it reposed faith in the people's capacity to coordinate everything from the family to the economy on a cooperative basis. For anarchists, freedom was an article of faith so that they aimed at elimination of authoritarian social organization. Kropotkin believed that true individual freedom can only be cultivated by conscious and reflective interaction of people with the social environment which supports their personal freedom and growth. The essence of freedom to him was *unity in diversity*, a sense of mutual dependence on others for collective action, but with unfettered opportunity to express individual differences. His ideas were derived from his world view of nature developed in the course of his sojourn in Siberia.

Kropotkin's View of Nature and His Concept of Mutual Aid

Kropotkin was writing during the period when social Darwinism was in ascendancy, and no intellectual could escape the impact of the evolutionary theories. Kropotkin's view of nature was based on three *premises* namely, nature is organic (i.e., holistic); it is historic; and it is spontaneous. His originality lay in the manner in which he interpreted the organic (holistic) characteristics of nature, especially in relation to man's *place in* the web of nature. This theme was the key idea and the central focus of his theory of, and his book on, *Mutual Aid* (no date). The first two chapters of the book were devoted to the discussion on mutual *aid* (i.e., cooperation) among animals. He demonstrated that both *cooperation* and competition are present in nature simultaneously, as in the case of human communities. Thus, "man is no exception in nature", wrote Kropotkin, since the same forces operate in the "living world of nature". In his view, therefore, it was erroneous to interpret biological *evolution* in terms only of struggle and competition between species as the social Darwinists insisted on doing.As one writer has pointed out,

> *A critical point to note here is the opposition between the holistic approach and the atomistic approach. The latter, which sees in nature a series of discrete units acting independently, was one of the fundamental tenets of the pervasive liberal ideology of the nineteenth and twentieth centuries. It permitted, not to say encouraged, partial analysis ... [and] it rendered the context irrelevant. This was the view of society, and this was the view of nature, each supporting the other in a reciprocal fashion (Arblaster, 1972, paraphrased in Galois, 1976).*

This is what lay behind the Social Darwinist concept of competition among organisms in nature, and was supposed to be reflected in the competitive nature of man.

Kropotkin's view of nature as "historic" was also a product of his organic view of nature, and his analogy between man and animals. He wrote that "Man did not create society; society existed before man". He emphasized that life in nature was not a timeless constant, but a product of history and historical development. His concept of spontaneity in nature implied cooperation between organisms (leading to the concept of mutual aid). The concept of spontaneity also subsumed the concept of freedom, but Kropotkin's concept of freedom differed from that of other socialists as well as from the nineteenth-century liberals. According to him, an individual "will be really free in proportion only as others around him become free" In its application to human societies, this view of nature implied that:

... all mutual relations of its members are regulated, not by laws, not by authorities, whether self-imposed or elected, but by mutual agreements between members of that society and the sum of social customs and habits. developing and continually readjusted in accordance with the ever-growing requirements of a free life stimulated by progress of science, invention and steady growth of higher ideals (Kropotkin, 1970, p. 357).

Kropotkin's historical research indicated that struggles for existence had been carried out not by individuals, but by groups of individuals cooperating with one another. This led him to affirm the predominance of "mutual aid" over competition in the quest for survival, and the progress of human civilization. To him "mutual aid" was "the germ out of which all subsequent conceptions of justice, and ... morality" have evolved (Kropotkin, 1924, cited in Breitbart, 1981, p. 137).

Kropotkin's concept of spontaneity in nature also included the recognition of an element of irrationality. He subscribed to the notion of "poetry in nature". He spoke about the idea and need of a poetical love of nature, and stressed that geography possessed the potential for awakening this love. In his view, the works of Humboldt and Ritter were "most liable to draw the poetical love of nature, the desire of knowing more about her mysteries, ... [and] awakening the thirst for further knowledge" (Kropotkin, 1893, cited in Galois, 1976, p. 88).

Kropotkin recognized the importance of non-purposive behaviour. He wrote that "bread alone" was not enough; art formed "an integral part of a living whole ... and the spirit and serene beauty of [artistic] creations ... produce ... beneficial effect on heart and mind". In his view, games and amusements not only performed a social function in learning, they represented an expression of the joy of life.

Kropotkin's Theory of Social Ecology

In course of developing his concept of "mutual aid" among organisms and human groups, Kropotkin laid the foundation for a radical theory of social ecology. He viewed both nature and social groups as organic wholes so that the action of one part affected all the other parts. He considered social groups as being subject to many of the same processes as are found in organic nature. As such, he urged that human communities should discover the laws of nature in organisms, and act in accordance with those laws. It was not, however, his case that society should refrain from intervening in nature. All that Kropotkin meant was that human intervention should be based on a proper understanding of nature, and with due regard so as not to unsettle its balance. He believed that rather than trying to "legislate" environmental awareness into the citizenry, attention should be focused on reinforcing a sense of community and love of place. He firmly believed that rootedness in a particular environment fosters greater human interaction and a more intimate relationship with one's surroundings (Kropotkin, 1914, paraphrased in Breitbart, 1981, p. 140).

Kropotkin s Views on What Geography Ought to Be

In a paper entitled "What Geography Ought to Be" (1885), published as part of a larger report on geographical education in Britain, Kropotkin had made a forceful plea for making the content and methodology of academic geography socially relevant. According to Kropotkin, the goal of education is to create in the citizenry a keen awareness of the diverse social (including economic and political) forces impinging upon their life, and to create in them a desire to resist *political and* social manipulation. According to him, owing to its potential to capture the imagination of children, geography was most eminently suited to serve this most important objective of the education of the young, and to inculcate in them mutual respect for other communities and nations. He wrote that

The task of geography in early childhood [is] to interest the child in the great phenomena of nature, to awaken the desire of knowing and explaining them. Geography... must teach us that we are all brethren, whatever our nationality Geography must be ... a means of dissipating prejudice and creating other feelings more worthy of humanity. It must show that each nationality brings its own precious building stone for the general development of the commonwealth, and that only small parts of each nation are interested in maintaining hatreds and jealousies (Kropotkin, 1885).

To sum up, Kropotkin had tried to revolutionize the discipline of geography in a number of key areas. "His theories of geographic education, human ecology, and decentralization were aimed at halting the use of geographical research for exploitative and imperialistic purposes. Instead of subscribing to a narrow physical view of the discipline, Kropotkin emphasized the interrelatedness of natural and social processes, and the importance to both of cooperation over competition. He also recognized that a true ecology movement had to be linked to a revival of community, and hence, radical, political, social, and economic change" (Breitbart, 1981, p. 150).

According to Galois (1976, p. 91), Kropotkin offers a view of nature and potentiality of geography which could replace the post-quantitative revolution *"spatial* monomania" with a socially conscious account of the socioeconomic conditions in different parts of the earth. That Kroptokin's contribution to the method and philosophy of social and economic geography had remained generally neglected until recently may be explained by the fact that Kropotkin had presented these ideas during a period when the capitalist nations of the West were attempting to consolidate their power over the resources of the world. Under the prevailing imperialistic accumulation of capital through colonial exploitation by means of the political strategy of divide and rule, Kropotkin's voice had no listeners so that (Galois lamented) when the Royal Geographical Society of London wanted to educate its members in geography through an arranged lecture series in 1887, it looked to young *Mackinder who was then* a young man of 26 shaping up into a brilliant *speaker and scholar, rather* than to Kropotkin who had by then already made a mark as an eminent geographer and was at hand right in the *office of the Royal Geographical Society.*

DEVELOPMENTS IN THE UNITED STATES

Starting with the foundation of the Johns Hopkins University in 1875, the concept of university as a community of scholars had taken root in the New World. The time had now arrived for setting paradigms for scholarly performance in each discipline by its own professionals. The pioneering work in the introduction of the new geography, then making news in Germany and France, was performed by William Morris Davis who had taken appointment as an instructor in physical geography in the department of geology at Harvard in 1878. The first separate university department in geography to be established in the United States was at the University of Chicago in 1903 under the charge of the geologist Rollin D. Salisbury. Geography had, however, already been present in American schools and colleges for quite some time. Arnold Guyot (1807-1884), a Swiss scholar, and former student of Ritter, had arrived in the country in 1848 on invitation from the Harvard University to deliver a series of lectures outlining the nature of "new" geography. His lectures had been brought out in book form under the title *Earth and Man: Lectures on Comparative Physical Geography in its*

Relation to the History of Mankind, the following year. This book had remained the standard reference on Ritter's ideas for a long time. Another early pioneer in this regard was George Perkins Marsh (1801-1882) whose book entitled *Physical Geography as Modified by Human Action* had been published way back in 1864. Through this book, Marsh had introduced the American public to the ideas of Humboldt, Ritter, and Mary Somerville focusing on interconnections between man and his natural surroundings. Another important name in this regard was that of Mathew Fontaine Maury (1806-1873), a naval officer who had collected a mass of data on winds and currents of the oceans, and in 1850 had presented a model of atmospheric circulation on the earth's surface. His book entitled *Physical Geography of the Sea* (1855) was widely read.

Contribution of William Morris Davis (1850-1934)

Central to Davis's contribution to geography was the concept of "geographical cycle", as he chose to call it, though it is more popularly known as the cycle of erosion. His geographical cycle was a generalized model of the sequence of landforms that would occur in the course of erosional work of running water on an elevated portion of the earth's surface, if there were to be no change in its surface in relation to elevation of sea level, and no drastic change in climate. His formula for landform evolution was based on a combined interaction between the *structure* of surface rocks, the agency of landform change *(process)* and the *stage* in the sequence of landform change already reached at the particular time. Davis claimed that his model of geographical cycle provided a theoretical framework in reference to which the observed landforms could be described and analysed. He wrote:

In the scheme of the cycle of erosion ... a mental counter-part of every landform is developed in terms of its understructure, of the erosional process that has acted upon it, and the stage reached by such action ... [And] the observed landform is then described not in terms of its directly visible features, but in terms of its inferred mental counterpart. The essence of the scheme is simple and easily understood; yet it is so elastic and so easily expanded or elaborated that it can provide counterparts for landforms of the most complicated structure and most involved history.

Davis belonged to the period in intellectual history when Darwin's ideas about the evolution of species were in great currency, and scholars in most fields of study were increasingly drawn to the concept of development through gradual and cumulative change over a long period of time (as part of the theory of evolution), and they were attempting to apply it as an underlying principle in their own researches. Davis's concept of cyclic development of landforms was clearly Darwinist in inspiration. Using the evolutionary terminology, Davis identified three stages in landform development—*youth, maturity,* and *old age.* The power of evolutionary thinking to bring diverse facts into meaningful relationships had greatly fascinated Davis, so that he wrote:

> *We may in imagination picture the life of geographical area as clearly as we now witness the life of a quick growing plant.... The time is ripe for the introduction of these ideas. The spirit of evolution has been breathed by the students of the generation now mature all through their growing years, and its application in all lines of study is demanded (Davis, 1889, included in Davis, 1909, pp. 85-86).*

Davis defended the concept of cycle of erosion with such vigour, and demonstrated it with such pursuasiveness, that it soon became almost universally accepted as a working model for landform analysis.

The key to the cyclic view in geomorphology lies in the idea of systematic, irreversible change of form through time, and it is from this that the biological concept of ageing was appropriated by Davis and his students to the study of landforms. It is important to remember here that Darwin's theory of evolution was, in reality, far from one of *evolution* interpreted as linear development through the passage of time. Darwin was the primarily concerned with identifying the process whereby random variations in plants and animals could be selectively preserved, and, by inheritance, lead to changes at the level of the species. Thus, what for Darwin was a *process* became for Davis and others a *history.* For many geographers like Davis, *"evolution* implied little more than the idea of change, development, and *progress* and Darwin was, in spite of himself, seen as its author" (Stoddart, 1966).

As the leading figure in American geography in his time, it was natural that Davis should be concerned with problems in geographic education and that he should state his position in regard to the nature and methodology of geography. In a paper entitled "An Inductive Study of the Content of Geography" (1906), he had clarified that the essence of his approach to geography was to seek cause-and-effect generalization "usually between some inorganic elements of the earth... acting as control, and some element of the ... distribution of the earth's organic inhabitants serving as response". Causal explanatory relationship between organic and inorganic elements on the earth surface had appeared to Davis "the most definite, if not the only, unifying principle in geography". He was one of the most prominent advocates of Darwinism in human geography.

Davis was a member of the Committee of Ten appointed by the National Education Association in 1892 to review the status of geography in precollege school programmes and college entrance requirements. The report that was drafted by Davis, recommended that

[geography in America] should take on a more advanced form and should relate more specifically to the features of the earth surface, the agencies that produce or destroy them, the environmental conditions under which these act, the physical influences by which man and the creatures of the earth are so profoundly affected.

The report was accepted by the government. Following the imple- mentation of these recommendations school geography in the U.S.A, was transformed from pure memory work to the status of a general science. However, the Davisian legacy to geography was that (at least at the level of the American school system) teaching of geography became oriented to a restricted paradigm of cause-and-effect relationship between physical environment and human response. In other words, irrespective of changes at the level of research, geography in the U.S.A, had continued, for a long time, to be oriented to a deterministic perspective. (For fuller treatment of the Davisian "strategy" see: Livingstone, 1992, pp. 202-212.)

Contribution of Mark Jefferson (1863-1949)

Geography made rapid progress in the United States, so that in the opening years of the twentieth century, there were several geography departments across the country offering university courses under faculties comprising senior geographers. As the community of geographers grew, there was far more open questioning on the nature and content of geography questions and answers that helped give American geography a distinct identity. Many scholars had contributed in this development, but a most distinguished name was that of Mark Jefferson, a former student of Davis, who was appointed professor of geography at the Normal College in Yapsilanti in 1901, and had stayed there until 1939.

As James (1972) wrote, Jefferson deserves a special place in the history of American geography not only because of the enthusiasm he enkindled in his students, but also for the many contributions to the conceptual structure of geography that came from his pen. Jefferson strongly disagreed with the recommendations of the Committee of Ten regarding the content and conceptual approach to geography. He insisted that the focus of geography teaching should be "man on the earth", in that order, not "the earth and man". Jefferson's geography (in sharp contrast to Davis's) was a man-centred geography. Further, Jefferson was opposed to the view of the Committee of Ten which had favoured the study of systematic geography to the exclusion of regional geography of other parts of the world. As a professor in a teachers' training college, Jefferson realized the role of knowledge about lands and peoples around the world in training the mind of the future citizens of a rapidly shrinking world.

Responding (in 1931) to a questionnaire in regard to the nature of geography, Jefferson stated that his view of geography was many things in one, so that it defied a short and crisp definition. To Jefferson, the nature of geography is defined by:

the fact that there are discoverable causes of distributions and relations between distributions. We study geography when we seek to discover them .... But there is an art of geography—the delineation of earth's features and inhabitants on maps—cartography, and a science of geography, which contemplates the facts delineated and seeks out the causes of the form taken by each distribution and its relationship to others (cited in Martin, 1968, pp. 319-321; reference in James, 1972, p. 369).

Contribution of Eisworth Huntington (1876-1947)

Another former student of Davis at Harvard, Huntington was a most prolific writer and an imaginative interpreter of the effects of climate on human life. Correlating the periods of drought with historical dates, he developed the hypothesis that the great migrations and invasions of the nomadic peoples of Central Asia resulting in the Mongol conquests of China and India, and invasions over eastern Europe, in the thirteenth century, could be explained by dry climatic spells leading to the drying up of the pastures that formed the backbone of nomadic economy of the central Asian region. He presented this theory in his book entitled *The Pulse of Asia* (1907). The book was a great success in the world of scholarship, and had quickly launched its author on the road to academic fame. He became established as the most knowledgeable person on the influences of climate on human history. Another book published in 1915 under the title, *Civilization and Climate,* advanced the questionable thesis that civilizations could develop only in the stimulating climates of the temperate regions, and that the monotonous heat of the tropics had destined the people of those areas to live in relative poverty.

Huntington's books were immensely popular among historians, sociologists, and medical students (owing to his statements regarding the close relationship between health and climate), as well as geographers, but at the time that Huntington was highlighting climatic influences on civilization in a deterministic style, American geography was fast moving away from the philosophy of environmental determinism. Owing to this, Huntington's influence on American geography—its philosophy and methodology—was rather limited.

Contribution of Ellen Churchill Semple (1863-1932)

Another contemporary geographer whose name deserves special mention as a leading figure in the formative phase of American geography, was Miss Ellen Churhill Semple who, after a Masters degree in history, had gone to Germany to study geography under Ratzel at the University of Leipzig in 1891-1892, and again in 1895. Ratzel's ideas had made a lasting impression on her historically trained mind so that she was inspired to study American history in relation to its earth conditions. The result was the publication of her first book entitled *American History and its Geographical Conditions* in 1903. The book was an immediate success and confirmed her status as an eminent teacher of history and geography.

Semple's place in the historiography of American geography lies in that she had carried Ratzel's philosophy and methodology of geography to the *New* World, and had mesmerized a generation of American students by her persuasive writing and her enchanting literary style, backed by convincing scholarship. Through her books, generations of American geographers came to subscribe to the view that evironmental influences play a key role in shaping man's life upon the earth. Her version of the first volume of Ratzel's *Anthropogeographie* was presented in her book entitled *Influences of Geographical Environment* (1911). The opening paragraph of the book set its tone and style:

> *Man is the product of the earth's surface. This means not merely that he is a child of the earth, dust of her dust; but that the earth has mothered him, fed him, set him to task, directed his thoughts, confronted him with difficulties that have strengthened his body and sharpened his wits, given him problems of navigation or irrigation and at the same time whispered hints to solution.*

Further sentences in the opening paragraph, and many interspersed throughout the book, emphasized that every aspect of man's life upon the earth (including his philosophy, religion, as well as physiology) mirrored the influence of the physical environment of his habitat.

Sample had described her own method of study as comparative. In the preface to her 1911 book she wrote that her method of research had been to compare typical peoples of all races and all stages of cultural development, living under similar geographic conditions. If these peoples of different ethnic stocks but similar environments manifested similar or related social, economic, or historical development, it was reasonable to infer that such similarities were due to environment and not to race.

An intrinsic failure of Semple's style and method was that she had carried the concept of earth as the controlling factor in human affairs beyond the possibility of objective verification:

In combining the writings of all nations for examples to illustrate her principles ... she failed to look carefully for examples that contradicted her principles .... People who live in pass routes, she wrote, tend to become robbers of passing travelers. Then she presented case after case of people in pass routes who rob for a living, but she did not look for people in pass routes who do not rob; nor did she seek explanation for robbers who do not live in pass routes (James, 1972, pp. 379-380).

She was, however, careful enough to emphasize that the environ- ment does not control human actions; it *influences* them so that there is a tendency for people to behave in predictable ways, but there could be deviations in the exact direction taken. To this extent her man-environment thesis was *probabilistic* in approach.

It appears somewhat strange that Semple focused only upon the approach to human geography as presented in the first volume of Ratzel's *Anthropogeographie*, the approach that had focused on man- environment relationships from the perspective of the environment viewed as a determining factor in man's life. The second volume of Ratzel's *Anthropogeography* (1891) that approached the problem from the reverse route—in terms of the role of human will and choice, and the part played by culture and history—therefore, remained an almost unknown entity in American geography, so that Ratzel was, despite himself, treated as an old style determinist.

Geography as Human Ecology: The Contribution of Harlan H. Barrows

In American geography, the concept of geography as human ecology was set forth in clear terms for the first time by Harlan Barrows (1877-1960) in his 1922 presidential address to the Association of American Geographers (published in the *Annals*, A.A.G. in 1923). Like Jefferson and others before him, Barrows underlined that man's adaptation to the conditions of his habitat is not caused by the physical environment. On the contrary, this adaptation is a function of human choice—the central idea behind the concept of possibilism, then so much in currency in France. Barrows had expressed the view that although much of the subject matter of geography had been lost to the systematic disciplines, the content of geographical study was still far too broad for its development as a coherent discipline, so that he proposed that the specialized branches of geography, such as geomorphology, climatology, and biogeography should be abandoned, and geographers should concentrate upon human ecology as the unifying theme—the central organizing principle—for their work.

Barrows was of the view that "those relationships between man and the earth which result from his effort to get a living [are] in general the most direct and intimate", and that most other human adjustments on the earth's surface are primarily guided by these economic relations. Accordingly, he recommended that "development of economic regional geography should be promoted assiduously, and that upon economic geography for the most part, other divisions of the subject must be based". Barrows emphasized the need for intensive field work, and regarded "thoroughly effective technique of field work as our greatest immediate need". He emphasized that the field represented the geographer's laboratory.

Geography as Chorology: The Contribution of Carl Sauer (1889-1975)

The concept of geography as a chorological science had a long history of development in Germany and the other countries of Europe. In America, however, geography had for long remained confined to the search for geographic influences in human development. By the beginning of the 1920s, many among the younger generation of geographers had started questioning the validity of the content and method of geography as a discipline built around the basic theme of man-environment relationships. The new generation of students was anxiously looking for an alternative model for geographical work to replace the existing one which they were finding increasingly unsatisfying. It was at this juncture in the history of American geography that Carl Sauer (1889-1975), who had then taken charge of a new department of geography at the University of California at Berkeley, published his frequently cited essay entitled "The Morphology of Landscape" (1925). Sauer was critical of the concept of geography built around the theme of man-land relationships, and underlined the intellectual strait-jacketing that adherence to this concept as the guiding principle of geographical work had created, since the concept tied the student to a single dogma that committed him to a particular outcome of investigation in advance. The guiding premise was that the environment influenced man, and that in course of man's life upon the earth the environment itself experienced changes.

Geography as Chorology: The Role of Hartshorne's "Nature of Geography"

The real change over in American geography to chorology as the basic paradigm for geographical work came only after the publication of Hartshorne's monumental nature of geography in l939. This book presented an authoritative account of developments in modern geography, and had soon become essential reading for graduate students in every geography department. From then on, the Hettnerian concept of geography as a chorological science became enshrined as the mainstream concept of the discipline, and it continued to be so until the late 1950s.

8.1 INTEGRATION THROUGH THE CONCEPT OF CHOROLOGY

Ferdinand von Richthofen (1833-1905)

Richthofen was born in an aristocratic family of Kalsruhe in Silesia in 1833. He had received advanced training in geology, and was keenly interested in pursuing a career in geological exploration and research. To begin with, he started research in the Alps and later, under the auspices of the Austrian government, in the Carpathians. In 1860, he was selected by the Prussian government to accompany an expedition to Far-east to study the region's lands and resources. After working in China for some time, Richthofen went to California where he spent six year devoting himself to the study of geology in the field as well as in the laboratory. While in California, he received an offer from the Bank of California to support his fieldwork in China on condition that he should regularly report the result of his explorations to the Chamber of Commerce at Shanghai. In the course of his field observations in China, Richthofen was the first to map the coal fields of China.

Richthofen's interest in the field was not limited to locating minerals. He was keenly interested in the study of geological structures and the origins of landforms. He was the first to identify the extensive stretch of land to the east of the Gobi desert covered with a thick layer of powdery material as being wind-blown dust or loess. He also pointed out that these extensive plains of loess as well as other sedimentary rocks in the region lay over a relatively level to gently rolling surface that cut across old geological structures of varying degrees of resistance to erosion. This led him to advance the theory that the underlying platform had been carved by oceanic waves striking against a continuously sinking landmass.

Richthofen returned to Germany in 1872 with the intention of consolidating the results of his exploration in China. The new German empire had been just inaugurated, and it was keen on promoting scientific research through liberal financial grants. Richthofen received a suitable grant for the publication of his China studies, and five volumes of it were published between 1877 to 1912.

Berlin, which was home for Richthofen after his return from China, had given him enthusiastic reception. He was put in charge of the *Gesellschaft fur Erdkunde* which under his leadership emerged as the first-rank geographical society. He was appointed to the post of professor of geography at the University of Berlin in 1875 where he was granted leave of absence to complete his China work. In 1877 he accepted appointment to the chair of geography at the University of Bonn. From then on, formal academic work began to occupy most of his time so that his China volumes were put aside for some time. In 1883 Richthofen moved from Bonn to Leipzig. He returned to Berlin in 1886 accept a new chair in physical geography.

8.1 Alfred Hettner (1859-1941)

The received concept of geography as chorology found a most effective advocate in Alfred Hettner under whose leadership chorology became the guiding principle of geography in Germany, and, later, all over the English-speaking world following the publication of Hartshorne's *Nature of Geography* (1939). As such, Hettner rather than Richthofen came to be remembered as the father figure in the mid-twentieth century revival of the concept of geography as a chorological science. Hettner was the first geographer of his generation who had entered university with the conscious intention of becoming a geographer. During 1877-1878 he studied at the University of Halle under Kirchhoff from whom he had received the first clear insight into the field of geography. From Halle he went to Bonn and then to Strasbourg where, under Gerland in 1881, he obtained his doctorate on the climate of Chile. While studying at Strasbourg, he became deeply interested in philosophy, a fact that (according to Dickinson) explains his subsequent publication of essays on the framework and methods of geography – the set of writings that Hettner himself regarded as his most important contribution.

8.1 GEOGRAPHY AS A LANDSCAPE SCIENCE

Otto Schluter (1872-1952)

Notwithstanding the considerable popularity of the concept of geography as the study of earth's areas in terms of what Sauer called "areal differentiation", many geographers had felt uneasy about the identification of geography as a chorological science which like the chronological (historical) sciences was defined in terms of its method rather than its subject matter. They strongly felt that geography, like other systematic sciences, must have a distinctive subject of study with which it could be clearly identified as a field of science. Another source of dissatisfaction was the Hettnerian schema for regional geography which appeared to overemphasize the importance of Physical features in the geography of regions and places. By tying every aspect of an area back to its physical features, the Hettnerian model for regional studies had tended to overlook the role of factors such as distribution and density of population, economy, patterns of development in relation to routes of circulation, and a host of

historical-cultural forces and factors that impart individuality to places irrespective of their physical environment. A third source of dissatisfaction was that many of the interrelations observed in regional studies were cumulative outcome of processes of change over time. These could not be properly understood without the study of past geographies of the place and the changes taking place over a period of time. In other words, geography as chorology neglected time.

These points of dissatisfaction with the concepts of geography put forward by Ratzel, on the one hand, and Richthofen and Hettner on the other, had led to a continued search for alternative concepts of geography as a science. One such alternative view was built around the concept of landscape first introduced by Wimmer in 1885 in his *Historische Landschaftunda*. But the concept gained popularity only after 1906 following its further exposition by Otto Schluter.

Born in Westphalia in 1872, Schluter first studied German language and history but while a student at the University of Halle he attended the lectures of Kirchhoff on human geography. This led to the change of his interest from Germanic studies to geography. Schluter wrote his dissertation at Halle, but shifted to Berlin in 1895 to study under Richthofen, under whose influence he developed a strong interest in question of scope and method of geography, an interest that resulted in his famous “Objectives of the Geography of Man” (1906) which projected an alternative concept of geography as the study of landscapes. Five years later he was appointed to the chair of geography at the University of Halle where he stayed until his retirement in 1951. Schluter was keenly interested in the geography of the settlements in Central Europe. The result of his nearly forty years of labour on this subject was published in a three-volume work under the title *Siedlungsraume Mittelenuropas in Fruhgeschichtlicher Zeit* (1952, 1953, 1958).

In his 1906 methodological paper, Schluter had suggested that geographers should concentrate on the study of phenomena on the surface of the earth that could be perceived through the senses; and the focus should be on the totality of perception in each area. This totality of "visual perception of area" was termed as landscape. According to him, acceptance of landscape as the subject matter of geography had the potential to raise the discipline of geography to the level of the other logically defined fields of science.

Since the concept of landscape was based on visual perception of the surface features in given areas, the nonmaterial content of areas, such as political organization, religious-cultural beliefs, economic institutions and the like, lay outside the central focus of geography as a science. Schluter wrote that knowledge about these aspects could be borrowed from the relevant fields of knowledge, and be used in interpreting the landscape which, like an archaeological deposit, mirrors the culture and economy of the human communities inhabiting the particular segments of the earth's surface. Interest in political, cultural, and economic aspects was, however, to be limited only to the extent that they gave character to the visible landscape.

Schluter incorporated the concept of process i.e., development through time, in his concept of geography as the science of landscape by means of the derivative concepts of cultural and natural landscapes. He called them *Kulturlandschaft* (cultural landscape) and *Naturlandschaft* (natural landscape). For him the purpose of the study of landscapes was "not only of classifying categories of phenomena and determining their distribution and associations, but of examining their characteristics through the process of change through time". He emphasized that human geography should aim at the recognition of the form and arrangement of earthbound phenomena as far as they are perceptible to the senses. He claimed his method of study to be morphological, and its procedure parallel to that applied in the study of landforms.

Previous Year Question Paper-III

Unit – 8

Sub Unit – 1

January - 17

1. Who wrote the book 'La Geographie Humaine' ?

(1) P.E. James (2) Jeans Brunhes

(3) R.J. Johnston (4) E. Jones

2. Who amongst the following defined geography as a chorological Science ?

(1) Richthofen (2) Hettner

(3) Ptolemy (4) Peter Haggett

3. "The dominant idea in all geographical progress is that of terrestrial unity." This statement is attributed to

(1) Richard Hartshorne (2) Vidal de la Blache

(3) Jean Brunhes (4) Friedrich Ratzel

4. Who was the first promoter of geographical knowledge from Germany ?

(1) Ferdinand Von Richthofen (2) Carl Ritter

(3) Carl Andree (4) Oscar Peschel

5. Who defined cultural geography "which emphasizes human cultures and is commonly equated with human geography" ?

(1) John Eyles (2) Emrys Jones

(3) Dudley stamp (4) Eshref Shevky

6. Match List-I with List-II and select the correct answer from the codes given below :

List-I (Geographers)		List-II (Country)	
I.	Alexander Von Humboldt	A.	France
II.	II. Ellen Churchil Semple	B.	U.K.
III.	III. Peter Haggett	C.	U.S.A.
IV.	IV. Jean Brunhes	D.	Germany

Codes :

	I	II	III	IV
(1)	D	C	B	A
(2)	C	B	A	D
(3)	B	D	C	A
(4)	A	D	C	B

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	24	B	8.1
2.	25	B	8.1
3.	27	B	8.1
4.	28	D	8.1
5.	52	C	8.1
6.	30	A	8.1

PAPER-II

November - 17

1. Who among the following defined Geography as human ecology ?

(1) Hartshorne (2) Schaefer (3) Barrows (4) Richthofen

2. Who among the following correlated the colour of ocean water and its salinity ?

(1) Al Masudi (2) Al Maqdisi (3) Ibn – Khaldun (4) Ibn – Sina

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	16	C	8.1
2.	18	A	8.1

PAPER-III GEOGRAPHY

November – 17

1. The term 'cultural landscape' was developed by :

(1) C. Darwin (2) C.O. Sauer (3) A. Humboldt (4) C. Ritter

2. Who was the first Greek Scholar to calculate the circumference of the earth ?

(1) Aristotle (2) Herodotus (3) Anaximender (4) Eratosthenes

3. Match List - I with the List - II and select the correct answer from the code given below :

List - I (Geographer)	List – II (School of Geography)
(a) Albert Damangeon	(i) German school of geography
(b) Friedrick Ratzel	(ii) French school of geography
(c) Halford J. Mackinder	(iii) British school of geography
(d) Isaiah Bowman	(iv) American school of geography

Code :

	(a)	(b)	(c)	(d)
(1)	(i)	(ii)	(iv)	(iii)
(2)	(ii)	(i)	(iv)	(iii)
(3)	(ii)	(i)	(iii)	(iv)
(4)	(iv)	(ii)	(iii)	(i)

4. Who wrote the book 'Meteorologica' ?

(1) Aristotle (2) Posidonius (3) Plato (4) Erastosthenes

5. The concept of 'Cultural landscape ' was popularised by :

(1) Wilber Zelinsky (2) Carl Sauer (3) Anne Buttimer (4) Ratzel

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	24	B	8.1
2.	28	D	8.1
3.	30	C	8.1
4.	31	A	8.1
5.	52	B	8.1

PAPER-II

January- 17

1. Who defined Geography as human ecology ?

(1) Schaefer (2) Barrows

(3) Hartshorne (4) Ellen Semple

2. The approach that some geographical facts according to Ritter, cannot be explained scientifically, is termed as

(1) Locational (2) Ecological

(3) Teleological (4) Regional

3. The concept of Cultural landscape was promoted by

(1) Ratzel (2) Carl Sauer

(3) Wilber Zelinsky (4) Aune Bultimer

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	19	B	8.1
2.	20	C	8.1
3.	32	B	8.1

PAPER-II

July- 17

1.Who among the following scholars laid down the foundation of dichotomy of general versus species Geography?

(1) Immanual Kant (2) Sebastian Munster

(3) Bernhard Varenius (4) Peter Apian

2. Which of the following pairs does not match ?

Author		Book
(1) Al - Masudi	-	Router and Realms
(2) Al - Balaki	-	Kitabul Ashkal
(3) Al - Biruni	-	Kitab-al-Hind
(4) Ibn - Khaldun	-	Muqaddimah

3. Which one of the following in the correct sequence of German geographers contributing to the development of geographical thought ?

(1) Ratzel - Troll - Hettner - Peschel

(2) Peschel - Hettner - Ratzel – Troll

(3) Peschel - Ratzel - Hettner - Troll

(4) Troll - Hettner - Peschel – Ratzel

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	32	C	8.1
2.	33	A	8.1
3.	36	C	8.1

PAPER-III

July- 16

1. Who was the author of the book "Nature of Geography" ?

(1) Isaih Bowman (2) Rudolf Kjellen

(3) Fredrich Ratzel (4) Richard Hartshorne

2. answer from the codes given below :

I. Aristotle

II. Eratosthenese

III. Plato

IV. Strabo

Codes : A B C D

(1) II III I IV

(2) I II IV III

(3) IV III I II

(4) III I II IV

3. Match List – I with List – II and select the correct answer from the codes given below :

List – I (Author)	**List – II (Book)**
I. Olto Schluter	A. Political Geography
II. Von Richtofen	B. Das Ausland
III. Oscar Paschel	C. Major Works on China
IV. Friedrich Ratzel	D. Visible Contents of Landscape

Codes :

	I	II	III	IV
(1)	D	C	B	A
(2)	A	B	D	C
(3)	B	D	C	A
(4)	C	B	A	D

4. Which one of the following pairs does not matched correctly ?

(Author)		**(Book)**
(1) Ibn Khaldun	–	Muqaddimah
(2) Al-Balakhi	–	Kitabul Ashkal
(3) Al-Masudi	–	Routes and Realms
(4) Al-Baruni	–	Kitab-al-Hind

5. Which one of the following authors has stated "there are not necessities but everywhere possibilities and man as master of these possibilities is the judge of their use" ?

(1) Semple (2) Blashe

(3) Febvre (4) Durkheim

6. Who defined geography as human ecology ?

(1) Hartshorne (2) Schaefer

(3) Semple (4) Barrows

7. Match List – I with List – II and select the correct answer using the codes given below :

List – I **(Geographer)**	**List – II** **(Contribution)**
I. L.D. Stamp	A. Makers of Modern Geography
II. Alexander Von Humboldt	B. Nature of Geography
III. Richard Hartshorne	C. Great Britain : Use and Misuse of Land
IV. R.E. Dickinson	D. Cosmos

Codes :

	I	II	III	IV
(1)	B	D	A	C
(2)	A	C	B	D
(3)	C	B	A	D
(4)	C	D	B	A

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	25	D	8.1
2.	26	D	8.1
3.	27	A	8.1
4.	28	B	8.1
5.	30	C	8.1
6.	31	D	8.1
7.	32	D	8.1

PAPER-II

July- 16

1. Who among the following pleaded that "history be treated geographically and geography be treated historically" ?

(1) Holmes (2) Herodotus

(3) Hecateous (4) Thales of Militus

2. The statement that "Egypt is the gift of the river Nile" is attributed to

(1) Aristotle (2) Strabo

(3) Herodotus (4) Seneca

3. Who among the following scholars made corrections to Ptolemy's Book ?

(1) Al-Masudi (2) Al-Idrisi

(3) Al-Baruni (4) Ibn-Khaldun

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	16	B	8.1
2.	18	C	8.1
3.	19	B	8.1

PAPER-II

December- 15

1. Who among of the following first used the word 'Geography'?

   (1) Eratosthenes (2) Strabo

   (3) Hipparchus (4) Poisonous

2. Vidal de la Blache was associated with which of the following schools of thought?

   (1) Possibilism (2) Determinism

   (3) Modern Determinism (4) Stop and Go Determinism

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	15	A	8.1
2.	19	A	8.1

PAPER-III

December- 15

1. Who was the first person to divide the circle into 360 degree?

(1) Ptolemy (2) Herodotus

(3) Eratoshenes (4) Hipparchus

2. Who are considered as the founders of Mathematical Geography?

(1) Plato and Aristotle (2) Thales and Anaximeneder

(3) Hecataeus and Herodotus (4) Ptolemy

3. Who wrote the book Meteorologica ?

(1) Aristotle (2) Posidonius

(3) Plato (4) Thales

4. Who laid the foundation of modern geographical thought?

(1) Humboldt and Ritter (2) Kant and Varenius

(3) Hettner and Richthopen (4) Humboldt and Davis

5. Read the following statements:

(a) Ratzel dominated German Geography in the second half of the 19th century.

(b) Ratzel coined the term Anthropogeographic.

(c) Ratzel was highly influenced by Darwin's theory of evolution of species.

Which of the above statements are correctly associated with Ratzel?

(1) (a), (b) and (c) (2) (a) and (b)

(3) (b) and (c) (4) Only (c)

6. Which is the correct sequence in chronological order of the following Greeks who contributed vastly to the Evolution of geographical thought during the ancient period?

(1) Aristotle, Eratosthenes, Anaximander, Ptolemy

(2) Eratosthenes, Anaximander, Ptolemy, Aristotle

(3) Anaximander, Aristotle, Eratosthenes, Ptolemy

(4) Ptolemy, Anaximander, Aristorle, Eratosthenes

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	25	D	8.1
2.	27	B	8.1
3.	28	A	8.1
4.	29	A	8.1
5.	30	A	8.1
6.	31	C	8.1

PAPER-II

June- 15

1. Which one of the following philosophers did propagate the principle of Unity in Diversity?

(1) Carl Ritter (2) Immanuel Kant

(3) Alexander Von Humboldt (4) O.H.K. Spate View Answer with

2. To which school of Geography does E.C Semple belong?

(1) American School of Geography (2) Russuan School of Geography

(3) British School of Geography (4) French school of Geography

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	19	A	8.1
2.	20	A	8.1

PAPER-II

June- 14

1. Which one of the following pairs does not match correctly ?

17

Author	**Book**
(A) Ibn Khaldun	– Muqaddimah
(B) Al-Balakhi	– Kitabul Ashkal
(C) Al-Masudi	– Routes and Realms
(D) Al-Biruni	– Kitab-al-Hind

2. Match List – I with List – II andselect the correct answer from the codes given below :

List – I (Geographers)	**List – II (Concepts Developed)**
i. F. Ratzel	a. Landscape Science
ii. C. Ritter	b. Areal differentiation
iii. R. Hartshorne	c. Teleological view
iv. O. Schluter	d. Social Darwinism

Codes :

	a	b	c	d
(A)	iv	iii	ii	i
(B)	iii	iv	i	ii
(C)	ii	iv	iii	i
(D)	iv	i	ii	iii

3. Which one of the following is in correct sequence in the development of German geographical thought.

(A) Troll, Peschel, Hettner, Ratzel (B) Peschel, Ratzel, Hettner, Troll

(C) Peschel, Troll, Hettner, Ratzel (D) Ratzel, Peschel, Troll, Hettner

4. Who coined the term 'Cosmography'and divided it into uranography and Geography ?

(A) O. Peschel (B) C. Ritter

(C) B. Vareneous (D) A. Humboldt

5. The book entitled "Perspective on Nature of Geography (1959)" was authored by

(A) Ellen Churchill Semple (B) Rudolf Kjellen

(C) Richard Hartshorne (D) Isaih Bowman

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	17	B	8.1
2.	18	A	8.1
3.	19	A	8.1
4.	20	D	8.1
5.	21	C	8.1

PAPER-III

June- 14

1.The statement – "Systematic geography must move into theoreticalspheres and Regional Geography into a search for generic and not unique studies" was made by

(A) Richard Hartshorne (B) Issiah Bowman

(C) William Bunge (D) Peter Haggett

2. Match List-I and List-II and select the correct answer using the codes given below :

List - I	**List – II**
i. Otto Schluter	a. Politicalgeography
ii. Von Richthofen	b. Das Ausland
iii. Oscar Peschel	c. Major work on China
iv. Friedrich Ratzel	d. Visible content of the landscape

Codes :

	a	b	c	d
(A)	iv	i	ii	iii
(B)	iv	iii	ii	i
(C)	iii	iv	i	ii
(D)	ii	I	iv	iii

3. Who among the following was a strong supporter of Ritter's teleological ideas ?

(A) Guyot (B) Peschel

(C) Gerland (D) Ratzel

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	23	A	8.1
2.	27	B	8.1
3.	30	A	8.1

PAPER-II

December- 14

1. The term 'Cosmography' was coined by

(A) Mackinder Halford J. (B) Humbolt

(C) Kant Emmanuel (D) Ptolemy

2. Match the following List – I with List – II and select the correct answer from the codes given :

List – I	**Lis– II**
a. Unity in Diversity	i. Vidal-de-la Blache
b. Social Determinism	ii. Jean Brunhes
c. Terrestrial Whole	iii. Carl Ritter
d. Interaction	iv. Frieduch Ratzel

Codes :

	a	**b**	**c**	**d**
(A)	iii	ii	iv	I
(B)	iv	ii	i	iii
(C)	iii	iv	i	ii
(D)	ii	i	iv	iii

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	17	B	8.1
2.	18	A	8.1

PAPER-III

December- 14

1. Find the sequence of the following contributions by geographers :

i. The origin of species ii. Cosmos

iii. Anthropogeographic iv. Erd knude

(A) i, ii, iii, iv (B) iii, iv, ii, i

(C) ii, iv, i, iii (D) iv, iii, i, ii

2. Who was the author of Cosmos ?

(A) Ritter (B) Humbolt

(C) Ratzel (D) Bruhnes

3. Which Arab geographer served in the Court of Muhammad Bin Tughlaq ?

(A) Al-Beruni (B) Ibn-e-Khaldun

(C) Ibn-Batuta (D) Al-Idrisi

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	26	C	8.1
2.	29	B	8.1
3.	51	C	8.1

SUB UNIT-2

Geographical Thought

8.2. THE DARWINIAN THEORY OF EVOLUTION:

Charles Darwin was greatly excited about the idea of biological evolution. He was attracted by the mounting evidence in support of the central idea about progressive and cumulative changes in life, from the simple to the most complex. He engaged himself in amassing all available information on this subject, which appeared to him to offer irrefutable proof that life upon the earth had evolved through a long-drawn process of gradual change spread over millions of years. This encouraged and inspired him to delve deeper into the hitherto unresolved process through which evolution of life had taken place. Through many years of tireless work, Darwin succeeded in finding the answer. The detailed account of his findings was published in his monumental book *The Origin of Species by Means of Natural Selection*, first published in 1859. Although many finer points of Darwin's original thesis have since been revised as a result of later advances in knowledge in the filed of genetics, the basic theory remains intact. The fundamental ideas in Darwinian theory of evolution included:

1. *The Struggle for existence.* In nature there is continuous struggle for existence among the various species of plants and animals. Scientific evidence showed that over considerable periods of time, the number of individuals in any species (in any community of plants or animals) remains almost constant. From this Darwin inferred that the number of offspring of any species that survive to reach maturity and to breed, is balanced by the number of mature individuals that die each year.

2. *Variation within species.* We find that in any given generation there is considerable variation among individuals in any society. The same is true about other organism in nature. Except for some examples in cases of twin births, we hardly ever come across two individuals completely resembling each other in details. Darwin wrote that when a large number of individuals belonging to a single species are examined, wwe find considerable variation among them in regard to structure, complexion, activity pattern, and the like, and that these differences appear to have been passed on from one generation to the next so that, for example, children of tall parents tend to be tall.

3. *Survival of the fittest.* Since individuals in any given society vary in individual cahracteristics, it is inevitable that some are stronger than others. Given the fact that there is a perpetual struggle for survival in nature, it is obvious that only the strongest-the fittest-shall survive and proliferate. This helps to maintain the characteirstics that had enabled the species to get the better of other who had lacked this quality. This process of struggle and selection in nature goes on endliessly, so that with the passage of time, the membes of the species progressively become better adapted to withstand the vagaries of the environment.

4. *Natural Selection.* The environment itself undergoes a slow process of long-term changes. The changed environment demands of the species a new set of characteristics better suited to withstand the environmental hardships, so that the process of selection and survival has to start a fresh each time, and only those individuals of the species survive to breed and perpetuate that are most capable of meeting the demands of environmental change.

IMPACT OF DARWIN ON GEOGRAPHICAL THOUGHT

From the foregoing discussion it is clear that "Darwin's theory was not simply one of evolution, but concerned a mechanism whereby random variations in plants and animals could be selectively preserved, and by inheritance lead to changes at the species level" (Stoddart, 1966). As Stoddart underlined it, in geography, however, Darwinism was interpreted in the sense of a "continuous process of change in a temporal perspective long enough to produce a series of changes" (Scoon, 1950). It was in this restricted sense that the term evolution was used by many a worker in the natural as well as the social sciences. These students ignored the fundamental point that Darwin's main interest in propunding his theory of evolution was in the mechanism through which wvolution had progressed rather than in "evolution" (in the sense of change through time) itself. In the social sciences in general, and geography in particular, the central element in Darwinian theory, i.e., the role of randomness and chancew, had passed almost unnoticed.

Follwing the pattern set by Stoddart (to whom we owe much of the discussion that follows) the rest of this discussion is focused on the following four main themes in Darwin's theory, which appear especially relevant to the discussion on the impact of evolutionary biological theory on geographical thought:

1. The idea of change through time;
2. The idea of organization;
3. The idea of struggle and selection; and
4. The role of randmnes and chance variations of character in nature.

Time and Evolution:

Early in the 19th century (1830-1833), Scottish geologist Charles Lyell (1797-1875) has published a three-volume work on *Principle of Geology*, which challenged the widely held mediaeval notion regarding the age of the earth. On the basis of scientific evidence collected, Lyell put forward the theory that the present-day landforms on the earth's surface are produced by a slow process of evolution spread over a long process of geological change. This theory of landform evolution cut at the roo of the mediaeval notion of catastrophic origin of the earth as a divine creation. His predecessor James Huton(1726-1797) had already demonstrated the theory of *uniformitarianism* in landform evolution, according to which the process of landform change seen to be operative at the present time are sufficient to account for all the landform changes that occurred in the past, and that the cumulative effect of this ceaseless process of change is visible in the structure and fform of the present-day landforms. The works of Hutton and Lyell had greatly impresses Charles Darwin, so that his first major scientific publication on *The Structure and Distribution of Coral Reefs* in 1842 was inspired by the idea of evolution through change over time. The work demonstrated how atolls were formed by slow transformation of fringing reefs into barriers reefs and then into atolls through the process of slow subsidence-spread over a long period of time. The initial deduction and subsequent development of the theory of atoll evolution closely resembled his later approach to the origin of species.

Darwin's work on the origin of atolls, and the idea regarding slow transformation of biological species over time, together inspires Americal geographer W.M.Davis to develop his own theory of the cycle of erosion and landform transformation as a slow process change in time. However, Davis' major difficulty lay in the fact that, unlike Darwin who dealt with species, Davis took his illustrations not from the species or the population, but from the individuals, i.e., isolated landforms. As such, Davis' cycl of erosion was essectiallly nothing more than *denudation chronology*.

As Huxley(1887) had underlined long ago, "*the Origin of Species* [was] the logical sequence of [Lyell's] the *Principles of Geology"*. The concept of *uniformitarianism* in geology, and later on in biology, involved the need for time far in excess of what was until then allowed by theology.

Once the reality of small but cumulative variations was established in biology,a similar conclusion followed. Time became one of "Darwin's chief requirments…When Davis in 1899, therefore, wrote his paper on cycle of erosion…it was time which he singled our as of most practical value (Stoddart, 1966).

Thus the Davisian concept of cycle of erosion was inspired by the central idea in the Origin of Species regarding change through time, and Davisian geomorphology adapted the biological analogy of aging to the development of landforms: Davis' theory was deductive, time oriented, and imbued with mechanistic notions of causation. It derived its uniformitarianism fro Lyell, and its theme of change through time from a simplified view of the theory of biological evolution.

Very similar views were propounded in plant geography, especially ecology, under the leadership oof Clements (1916). In the social sciences, however, the development of the time perspective had to await the emergence of a historical tradition following the consept of prehistory in the 1830s. the first major contributors in this regard included Sir Henry Maine's *Ancient Law(1861), E.B. Taylor's Early History of Mankind (1865), and his Origin of Civilization (1870).* These together set had the stage for the development interpretation of history, until Malinowski offered a functional interpretation in the 1920s.

The concept of change through time also became a dominant theme in human geography, more specifically in the Berkeley School under the leadership of Carl O. Sauer (1925). Sauer and his students focused on in-depth study of histrorical evolution of settelments in the Americal southwest and elsewhere. It was also the central theme in Whittlesy's(1927) idea regarding sequent occupance. To conclude:

Primarily-geographes interpreted the biological evolution in terms of change through time: what for Darwin was a process became for Davis and others a history-For a time "evolution" implied little more than the idea of change, development, and "progress" and Darwin was in spite of himself seen as its author (Stoddart, op,cit).

Organization and Ecology:

The theme of organization and ecology was implicit in Darwin's theory of volution. In chapter 3 of the *Origin of Species* Darwin wrote that he was greatly impressed by the "exquisite" adaptation and interrelationships of organic forms "to each other and to the physical conditions of life". This was a major inspiration in Haeckel's(1869) *New Science of Ecology*. Thus, irrespective of theological resistance and opposition to any concept that attempted to contradict the concept of divine creation, in the immediate post-Darwinian period, amn had himself become a subject matter for scientific investigation. Part of the reason was that in his later publication such as, *Expression of Emotions of Man and Animals(1868), and Desecnt of man(1871)* Darwin had himself treated man at the same level as other living organisms.

Hawckel's views on ecology were highly influential in setting a treand in the study of man in relation to his environment. From about 1910 onwards, the term "human ecology" was frequently used to refere to studies of this kind. Writing in the year 1946 Americal sociologist Richard Park had observed that human ecology deals with the web of life, the balance of nature, the concepts of competition, dominance and succession, biological ecomomics and symbiosis. His source of inspiration lay in the contemporary cross currents in biology.

American geographer Harlan H. Barrows(1923) had echoed similar sentiments in his Presidential address to the Association of Americal Geographers, wherein he said that the aim of geographer was:

To make clear the relationship existing between natural environments and the distribution and activities of man..to view this problem..from the standpoint of man's adjustment to the environment, rather than that of environmental influence…The centre of geography is the study of human ecology in specific areas.

Barrow's views had led to a good deal of opposition, since to many it appeared as an attempt to banish the study of geomorphology from the fild of geography. As such, Barrows' ideas failed to receive any significant support among fellow geographers, except for the Berkeley school which was concerned with studies of the origins of settelments froma development-ecological perspective.

The concept of organization, and organism, in geography predates Darwin but the earlies concept of organism was purely teleological in origin, and it had involved explanation by analogy. After Darwin, organic analogy lost its earlier metaphysical connotations, and the concept became more biological in orientation and expression. Ecological studies became more specifically empirical in method, and they slowly replaced the previously popular geographical tradition of synthesis through analogy that was so dominant in the time of Humboldt and Ritter, and half a century later, in the French school of regional studies under Vidal dela Blache.

No doubtm organismic analogy had its uses: it served as a unifying theme in our increasingly particularistic discipline, so that referring to his scheme of Natural Regions, Herbertson (1913-1914) had stated that his Natural Regions represented "definite associations of inorganic and living matter with definite structures and functions with a real form and possessing regular and orderly changes as those of a plant or an animal". Herbertson had maintained that like plants mand animals, regions could also be ranked into species, general, orders and classes. Such organismic thinking also prevaded the scheme of regions proposed by another british geographer, Unstead (1926). Ratzel's scheme of political geographer built around the state as a living organism, had been deeply inspired by the Darwinian theory.

As Fleure (1929, p.13) wrote: the fundamental criterion for the application of organismic analogy is that the phenomenon under consideration should possess properties of organization of its constituent parts into a functionally related mutually interdependent complex, which possesses properties which are more that the sum of its parts. Methodologically, however, the organismic analogy in geography was theoretically an unsound approach to explanation, since it was a synthetic notion that gave no assistance in the actual course of investigation. Besides, it was an idiographic concept in an increasingly nomothetic science(Siddal, 1959), so that it was abandoned as a working principle in geography by the end of the 1930s.

Selection and Struggle:

Among geographers who used the concept of struggle and selection in the course of environmental adaptation by human communities the names of Fleure, Huntington and Griffith Taylor stand out most prominantely. Fleure (1919,1937,1952) stresses the need for physiological stusy to assess environmental effects on man. To facilitate such studies he devised a typology of human regions-regions of difficulty, of effort, and of increment. However, the theme, as it has developed since the time of Fleure, is far too technical in approach, and therefore, goes beyond the competence of the average student of geography. Elsworth Huntington, on the other hand, had focused on the theme of natural selection, environmental influences and human populations on a worldwide scale, so that it had required little expert knowledge of the biological sciences. Griffith Taylor used this concept in his studies on races, states, and towns, but the questions that Huntington and Taylor asked could not be meaningfully answered in terms of the generalized approach they had adopted, so that the whole determinist- possibilist controversy had moved on to a philosophical rather than an empirical level. This theme was, howver, most effectively developed in Ratzel's political geography.

Randomness and Chance:

As discussed in the foregoing paragraphes, in geography, the Darwinian theory of evolution was generally interpreted either in terms of change through time (Davis), or as struggle and selection (Ratzel). In either case, the theory was applied in an overwhelmingly deterministic perspective. This was contrary to Darwin's own intentions since in his theory of biological evolution, the element of chance played a major part, so that irrespective of the running theme of environmental adaptation the *Darwinian approach to evolution was, at its core probabilistic rather than deterministic*. Only much later, in the 1960s, did geographers begin to recognize the importance of stochastic processes, i.e., processes involving randomness and chance, in geographic change.

As Merz (1927) noted, the geographers' neglect of the role of randomness and chance is somewhat surpricing in view of the fact that "the study of this blind chance in theory and practice [was] one of the greatest scientific performances of the nineteenth century". As Stoddart (1966) pointed out, part of the reason for the neglet lay in Darwin himself, in the sense that his theory " made a clear distinction between the way in which evolution was effected, and the course of evolution itself: Geography seized on the latter and ognored the former. Darwin began with the idea of the selection of "chance" variations, which are "no doubt" governed by laws. These laws Darwin failed to discover, and in time came to emphasize chance less and less". Thus, "Darwinism in the sense of development or evolution through time was seized on in geography as a unifying principle to subsume vast quantities of other wise discrete and apparently unrelated data… But called Darwinism or not, it omitted Darwin's central theme" (Stoddart, 1966).

Conclusion:

As the foregoing discussion showed, of the four major themes in Darwnian theory of evolution, geographers had picked only thj\e following three: the notion of change through time (Davis), of struggle and selection leading to survival of the fittest (Ratzel), and of iterrelatedness of phenomena existing together in specific locations on the earth's surface leading to the concpets of organization, organic analogy, and ecology as used in the works of Fleure, Huntington and Taylor. Thus, the central point in Darwin's theory regrading the role of randomness and chance in the process of evolution, was completely negelected, so that Darwin's essentially probabilistic theory was interpreted in geography in a conspicuously deterministic manner. The influence of Darwin in the chorological geography of Hettner-and-Hartshorne was also clearly visible in its central focus on the concept of spatial organization. Thus, Hartshorne(1959), emphasized the interdependence of phenomena of diverse origins existing together in particular segments of the earth's surface.

Darwin's lasting contribution to the philosophy and methodology of modern science lay in that:

1. He separated scientific inquiry from a priori assumptions of the teleological kind;
2. In the face of irrefutable evidence presented by Darwin in favour of gradual evolution of phenomena in nature, theology itself began to turn away from meddling in scientific matters, and had soon started to acknowledge that the Bible was no authority in the field of science (Livingstone,pp. 149-155);
3. Darwin also succeeded in giving the final seal of approval to the general acceptance of the concepts of uniformaitarianism and law like statements in science, and thereby completed the dismissal of the notions of Providential interference and catastrophism in science;
4. Darwin's unique contribution to modern though lay in that he was the first to establish man's place in nature, and thereby succeeded in making man himself a valid subject for scientific inquiry.

SUB UNIT-3

Contemporary Trends in Indian Geography

8.3. EVOLUTION OF MODERN GEOGRAPHICAL THINKING AND DISCIPLINARY TRENDS IN INDIA

Introduction

India, home of one of the world's earliest civilisations, has a long-standing intellectual tradition. The geographical studies in India began with the dawn of Indian Civilization in ancient times. Occupying a strategic location in Asia, Indian history is at crossroads of cultures from China to Europe. The contributions of Indian scholars in the ancient period are parallel to that of Chinese, Greeks and Romans[1]. In this geographically diverse subcontinent of Eurasia, discoveries on nature and humanity from *Upnishads* and *Vedas* led the development of various indigenous knowledge systems. The vast galaxy of seer- scientists, philosopher-poets and sages left behind a wealth of history of thought. In fact several inventions and discoveries believed to have originated in the Western world have been studied centuries earlier by our ancestors. Looking back at the roots of Indian geography reveals very rich and strong Indian intellectual heritage, a legacy of over 2000 years old. However, the formal foundations of academic geography in India were laid in the colonial period as late as 1920s[2]. Beginning in the 8th century, India was exposed to Islamic geographical concepts and ideas; and Muslim geographers began to take place beside Hindu scholars in contributing to the maturing of geographical study in India.

The arrival of the British and other European colonial powers in the 17th century forced an adjustment in Indian intellectual circles. Indian geography's progress in the modern times has been spectacular after Independence. After independence, geography acquired new functions in the context of national development, expansion of the educational system and strengthening of planning projects. The complete image of Indian geographical thought demands a thorough critical screening of the inherited wealth from

the past and the contemporary practices which together have decisive influences on the future directions. But, the major thrust of discussion here is on the significant developments in Indian geography during the last hundred years (contemporary phase); the major leadership in the development of Indian geography; paradigmatic changes; and the challenges faced by Indian geography.

8.3.1. The Roots of Indian Geography

'Geography' in Hindi is called "*Bhugol*'; '*bhu*' meaning 'the Earth' and '*gol*' meaning 'round', i.e. 'the study of round earth'.

Indian astronomers propounded the theory that the earth is a sphere. The ancient Indian scholars were adepts in all fields known to humanity. Some of these scholars are listed below with their major field of study (Table 1)[3]. This interdisciplinary knowledge lies at the root of geographic development.

Acharya Kapil contributed to the science of cosmology. Acharya Bharadwaj is known for outstanding discoveries in aviation science. Baudhāyana was an Indian mathematician, noted for writing the earliest *Sulba Sutra*,[4] the texts dealing with geometry and mathematical principles. Acharya Charak, crowned as the 'father of Medicine', produced *Charak Samhita* as his most renowned work, in which he has described the functions and medicinal properties of some hundred thousand plants.

Acharya Kanad, a genius in philosophy, was the pioneer expounder of realism, law of causation and the atomic theory. Acharya Sushrut, with his *Sushruta Samhita*, was another giant in the arena of medical science and his is an unparalleled work of the medical science of ancient India, popular as Ayurveda. Siddhārtha Gautama was a spiritual teacher who founded Buddhism. Panini is known for his Sanskrit grammar, and his *Ashtadhyayi* is the foundational text of the earliest known grammars of Sanskrit that stands at the beginning of the history of linguistics. Nagarjun was an extraordinary wizard of science whose research produced maiden discoveries and inventions in the faculties of chemistry and metallurgy.

The Earliest Known Indian Scholars

Name	Field
Acharya Kapil (3000 BC)	Cosmology
Acharya Bharadwaj (800 BC)	Aviation technology
Baudhāyana, (800 BC)	Mathematics
Acharya Charak (600 BC)	Medicine
Acharya Kanad (600 BC)	Physics (Atomic Theory)
Acharya Sushrut (600 BC)	Medicine (Surgery)
Gautama Buddha **(**563 to 483 BC)	Philosophy
Pānini (400BC)	Grammar
Nagarjuna (100 AD)	Chemistry
Âryabhatta I (476–550 AD)	Mathematics & Astronomy
Varahamihir (499-587 AD)	Astrology & Astronomy
Brahamgupta (598-668)	Mathematics & Astronomy
Bhāskara I (600 - 680)	Mathematics & Astronomy
Adi Shankara (788 AD - 820 AD)	Philosophy
Aryabhata II (about 920)	Mathematics & Astronomy
Sridharacharya (AD 991)	Mathematics
Brahmadeva (1060- 1130)	Mathematics & Astronomy
Bhaskaracharya (1114-1183 AD)	Algebra

The Indian scientists, like Aryabhatta-I, Varahmihira, Brahmagupta, Aryabhata-II, Sridhara and Bhaskaracharya, have shaped the course of mathematics and astronomy for the world to marvel upon. Aryabhatta's Magnum Opus, *Āryabhatīyam* (498 B.C.), was the summary of Hindu mathematics up to the time. It was recognized as a masterpiece and through its translation European mathematicians got enriched by the facts that Aryabhatta discovered 1,000 years before Copernicus and Galileo. Adi Shankara was an Indian philosopher who stressed the importance of Vedas, and his efforts helped Hinduism to regain strength and popularity.

Ancient Indian contribution to geography came through various fields of learning as Philosophy, Cosmology, Mathematics, Astrology & Astronomy, Physics, Chemistry & Metallurgy, Science & Technology, Medicine, and Linguistics. In fact, the Indian scholars contributed significantly in the growth and development of geography and its allied sciences. Although, the classical Indian scholars have richly contributed to the various fields of geographical study as physical geography, regional geography, climatology, mathematical and practical geography, their knowledge, particularly in astronomy (*Khagol- Shashtra*), was fascinating.

The philosophy in India developed from the common reservoir of Upanishadic ideas. This philosophic thought is classified into two broad categories viz. Orthodox *(astika)* and heterodox *(nastika)*[6]. Orthodox systems are those which accept the authority of Vedas, while the heterodox systems are those which reject it.[7] The ancient Indian scholars dealt with many problems pertaining to *Cosmology* (the science of Universe), *Cosmogony* (the origin of Universe) and *Cosmography* (the description of Universe). Today scientists rely on powerful telescopes and sophisticated computers to formulate cosmological theories. In former times, people got their information from traditional books of wisdom and the ancient schools of philosophy. Followers of India's ancient culture, for example, learned about the cosmos from scriptures like the *Srimad-Bhagavatam*, or *Bhagavata Purana* and the *Sankhya* School of Thought. The Srimad-Bhagavatam presents an earth-centered conception of the cosmos.

In India, mathematics has its roots in nearly 4000 years old Vedic literature. Various treatises on mathematics were authored by Indian mathematicians in which were set forth a number of mathematical traditions for the first time. Important contributions were made by scholars like Aryabhata, Brahmagupta, and Bhaskara II. Their mathematical concepts were transmitted to the Middle East, China, and Europe and led to further developments that now form the foundations of many areas of mathematics. Vedic literature is replete with concepts of zero; Calculus; arithmetic; geometry (*rekha-ganita)*;the techniques of algebra and algorithm, square root and cube root. The decimal number system in use today was first recorded in Indian mathematics[9] In addition, trigonometry, having evolved in the Hellenistic world and having been introduced into ancient.

India through the translation of Greek works, was further advanced in India[10]. It has been suggested that Indian contributions to mathematics have not been given due acknowledgement in modern history and that many discoveries and inventions by Indian mathematicians were known to their Western counterparts, copied by them, and presented as their own original work; and further, that this mass plagiarism has gone unrecognized due to Eurocentrism[11].

Astronomy is one area which has fascinated all mankind from the beginnings of history. In Indian language the science of Astronomy is called *Khagola-shastra*. The word *Khagola* is derived from the famous astronomical observatory at the University of Nalanda which was called Khagola. The Nalanda University was the center of education for scholars from all over Asia. Many Greek, Persian and Chinese students studied here. The lack of a telescope hindered further advancement of ancient Indian astronomy. Though it should be admitted that even with their crude instruments, the astronomers in ancient India were able to arrive at near perfect measurement of astronomical movements. The ancient scholars like Aryabhatta-I, Bhaskaracharya, Brahamgupta and Varahamihira were associated with Indian astronomy. They developed their views regarding the planetary positions, planetary movements and planetary forces, and also made the related astronomical calculations. What Copernicus and Galileo propounded was suggested by Aryabhatta nearly 1500 years ago.

From the Vedic times, Indians (Indo- Aryans) had classified the material world into four elements viz. Earth (*Prithvi*), fire (*Agni*), air (*Maya*) and water (*Apa*). To these four elements was added a fifth one viz. ether or *Akasha*. These five elements or *Pancha Mahabhootas* were identified with the various human senses of perception; earth with smell, air with feeling, fire with vision, water with taste and ether with sound. Since very ancient times Indians had perceived the material world as comprising these five elements and believed that these elements were physically palpable and hence comprised miniscule particles of matter. The last miniscule particle of matter which could not be subdivided further was termed *Parmanu* (the term being a combination of *Param*, meaning 'beyond' and *anu* meaning 'atom'). Thus the term *Parmanu* is suggestive of the possibility that, at least at an abstract level Indian philosophers in ancient times had conceived the possibility of splitting an atom which, as we know today, is the source of atomic energy. This Indian concept of the atom was developed independently and prior to the development of the idea in the Greco-Roman world. It was Acharya Kanada who first propounded that the *Parmanu* (atom) was an indestrutible particle of matter. Indian ideas about atom and atomic physics could have been transmitted to the west during the contacts created between India and the west by the invasion of Alexander. Even after Alexander's departure, massive trade and diplomatic relations existed between Indians and Greeks (who had settled in Asia). This way, Indian

ideas travelled westwards where they were developed further. Thus, it remains a fact that Indian ideas about atom are the oldest. Parallel to the development of the concepts of atom and atomic permutations and combinations in physics there also was a similar development of ideas in the area of Chemistry & Metallurgy.

8.3.2.Geographical Inheritance

Although geography was not then developed as a formal discipline, early Indian scholars had a well developed geographical sense and clearly understood spatial relationships. The earliest mention of geography as a discipline is traced to *Bhagwat Purana*, the 8th century puranic text when *Bhugol*, or *Bhoogol*, a vernacular term for geography in most Indian languages, is derived from Sanskrit. A large amount of geographical information is contained in the Mahabharata and Ramayana: the two great epics still unsurpassed in the classical Indian literature.

The earth studies of ancient Indian scholars dealt with its origin, sphericity, eclipses, size and dimensions, latitudes, longitudes and local time, directions or cardinal points, earthquakes and volcanoes, atmosphere and seasons, and its physical divisions. As far as the origin of the earth is concerned, many of the facts as put forward by the ancient Indian scholars were more or less accurately known. They believed in the solidification of earth from gaseous matter. The earth's crust, according to them, is made of hard rocks (*sila*), clayey material (*bhumih*) and sandy material (*asma*). The Puranas mention the earth to be apparently floating on the water like a sailing boat on the river. They were also aware of the fact that there is more land surface in the Northern Hemisphere. The concept of *Prithvi* (Earth) was the most basic in the study of geography. It has been profusely used in the Vedas and Puranas. The use of the term *Bhugol* for the discipline of Geography is the most appropriate and it clearly suggests that the ancient Indians endorsed the earth being a sphere, and not a flat disc as believed by some of their parallel civilizations. The facts related to the size and dimension of the earth were quite near to accuracy. It was well known to the ancient Indian scholars that the earth is an oblate spheroid slightly flattened at the poles. about 1000A.D. *Akshansh* and *Deshantar* are the terms used for 'latitudes' and 'longitudes' respectively in the ancient Indian literature. Puranas have a reference of three imaginary lines of latitudes passing through Equatorial belt, North Pole and South Pole. Accordingly, three major regions have been identified in the Literature, viz. Equatorial (*Nirakshadesha*), Northern Polar (*Meru*) and Southern Polar (*Bhadvanala*). The North Pole has been called as *Zenith* and the South Pole as *Nadir*. The South Pole was truly considered as the antipode of the North Pole,

i.e. diametrically opposite to it. However, the world was not believed to exist beyond Equator, as the region here was compared to hell of the earth. The Eastern part, on the other hand, was believed to be 'the land of Gods'. This thinking is in consonance with that of the Europeans in the Early Medieval period, when the Dark Ages prevailed and the East in 'T-in-O' Maps was assumed to be the place of *Adam* and *Eve*. The ancient Indian scholars have also drawn Prime Meridian. These imaginary lines, the position of Sun and various stars have helped them to determine local time at various places.

In Rigveda, there is formulated idea of four main directions, viz. *Purva* (East), *Paschim* (West), *Uttar* (North) and *Dakshin* (South). By adding Zenith (*Meru*) and Nadir (*Bhadvanala*) it was raised to six. But, afterwards, ten directions have been frequently mentioned in the Puranic literature. The designation of these directions in the Puranas is significant in the sense that it bears concept of the Gods dominating in each of these directions. The ten directions and the ruling deity of each is mentioned below (Table 2).

The knowledge regarding the earthquakes, atmosphere, weather, climate and seasons in this period is excellent.

For 'earthquakes' the term *bhukamp* has been used in Puranas. It was assumed that the deities of Air, Fire and Water cause the earthquakes. The ancient Indian scholars have identified the vacuum between the earth and the heaven as *Antariksha*. They were also aware of its vast extent and the occurrence of various weather phenomena here, as rain, winds, clouds, lightening, fog, and frost etc. Bhaskaracharya has conceived the thickness of this Antariksha around the earth to be 12 *yojans* (or 96 kms; one yojan being equal to about 8 kms.). As far as the knowledge about the seasons is concerned, it is based largely on the studies in India. Rigveda mentions five seasons. In Valmiki Ramayan, however, six seasons have been identified, viz. *Basant* (Spring), *Grishma* (Summer*), Prouri t/ Varsha* (Rainy), *Sharad* (Autumn),*Hemant* (Winter) and *Shishir* (severe Winter).

Cardinal Points and the Ruling Daities as per Puranic Literature

Direction	Ruling Deity
Purva (East)	*Indra* (The God of Rain)
Agneyay (Southeast)	*Agni* (The God of Fire)
Dakshina (South)	*Yama*(The God of Death)
Nairitya (Southwest)	*Niriti* (The God of Disaster)
Paschim (West)	*Varuna* (The God of Water)
Vayavya (Northwest)	*Marut/Vayu* (The God of Air)
Uttar (North)	*Kubera* (The God of Wealth)
Isana (Northeast)	*Isa* (The God of Power)
Urdhava (Zenith*)	*Brahma* (The Creator of Universe)
Adhoh (Nadir^)	*Sesanaga* (The Universal Ocean)

In the ancient period, the knowledge about various parts of the world was limited. It was due to the poor means of communication and transportation. Even then, the attempts were made to divide the world into several regions, on the basis of available information. Such descriptions exist in Puranas. Although incorrect, the term *Dwipa* has been used to designate various realms (continents) of the earth. Accordingly, the known world during the Puranic period was divided into seven Dwipas or 'regions'. These Puranic divisions exclude the American Continents, Greenland, England and Antarctica, since they were discovered only during the Age of Discovery in the late medieval period. The regions seem to have derived their names from the existing popular trees or grasses here. These seven regions were known as *Jambu Dwipa, Krauncha Dwipa, Kusha Dwipa, Plaksha Dwipa, Pushkara Dwipa, Shaka Dwipa and Shalmali Dwipa. Jambu dwipa* formed the centre of all these continents. In relation to the present day context, *Jambu* covered present Central Asia from North to South, including India, or the region north of Salt Sea. *Jambu*, in fact, is a bush found in Himalayan region. *Kusha* extended over present Middle East and most of Africa.

The name is taken from a sacred grass, *Kusa*, used in brahmanical ceremonies. The present Eastern Asia and adjoining lands constituted *Pushkara*. The present Mediterranean region formed *Plaksha*. Shalmali represented the region of Eastern Africa and Madagascar Island. This region is rich in *Salmala*, the silk-cotton tree, found on the margins of Equatorial regions of monsoon lands with moderate rainfall. Most of present Europe was *Kraunca*. Lastly, *Shaka* formed South-East Asia and adjoining Island groups. Hot and moist climate and thick evergreen forests characterize the region.

The geographical knowledge of ancient period about Indian Sub-Continent is related to its identification, people & culture and relief & drainage. In Vedic and Puranic literature, the entire country from Himalayas to Kanyakumari has been referred to as *Bharatvarsha*. This name has both geographical and historical significance. Bharata is construed by many historians as having been an Indo-Aryan king, and as king he unified the entire Indian subcontinent with the Dravidian peoples and other indigenous peoples as his subjects. According to the Mahabharata, Bharata's empire covered all of the Indian subcontinent, Afghanistan and Persia. The Republic of India is also known as Bharat after Bharata. Although, this Bharatvarsha, in ancient times was sub- divided into several regions certain parts of the country are very distinctively mentioned in the ancient Indian literature. They are, e.g. *Sapta- Sindhu* (Punjab Plains), *Aryavarta* (the Aryan domain) and the region of Indus valley or the Upper Gangetic Plains. The Vedas, Epics and Puranas make mention of a series of mountains in Bharatvarsha. They are, for instance, Himalayas *(Himavat*), existing like a bow in its northern part and divided into *Antagiri* (Inner Himalayas) and *Bahyagiri* (Outer Himalayas); *Kailash Parbat*, the abode of *Apsaras* (nymphs) and *Devas* (Deities) and rich in diamonds, minerals and other precious stones; *Vindhayans*, the extensive mountains with hundreds of peaks, variegated trees and creepers; *Mahendra Mali*, the Eastern Ghats; Sahyadri, the Western Ghats; *Rika*, the mountain range from Ken to Ton rivers north of Vindhayans; and *Suktiman*, the mountains of Khandera, Ajanta and Golkunda. The descriptions are also available for a number of Himalayan and other Inland rivers. Rigveda has mentioned various rivers originating from Himalayas, viz.

Ganga, Yamuna, Brahamputra, Saraswati, Satudri (Sutlej), Asikni (Chenab), Vitasta (Jhelum), Arjikeya (upper part of Indus), Susoma (Savan), Sindhu (Indus), Kubha (Kabul), Gomati (Gomala), Krumu (Kurrum), etc. Among the inland river the important ones that get a mention are Narmada, Tapti (Tapi), Godavari, Krishna, Cauvery and Tungbhadra. However, the most elaborate descriptions exist about Ganga and Brahamputra. The religious flavour is very strong in these descriptions, as the rivers have been considered sacred, to be worshipped as Goddesses in Hindu mythology.

8.3.3. The Middle Ages

During the middle Ages the geographical area known to Indians extended into Southeast Asia. Hindu emigrants brought civilisation to Burma, Combodia, and Champa, and in the East Indies set up the powerful sea- states of Sri Vijaya and Majapahit. India marked the effective limits of mercantile enterprise from China in the east to Greek- Roman world in the west. During this period the Indians efficiently applied the knowledge of geography to trade, commerce and colonisation. India came into contact with the Arabs in 712 AD when they came into Sind, but it was not until 1206 that Moslem rule started in Delhi and the geographic thought of the Arabs made an impact on the Indian society. In 1030 the Arab geographer Al- Biruni wrote the geography of India. The Arab geographical work was based on the development of the methods for making observations and using these for inventory of soil, products, and economic aspects of the area. From the 9th to the 15th century important new data were collected through direct observation by Arab and Indian geographers. After the 15th century geographical information and ideas began to emanate from Europe. These ideas were brought by the British colonialists to India. The Medieval period contributions to Indian geography came largely through the works of the Arab scholars like Al-Beruni, Ibn-Batuta and Abul Fazl. The contribution came through '*Kitab 'l Hind*' of Al-Biruni;'s *Travels in India & China* during 1325-54, a travelogue of Ibn- Batuta; and '*Ain-i-Akbari*' the third volume of *Akbarnama, of* Abulfazl-i-Allavi.

8.3.4. The Colonial period

Geography, like all other social sciences, was historically and socially conditioned during the colonial period (i.e. until 1947). In the colonial milieu, geography developed to meet primarily the needs of the administrators in the process of expansion and consolidation of the colonial empire. One of the major goals of geographic research carried on in India under the protective umbrella of colonial authorities was to provide descriptive accounts. of the land, people and products of different parts of the Indian subcontinent to colonial administrators. Maps and gazetteers were produced to acquaint the colonial civil service with basic geographic information. Geography was introduced into Indian universities during the 1920s. During this decade a number of Indian geographers pioneered in establishing geography as an academic discipline and took the initiative to organise geographical societies to promote research and publication. India's great luminaries during this period were N. Subramanyam (Chennai), R.N. Dubey (Allahabad), K.S. Ahmad (Lahore), Tahir Rizvi (Aligarh) and S.C. Chatterjee (Patna). During this phase two leading geographical societies were established – the Indian Geographical Society at Madras (1926) and the Geographical Society of India at Calcutta (1932).

The arrival of the Europeans on Indian scene marked a novel and vigorous approach to the geography of this land. Europeans were strangers of this land and after the initial skirmishes with the regional rulers they were able to establish their foothold in India. As the prospects of territorial expansion appeared in sight, the most successful of the European powers, the British, struggled to know and learn more about India, its territory, regions, places, physical features and its resources on the one hand and its people, and their social and economic life, on the other. From the mid-19th century the British represented by the East India Company were on the prowl. To promote their knowledge of the territories and the resources they set up a number of Surveys like the Survey of India followed by Geological, Zoological, Botanical, Linguistic, Archaeological and Anthropological Surveys. All these surveys worked to document meticulously the territories and the resources of the land. The survey work proceeded rapidly and by the end of the first quarter of the 19th century, the British had a fairly good

notion of the Indian territories and by 1881, the first map of India, on a scale of "1 Inch to 32 Miles" was produced. The establishment of the Great Meridian Arc of India, passing from near Cape Comorin to Banog, near Mussorie, in1881 and the completion of the survey of the entire sub- continent in due course was certainly a great achievement for the Survey of India, which simultaneously became a rich and reliable source of geographical information. Further, the gazetteers, the reports of the Geological, Archaeological as well as Anthropological survey of India, the Census data and reports, and statistical reports produced periodically and the climatic data from the Indian meteorological department of Government of India have been the reliable source of geographical information.

A comparative study of the concept, sources and methodology of geographical studies in the pre-colonial and colonial period shows that the aspect common to the points of view of both the periods is the centrality of space, place or region as a theme. The description of the earth has been the sheer anchor of both the periods. The Colonial geography had, to its advantage, far more authentic information of places and people-based as this information was and accurate surveying, based on extensive fieldwork and reports. Secondly, the concept and content of geography also changed from one of mere accumulation of facts and their description, to one of systematic description and interpretation¸ a scheme in which the character of place and pattern of distribution of specific elements in the landscape demanded explanation. Initially in the colonial period, the emphasis in Indian geographical study was on the collection and presentation of information to illuminate the various regions of the country, and to a much lesser extent, the continuing geographical analysis of classical Indian literature. The regional cataloguing of information was later encouraged by British colonial administrators' perceived need for detailed information on areas within their responsibility.

The magnificent collection of Indian district and other gazetteers was an outgrowth of such efforts. These reference books are as useful today as they were over a century ago when they first appeared. Nevertheless, these works remain primarily encyclopaedic in nature, with virtually no methodological or conceptual basis. Similarly, the Indian Census reports have made an excellent contribution to the advancement of Indian geographical knowledge and study.

Profile of Progress

Although the roots of Indian academic geography lie deep in antiquity, the discipline is now achieving maturity. Its development may be viewed as contained within a series of sequential phases[12], sketched as: (1) The Formative Stage: Pre-1950s; (2)The Informative Stage: The 1950s; (3)The Confirmative Stage: The 1960s; and (4)The Reformative Stage: Since 1971.

8.3.5. Contemporary Trends & Fields of Study

In the post-independence period, geography has expanded rather fast in the university education system. This is because of the efforts of and under the leadership of the geographers like George Kurian, S.P. Chatterjee, C.D. Deshpande, V.L.S. Prakasha Rao, R.L. Singh, Mohammad Shafi, Muzaffar Ali, R.P. Misra and Manzoor Alam. These geographers have been academically active in the decades of 1950s to 1980s. As a consequence, geography got promoted as a popular discipline, particularly in the universities of Delhi, Chennai, Kolkata, Varanasi, Aligarh, Chandigarh, Patna, Mysore, Hyderabad and Saugor. Three major institutions outside the subject but founded and led by geographers have boosted the reputation of geographers and geography in India.

These are:

(i) National Atlas & Thematic Mapping Organisation, (NATMO, 1957, Prof. S.P. Chatterjee);

(ii) (Centre for the Study of Regional Development, JNU (1970s, Prof. Moonis Raja); and

(iii) The Institute of Development Studies, University of Mysore (R.P. Misra).Evidently, a number of subfields have proliferated in the discipline by now and presently the major preoccupations of the Indian geographers are Human Geography; Economic Geography; Physical Geography;Environmental Geography; Regional Geography, regional planning and development; Cartography & Thematic Mapping; and Historical geography & Geographical Thought. The studies, particularly in environmental geography, population, settlement systems, habitat ecology and applied geography have made a remarkable progress both quantitatively and qualitatively.

Regional Geography, Regional Planning and Development

R.P. Misra, V.L.S. Prakasa Rao, L.S. Bhatt and K.V. Sundaram have made important contributions to the field. R.L. Singh's 'India: A Regional Geography" is the *magnum opus* of the Indian regional geography. Although, there remains a dearth of meso and micro regional studies in India, there has been witnessed a growing emphasis the studies on regional development and planning. Two valuable volumes have been edited by R.P. Misra,[29] and the strategy for regional and national planning worked out in these compendia deserves serious consideration. On the methodological plane the linkage of central place theory with that of growth pole is meaningful. L.S. Bhatt[30] has recognised three levels of planning in the national context, viz. the nation/macro-level, the regional/ meso-level, and the local/ micro-level. The other works in this direction have dilated upon the economic development and rates of economic growth; need for balanced regional development; problems pertaining to regional imbalances; identification of underdeveloped districts; provision of analytical framework and indicators of regional development; delineation of planning areas; and eco-development.

8.3.6. Cartography and Thematic Mapping

Over the years the field of cartography and thematic mapping has made great strides in the country. The main players are certainly the Survey of India, the NATMO and the Indian National Cartographic Association. *Indian Cartographer*. *Planning Atlas of Andhra Pradesh* (1976, S.M. Alam); *Resource Atlas of Tamil Nadu* (1983, A. Ramesh); *Planning Atlas of Uttar Pradesh* (1987, L.R. Singh); and *Census Atlas of India* (1981,B.K. Roy) are the hallmarks of geographic contributions to cartography by Indian geographers. However, the modern cartography in India exhibits the signs of integration of remote sensing and GIS as a support to mapping, decision making, planning and monitoring.There is evidence to show that in ancient Puranic literature (500 B.C.–A.D. 700), the concept of map scale and the consequent need for generalisation of geographical features on maps were fully realised. Ancient and medieval Indian works on town planning, architecture, military science, engineering and political economy indicate that the art of surveying and mensuration was fairly well developed as an aid to define the territorial limits of towns and villages, for laying out plans of civil works, and for carrying out military campaigns. The art of surveying as recorded in the manuals known as the *Sulbasutras* (science of mensuration) was fairly developed.[31] But, Cartographic productions in the real sense of the term began with the map of India brought out by the Greek geographer, Eratosthenes (3rd century B.C.), who for the first time prepared a map portraying India. Later, Ptolemy (2nd century A.D.) depicted India on a map of the habitable world as it was known at that time. Ptolemy's map which was repeatedly reproduced later served as the only source of cartographic information on the country up to the end of the 15th century A.D. From 16th century onwards, the Flemish, Italian, Portuguese and Dutch cartographers (as Bertoli, Gastaldi, Gerard Mercator,etc.) made considerable improvements in the art of making maps of the Indian sub- continent. Seventeenth century onwards, English cartographers started contributing to mapping efforts in India. The second half of the 18th century was marked by considerable improvement in production of good maps of India by European cartographers. Late 18th century onwards, a number of military cartographers and revenue surveyors contributed vastly to the initial development of Indian cartography,

James Rennel, the first Surveyor General of Bengal (1767-1777), being the foremost of all of them. Rennel's maps and atlases were the only reliable cartographic source till well beyond the middle of the 19th century when the regular sheets of the Survey of India based on more modern instrumental observations started coming out. By the end of the 19th century, as a result of one hundred years of continued triangulation work, precision levelling and plane table surveys covering a very large part of the country, sufficient cartographic information was now available enabling the Survey of India to produce modern contour maps on uniform scales having standard sheet lines and with correct values of latitudes and longitudes. Thus, in the course of continued survey and mapping effort for another four decades or so, India turned out to be one of the best mapped countries of the world on the eve of Independence in1947. India is now covered by some 5000 topographical sheets at different scales, one inch to a mile or its metric equivalent (1:50,000) and smaller scales. Besides, over the years the Land Record and Revenue Survey Departments of different states have brought out some 3000 and odd standard maps of administrative divisions based on rigorous cadastral surveys.

Thematic cartography in this country got a spurt since Independence in 1947, especially after setting up in 1956 of the National Atlas and Thematic Mapping Organisation (NATMO). Thematic maps are now playing important roles in development planning in India and are being increasingly utilised by administrators, planners, technologists and specialists in different branches of social, physical, biological and earth sciences. While NATMO has been specifically set up for the preparation of general thematic maps, several other agencies also prepare special purpose and scientific maps in India. These include such organisations as the Survey of India, the Map Office of the Registrar General, National Remote Sensing Agency, Central Arid Zone Research Institute, Indian Meteorological Department, Geological Survey of India, Naval Hydrographic Office, Town and Country Planning Organisation and Departments of geography in different Indian Universities. The census data, especially relating to the period from 1951 onwards, have proved to be of great asset to

the Indian thematic cartographers for mapping the economic, social and demographic characteristics of the country. Further, as a consequence of introduction of quantitative methods, computer processing of data, automatic mapping and remote sensing techniques, rapid transformation is taking place in the field of cartography.

Historical Geography & Geographical Thought

The most significant contribution to historical geography is certainly Schwarzberg's *Atlas of South Asia*[32] which portrays evaluation of Indian culture, society, economy and polity from the Stone Age to modern period. Other such research works have delved into the study of early man and his culture in Palaeolithic India; perceptive analysis of the ecological background of the Chalcolithic culture in India; India's colonial dependent economy and regional inequalities; analysis of the origins of place names and settlements; reconstruction of Bharatvarsha and its physiography; and the evolution of administrative areas. As far as the Geographical Thought in the country is concerned, the related contributions have been outlined in ICSSR's *A Survey of Research in Geography*. S.P. Chatterjee's *A Decade of Science in India: Progress of Geography (1963- 1972), Recent Trends in Indian Geography* by L.S. Bhatt[33] and P.P. Karan's work[34] supplement the efforts in this direction.

8.3.7. Paradigmatic Shifts

From the very beginning, modern geography as a field of scientific learning has occupied an anomalous status between natural and physical sciences- focussed on particular types of natural processes or circle of facts on the one hand, and the social sciences – focussed on particular types of societal functions and phenomena on the other.[35] Thus, as a discipline focused on the study of man's relationships with nature in particular segments of the earth surface, geography represented a cross-breed discipline that belonged neither to one nor to other. The result was that geography remained completely isolated from the mainstream intellectual discourse both in natural and social sciences, since the intellectual climate of the 18th and 19th century Europe was dominated by a fragmented perspective on a natural vis-à-vis social reality. The German philosopher Immanuel Kant (1724-1804) had fully appreciated this epistemological difficulty regarding the status of geography in the classification of the fields of knowledge – so that he presented a two-fold grouping of the ways of acquiring knowledge – one logical and the other physical. The former grouped the individual items into separate classes on the basis of morphological similarities in the processes of their origins. Such a scheme of classification ignored consideration of place and time of occurrence of the concerned phenomena or processes. This aspect was taken care of in Kant's Physical classification, which grouped phenomena that belonged to the same place and / or to the same time. Grouping of phenomena in terms of time is history (or historical science, of which geology is the other example); and that in terms of space is geography (spatial science, of which astronomy is the other example). Thus, while history is narrative, geography is descriptive in approach. The two together fill up the entire circumference of human experience. By virtue of their conceptual structure, both geography and history focus on the study of phenomena of diverse origins existing together: in terms of periods (time) in the case of history, and in terms of spatial segments (regions) in the case of geography.

In everyday experience time and space are inseparable. The one cannot be imagined without the other. However, in their over enthusiasm to emulate the 19th century model of science as pre-eminently an analytical mode of thought, geographers began to view time and space (history and geography) as mutually unrelated and independent of each other. The proponents of both areal differentiation and post-Schaefer spatial science schools of thought had insisted on separation of time from space, so that spatial context was treated independent of, and unrelated to, the temporal context. Insofar as isolation from the social sciences and history was concerned, the most important reason was that, from around 1880 to the end of the First World War, a series of sweeping changes in technology and culture had given rise to distinctive modes of thinking about, and experiencing, time and space. Another important factor in the disciplinary isolation of geography during this period was that in the closing decades of the 19th century and the early years of the 20th century, under the influence of the social Darwinist thought, as reflected in the works of Ratzel (1844-1904) and others, geography had become so closely identified with environmental determinism that with the rejection of environmentalism and physical- external explanations of social processes and formation of human consciousness, human geography was thrown out of the bathwater of environmental determinism.

By the mid-1950s geography had changed focus from area (areal differentiation and areal organisation) of space (the study of distance-based relationships- social, economic and political). This implied change over from absolute space to relative space – thus paving the way for the change-over from description to analysis, and from the study of places as unrepeatable entities to the study of areal/ spatial phenomena as particular cases in the manner of the systematic sciences, so that the mathematical mode of reasoning began to be insisted upon. This was the beginning of the quantitative revolution. The pace of progress was so rapid that the revolution was over by early 1960s.[36] The frequency with which new ideas came into currency was so rapid thereafter that within the span of a decade we had three different 'revolutions' (behavioural, humanistic, radical-Marxist) following one another in quick succession.

Whereas, the humanistic perspective had focussed on the role of human agency, the radical-marxists concentrated on the role of structural relationships in the explanation of man-environment system. Thus, to begin with, the two perspectives were treated as alternative ways of looking at man's relationship with the environment. The convergence between the spatial and the historical materialist perspectives marked the change of focus in the study of geography from the earlier emphasis on *relative space* to *rational space*, so that by the end of the 1980s human geography had become increasingly focussed on *the study of the spatiality of human life* in all its manifestations– social, economic and political – thereby raising the status of human geography as a core social science discipline: one sharing active research frontiers with every other social science discipline – whatever its subject of study – since every aspect of human organisation, inevitably, is spatially rooted.

The rapprochement between spatial and the historical materialist perspective through the initiative of Marxism in the late 1960s and the 1970s (reflected in the Marxist geography of the decade) eventually led to the rise of new critical human geography around 1980. Since then, a considerable convergence between spatial and sociological perspectives has taken place.[37] With the adoption of structuration as a spatio-social process, the barrier that had supposedly separated the spatial perspective from the social, economic, and political spheres of man's life upon the earth surface, could no longer be sustained. This heralded the end to the almost three-quarters of a century old academic isolation of geography from the rest of social science. Today it is a universally accepted premise in social science that every aspect of human organisation– social, economic, and political- is spatially constituted. This change over in perspective was essentially a reflection of the changed societal perspectives in the face of globalising and post-modernist context of the late 1970s and 1980s. Thus, alongside the fall of conceptual barrier between space, society and history, the 1980s also witnessed rapprochement between the humanist and the historical materialist perspectives, so that by the end of 1980s it had come to be widely believed that the study of human geography raises theoretical questions as to the nature and relationship between the individual and society, and that human agency and

social structure are equally integral to social and spatial understanding. With such a changed perspective on place and space, geography has now been transformed into an all-inclusive and open-ended field of enquiry focused on the inherent spatiality of human life in the total context of the man- environment system, thus making it simultaneously both an environmental and a social science discipline, in the true sense of the two terms. In such geography there is no dichotomy between the physical and social aspects of the discipline, between moral and material, and between time and space – so that questions of do's and don'ts have become meaningless. Thus, as part of the social science fraternity, geographers are concerned to discover not only the world in which we are living, but also to discover, as geographers, how we inhabit, reproduce and change that world.

8.3.8. Future Directions

Clearly, Indian geography is today at an important turning point. The foundation laid down after independence by geographers who are now in retirement is being challenged by newly developed or introduced methodologies or research techniques, such as remote sensing, quantitative analysis and GIS. At the same time, the Indian geographers are just now beginning to look beyond their own regional boundaries, indeed even to the rest of the world for research subjects.

The four stages of its growth sketched above reveal that geography has moved away from the initial 'gazetteer map' to a more descriptive / analytical framework which is still in its making and there are many gaps to be filled in. The need of the hour is to develop a methodological system of Indian geography which has its distinctive traits as an intellectual and scientific discipline that can provide a meaningful synthesis of our cultural heritage and physio-technological progress, our habits and habitats, as well as our opportunities and challenges and that can be more substantive, productive and satisfying. Modern Indian Geography, if it has to reach the status of science, must start studying our problems of life and living. Unless we identify the geographical perspectives of these problems and seek an explanation, there can be no Indian geography.

Geography: Focus of Inquiry

In 1950s, As it was	In 2000, As it is
Areal Differentiation	Areal Integration
Balanced Regional Development	Sustainability
City	City Systems
Climatic Types	Climate Change
Dividing Land	Sharing Water
External Threat	Internal Security
Food Productivity	Food Security
Industrial Estates	Industrial Parks
Nation State	Globalisation & Localisation
Political boundaries	Political Landscapes
Population Explosion	Population Displosion
Rule of Majority	Role of Minorities
Self-Sufficiency	Interdependence

PAPER-III

June- 15

1. Which Indian geographer has written the book ‘Geography of Purans’?

(1) S. M. Ali (2) P. P. Karan

(3) M. Shafi (4) B. Dubey

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	29	A	8.3

SUB UNIT-4

Major Geographic Traditions

8.4 RE-ESTABLISHMEANT OF GEOGRAPHY AS AN INTEGRATED SCIENCE: THE STUDY OF MAN-LAND RELATIONSHIPS

Friedrich Ratzel (1844-1904)

Described as the greatest single contributor to the development of geography of man, Friedrich Ratzel was born in a middle class German family in 1844. He pursued advanced study in zoology, first at Heidelberg and then at Jena. Ratzel's youth passed through a period of great intellectual upheaval in the world of science in the wake of the publication of Darwin's concept about the origins of species. Ratzel had written a dissertation on Darwin's theory in 1869. He was, however, more interested in field studies of plants and animals than in the laboratory. He took employment as an assistant to a French naturalist on his trip to countries around the Mediterranean, but as war broke out between France and Prussia in 1870, Retzel quit the job to join the Prussian army. After the war, he went to Munich to register as a student. There he came in touch with the famous naturalist and ethnographer Moritz Wagner and was introduced to his theory about the importance of migration in the evolution of species.

Ratzel was greatly excited by travel. As part of this interest, he was drawn to studying how the people of German extraction lived and made use of resources in different parts of the world. His project for such a work was accepted by the editor of *Kolinsche Zeitung*, and he was employed as a roving reporter. This enabled him to travel to several countries in Eastern Europe inhabited by sizeable numbers of German minorities. He visited Italy in 1872, and U.S.A. and Mexico during 1874-1875. His visit to the New World has been described as the turning point in his career. From his study of various minority groups – European, American, and Chinese – he devoted himself to developing general concepts regarding geographical patterns resulting from contacts between aggressively expanding communities and the retreating indigenous populations, It was this research experience in regional study that aroused his interest in the study of human geography.

Ratzel's extensive travels in the New World resulted in several publications. One on Chinese migration had appeared in 1876; two volumes on the United States were published in 1878 and 1880 dealing with the country's physical and cultural geography with special emphasis on its economic scene. These books brought to their author considerable popularity and honour as a scholar. After his return from the New World in 1875, Ratzel resigned his job as a journalist and took up assignment as a tutor (*privat dozent*) in geography in 1880. Ratzel left Munich in 1886 to join the University of Leipzig as professor of geography. He stayed there until his death in 1904.

After completing the publication of the result of his travels to the United States, Ratzel turned his attention to methodological issues. The first fruit of his labour came in the form of the first volume of *Anthropogeographie* in 1882. The appearance of this book marked a major event in the history of geography, in that it had a far-reaching effect on the nature and methodology of geography which at that time was faced with serious crisis of identity with regard to its content and practice. According to Hartshorne (1939, p. 90) the term *anthropogeographie* was in itself misleading in that it suggested the connotation of geography of man in terms of individuals and races (that is, anthropological geography) whereas the major thrust of Ratzel's book concerned the works of man, particularly the products of man's social life relationship to the earth. (This was apparently a reflection of the influence of the ethnographer Moritz Wagner whom he had met in Munich.) With his sound background in the life sciences, Ratzel saw in geography the sought-for opportunity for establishing a connection between natural science and the study of man.

Ratzel set out to lay a scientific foundation for the study of man in geography. In his *Anthropogeographie* he demonstrated that the geography of man and his work could be put to systematic analysis in the same way as the elements of the non-human (i.e., physical) world. Ratzel was, therefore, in the true sense of the term, the father of modern human geography as a field of scientific enquiry.

The second volume of Ratzel's *Anthropogeographie* was published in 1891. The two volumes had represented two quite different approaches to the study of the human element in geography. The first volume was organized in terms of physical features of the earth, which were studied in terms of their influence on human culture. The central focus of this volume was to analyze how far and in what manner man's life upon the earth is shaped by the physical forces of nature. This was the common procedure adopted by geographers at that time, though some of Ratzel's contemporaries (most notably Kirchhoff, 1833-1907) had started studying human geography by the reverse method; that is, by analysing human activities and human cultures in relation to the physical environment which, in methodological terms, implied proceeding study of human geography by starting with man rather than the natural environment. The second volume of Ratzel's *Anthropogeographie* was written from this reverse perspective. Strangely, however, in the English-speaking world, it was Ratzel's first volume rather than the second that became the dominant input in human geographical methodology so that, despite his second volume of *Anthropogeographie*, Ratzel came to be identified by later generations of geographers with the concept of human geography as the study of man's life upon the earth in terms of the influences of the physical environment. This was the source of the long and erroneously held belief that Ratzel had advocated a deterministic view of human geography.

The first volume of *Anthropogeographie* had carried the rather revealing subtitle "An introduction to the application of geography to history". Thus, the book was designed to seek the causes of human phenomena in the natural environment. Clearly enough, Ratzel's approach was influenced by the theory that the physical environments played an active role in the basic ideas of the Darwinian theory of evolution. This idea had great attraction for geographers in view of the discipline's long-standing concern with the study of the interconnection between man and his environment. Under the impact of revived perspective of evolutionary biology, man had begun to be viewed somewhat like organism that could be studied in the way that biologists studied the organisms in nature in relation to their physical environment.

This was the beginning of the social Darwinist concept in human geography. The idea that the Darwinian theory could analogy be used as a methodological device in the study of human societies had been earlier suggested by the English philosopher Herbert Spencer (1820-1903), who draw attention to the close resemblance of human societies to natural organisms, and speculated that some of the principles of evolutionary biology could be fruitfully applied to the study of man. This basic idea was the central theme in Ratzel's *Politische Geographie* (1897) wherein he described the "state" as an organism attached to the land, which like other organisms in nature passes through a developmental cycle: Like natural organisms, the states also must grow or die since cannot stand still. Like other natural organisms, states were conceptualized to be involved in an ongoing struggle for survival. This struggle was manifested in the states' exertions to acquire larger and larger territories as living spaces to support their growing populations. This was the central idea behind Ratzel's concept of *Lebensraum* (living space) that had become so popular in Germany during the interwar years. The concept implied the right of the more powerful states to expand their territories at the expense of their weaker neighbours.

The second volume of Ratzel's *Anthropogeographie* (1891) had carried the subtitle "The Geographical Distribution of Mankind", indicating the reversal of approach to the study of human geography from the one adopted in the first volume of *Anthropogeographie* published nine years earlier. Now the focus had shifted from the physical environment to human groups. In attempting to explain geographical distribution of cultural phenomena, Ratzel now paid greater attention to the role of migrations in the diffusion of cultural traits. He believed that every migration had an area of origin, and a specific cause and that each followed a particular route to its given destination. The migrant societies carried their memories, traditions, and skills with them so that pattern of life adopted in the new area of inhabitance resulted from two sets of forces – one from the local geographical environment, and the other from their remembered culture and technology which motivated them to use the environment in their own special way. Thus, for a full geographical explanation of cultural features it was necessary that the geographer should take both environmental and historical factors into account.

8.4.1 Areal Differentiation and its Critique

Peet and Thrift view the 30 years period between 1920s and 1950s as the period of conventional geography's retreat from its position as the "science of the origins of human nature" in the face of mounting criticism of environmental determinism both from within and outside the discipline. The possibilist perspective in geography that had followed was so vague a formulation on environmental causation that it virtually precluded systematic theoretical generalizations. Thus, environmental geography was replaced by geography as the study of areal differentiation focused on the description of particular places and areas as unique entities. Dissatisfaction with this turn of the discipline had started surfacing in the 1940s but the criticism was muted in view of the rampant anti-communism of the postwar period. Thus Schaefer's critique of Hartshornean-Hettnerian geography was only a mild methodological criticism of the chorological position against theory and generalization in geography by underlining that geography explains particular phenomena as instances of general laws.

Developments in Geography Since World War II

From Areal to Spatial Analysis

8.4.2 THE SCHAEFER-HARTSHORNE DEBATE: FROM REGIONAL EXCEPTIONALISM TO GENERALIZATION AND THEORY

This pent up feeling of disappointment with the state of affairs in 'contemporary geography had found voice in a forceful paper by Schaefer (1953), an economist turned geographer, then teaching at the University of Iowa. This posthumously published paper (Schaefer had passed away while the paper was still in the press) was aptly entitled "Exceptionalism in Geography". It became a rallying point for the large crop of young geographers who were feeling greatly dissatisfied with the "sterile" regional paradigm of geography as chorology. Schaefer criticized the "exceptionalist" claims made for regional geography, and put forward a strong case for geography to adopt the philosophy and methodology of scientific positivism.

Debunking the contention that geography could not adopt a systematic perspective owing to the restriction imposed by the uniqueness of places and regions, Schaefer wrote that most sciences, including physics and economics deal with unique phenomena and geography could claim no special status on that account. All sciences study unique events which they seek to explain in terms of general laws. This should equally apply to geography. He made a strong case for geographers to focus attention on the formulation of laws governing spatial distribution of phenomena on the earth surface since it is *spatial arrangement of phenomena, and not the phenomena themselves* that are the special concern of geography as a science.

He defined *geography as the science of spatial arrangements*, and underlined the essential difference between the nature of laws developed in geography vis-a-vis the laws of the other social sciences. *Geographical laws are pattern laws, as contrasted to the process laws of the other social science disciplines.* Schaefer advocated the need for effective channels of academic communication with other social science disciplines, and to interact with them more freely than had been the case in the past. He firmly believed that *a full understanding of the assemblage of phenomena in particular places described by the geographer cannot come without due understanding of the process laws governing their functions.* Thus, like Ackerman, Schaefer too was a strong advocate of interdisciplinary teamwork.

Since Schaefer's paper had posed a challenge to the concept of geography projected and popularized by Hartshorne's *Nature of Geography* (1939), it was natural that Hartshorne should offer a rebuttal in the form of a well-argued response. The first reaction from him came in the form of a letter to the editor of the *Annals,* A.A.G. (1954), in which the original paper of Schaefer had been published. This was followed by two full-length papers in the same journal in 1955 and 1958, and finally by his monograph entitled *Perspective on the Nature of Geography* (1959). Hartshorne used this monograph to present a wide-ranging review on the nature of the subject, including discussions on, and clarifications about, many points of criticism regarding the concept of geography as areal differentiation. The book was intended as a supplement to his *Nature of Geography.*

In his new monograph, Hartshorne stuck to the essentially chorological concept of geography propounded in his earlier book, and reasserted that "Geography is a discipline that seeks to describe and interpret the variable character of the earth's surface as the world of man" (p. 47); and underlined that although time was important in the study of geography, the discipline's "primary concern" was to describe "the variable character of areas as formed by existing features in interrelationships"; that is, functional relationships between phenomena of diverse origins existing together in particular places at the present time. Accordingly, in Hartshorne's view, historical geography as the branch of geography as a professional field could focus only on the study of the *historical present*, also called "past geographies". There was, nevertheless, a perceptible shift in Hartshorne's earlier position regarding the centrality of regional synthesis in geographical work. In this chapter entitled "Is Geography Divided between Systematic and Regional Geography?", he wrote that geography cannot be divided between systematic studies which analyze individual elements over the whole world, and those which analyse complete complexes of elements by areas, since:

The former are logically a part of the appropriate systematic sciences, the latter simply cannot be carried out. All studies in geography analyze the areal variations and connections of phenomena in integration. There is no dichotomy or dualism, but rather a gradual range along a continuum from those which analyze the most elementary complexes in areal variation over the world to those which analyze the most complex integrations in areal variation in small areas. The former we may appropriately call "topical" studies, the latter "regional" studies, provided we remember that every truly geographic study involves the use of both the topical and the regional approach (pp. 121-122).

In another chapter entitled "Does Geography Seek to Formulate Scientific Laws or to Describe Individual Cases?", Hartshorne emphasized that the primary objective of science is to extend the frontier of knowledge and to understand reality. "One of the most important methods of accomplishing this purpose ... is the construction and application of scientific laws. But to assert, as some do, that the formulation of scientific laws is the end-purpose of science is to confuse the means with the end" (p. 168). The focus on the essential task of geography as

the study of complex integrations in unique places, meant (in Hartshorne's view) that the geography, by virtue of the nature of its subject matter, must remain restricted to description and explanation of individual cases, i.e., particular areal complexes. In this context, Hartshorne (1959, pp. 169-170) highlighted his view regarding the essential nature of geography as a science in the following words:

Geography seeks (1) on the basis of empirical observation as independent as possible of the person of the observer, to describe phenomena with the maximum degree of accuracy and certainty; (2) on this basis, to classify phenomena, as far as reality permits, in terms of generic concepts or universals; (3) through rational consideration of the facts thus secured and classified, and by logical process of analysis and synthesis, including the construction and use wherever possible of general principles or laws of generic relationships, to attain the maximum comprehension of the specific relationships of phenomena; and (4) to arrange these findings in orderly systems so that what is known leads directly to the margin of the unknown.

Hartshorne emphasized that geography is a field the subject matter of which includes the greatest complexity of phenomena, and at the same time it is concerned, more than most other disciplines, with the studies of individual and unique cases. "For both these reasons geography is less able than many other fields to develop and use scientific laws, but nonetheless, like every other field, it is concerned to develop them as much as possible" (Hartshorne, 1959, p.170).

Difference between Schaefer and Hartshorne More Apparent than Real

Thus, the essential difference in the positions taken by Hartshorne and Schaefer was that: "Hartshorne's was a positive view of geography: Geography is what geographers have made it. Schaefer's view on the other hand, was a normative one, what geography should be, irrespective of what it had been" (Johnston, 1983, p. 57). The fact, however, was that since Hartshorne's position was fast losing ground, geographers in increasing numbers had, by the end of 1950s, veered round to Schaefer's view of geography as a spatial science. For this, they used methods of the other systematic sciences and were increasingly concerned with quantification and development of theory, so that by the time Hartshorne's *Perspective* had appeared in 1959, the "quantitative revolution" and reached its zenith (Burton, 1963).

As many scholars have noted, the contrast in the postures adopted by Schaefer and Hartshorne was more apparent than real. In his 1955 paper Hartshorne had, indeed spoken of an "essential agreement" between himself and Schaefer. As Gregory (1978) wrote, "It is certainly hard to see how Hartshorne's simple correlations differ from Schaefer's morphological laws, given that they can both be reduced to spatial patterns". The two differed only in respect to the status that each ascribed to the study of these patterns in geography as a field of scholarly study. While Schaefer regarded identification of laws about patterns of spatial relationships as the *raison d'etre* of geography, Hartshorne (1939, pp. 551 and 644) maintained that although identification of "concepts, relationships and principles that shall...apply to all parts of the world" was important, it could not be taken as the primary goal of geographic study. Such an emphasis, in Hartshorne's view, divested specific regions "of the fullness of their color and life" which according to him was the ultimate object of geographical inquiry. In a nutshell, "in principle, their disagreement was about ends and not means" (Gregory, 1978, p. 32).

Hartshorne was not opposed to the scientific method of the positivists, except in that the thought that owing to the uniqueness of areal integrations studied in geography, the method of positivist science was, in general, not applicable in geography. Schaefer, on the contrary maintained that uniqueness was a general problem of science in that every object was in detail unique but at the same time it shared some characteristics with other objects of the same kind. The problem of uniqueness, according to him, was, therefore, no ground for geography to adopt an "exceptionalist" stance. As Guelke wrote:

In extending the idea of uniqueness to everything, Schaefer effectively removed a major logical objection to the possibility of a law-seeking geography and demonstrated that Hartshorne's view of uniqueness as a special problem was untenable for anyone who accepted the scientific model of explanation (Guelke, 1977b, also see Guelke, 1977a).

The net outcome of the Schaefer-Hartshorne debate was that geography, by the end of the 1950s at least in the United States had come increasingly to be viewed as a science requiring the use of the "scientific method" so that like other sciences, it could also develop laws and theories relevant to its field of study. This brought about a distinct shift in emphasis from regional to systematic studies, which meant that geography thereafter began increasingly to be viewed as a field of study that required urgently to adopt a nomothetic perspective, that is geography required to develop the habit of seeking the general in the particular. This also involved a shift from *areal* to *spatial* studies; from *absolute* to *relative* locations; and from *areal integrations* to *spatial interaction*, circulation and movement (which generated to spatial patterns that geography as a spatial science sought to explain with a view to identifying morphological laws underlying them). Geography began now on to be increasingly viewed as a "discipline in distance" (Watson, 1955), so that the network of communication lines, and the flow of goods, people, and messages passing through them began to receive increasing attention. As the discipline dealing in distance, geography became increasingly a study of "spatial interaction" (Ullman, 1980), since it is these interactions that created the spatial patterns that the new geography as spatial science sought to explain.

Thus, the new orientation in geography toward search for theory and morphological laws became increasingly focused on the study of spatial patterns of diverse kinds. Patterns in space represented essentially geometrical forms of different kinds, so that the study of *geometries of space* became the central theme of the law-seeking new geography of the late 1950s and 1960s. For this reason, for quite some time, geography became increasingly drawn toward the development of theories that could explain and predict patterns generated by spatial interaction, and the resultant spatial forms.

Regional Geography and the Scientific Perspective

It is certainly true that the pre-World War II practioners of human geography had by and large kept aloof from debates concerning the philosophies and methods of science, and had preferred instead to pursue a version of geography focused on "scholarly interpretation rather than scientific explanation", laying emphasis on careful description of people and places—a theme that was then deemed the corner-stone of a discipline focused on areal differentiation. But:

> *to argue that pre-war geography was not at all influenced by the ideas and theories of science would be quite incorrect. Regional geography was in fact implicitly rooted in long-standing ideas about the procedures and philosophies of science particularly induction. This is a process which led geographers to make generalizations on the basis of repeated observations, so that conclusions about the nature of different spaces and places could be made on the basis of particular premises. This implied the adoption of the notion of causality, where certain things are deemed to be associated with other things (Hubbard et al. 2002, p. 27).*

Indeed, Hartshorne had amply clarified his case regarding generali- zation and theory in regional geography in his 1959 monograph, pp. 121-122 and 169-170—excerpted in foregoing discussion.

THE COURSE OF DEVELOPMENT OF GEOGRAPHY AS A SCIENCE OF SPATIAL ANALYSIS

The movement towards new geography as the science of spatial analysis with a well-defined theoretical focus had started, to begin with, in a few selected centres in the United States around the middle of the 1950s, and from there it had quickly spread to other centres in and outside the United States. These major centres of development were:

• The University of Iowa (to which Schaefer had belonged, although the leader of the school was Harold McCarty);

- The University of Wisconsin at Madison (where John Weaver's Ph.D. thesis submitted way back in 1943 had been one of the early examples of the application of quantitative techniques in geography. The work related to this thesis became the basis of a widely used statistical procedure for defining agricultural regions developed by Weaver in 1954). However, most of the advance came only later under the leadership of A.H. Robinson who, in collaboration with Bryson (a colleague in the department of Meteorology), focused attention on the development of statistical methods in cartography.
- The University of Washington at Seattle became, under the leadership of W.L. Garrison, the most important centre for the development of theoretically oriented geography, using the method of science and mathematics in the study of problems in urban and economic geography. The *central place theory* became a major focus of work at this centre. Edward Ullman (1980) was an important member of the University of Washington team of new geography as the science of spatial interaction. The department also benefited from the visits of the Swedish theoretical geographer Hagerstrand (a leader in the development of methods for the study and prediction of spatial patterns and processes). Several of the leaders of the new geography in 1960s (including Berry, Bunge, Dacey, Marble, Morrill and Tobler) were students of Garrison at Seattle.

- A fourth important influence in the development of quantitatively- oriented theoretical geography of the 1950s was the astronomer J.Q. Stewart of the University of Princeton, who drew attention to regularities in the distribution of various aspects of population dynamics that seemed to follow laws similar to those of physics. His interest in identifying law-like behaviour in the themes studied by social scientists had led him to develop a new field of study that he named *social physics*, which was based on the premise that "dimensions of society are analogous to the physical dimensions and include numbers of people, distance, and time". Social physics dealt with observations, processes and relations in terms of these three variables. According to Stewart, "the distinction between social physics and sociology is the avoidance of subjective description in the former" (Stewart, 1956). Stewart's ideas were first introduced in geography in 1947 in a paper published in the *Geographical Review* and subsequently in another paper published in 1956. Later, he collaborated with geographer William Warntz (Stewart and Warntz, 1958, 1959). The latter wrote extensively on this subject. His best known work was *Toward a Geography of Price* (1959).

The work carried out under the social physics tradition contrasted markedly with the work of the other three groups noted above in that:

Stewart and Wamtz...conformed more than any others to Bunge's call for scientific approach which aimed at a high level of generality. Second, there was the nature of the approach to theory, for macro geography [of Stewart and Wamtz] was inductive in its search of regularity rather than testing deductive hypotheses. Finally, the analogies sought for human geography were in a natural science—physics—and not in the other social sciences (Johnston, 1983, p. 68).

Outside the United States a major centre of quantitative-theoretical geography had developed at the University of Lund in Sweden under the leadership of Hagerstrand. The first beginnings in theoretical geography at Lund had been made under Edgar Kant, an Estonian geographer who had taken refuge at Lund after the Second World War (Buttimer, 1983). He was the first to introduce the work of Christaller and Losch into Swedish geography. He had tested these theories in the course of his field research in Estonia. Hagerstrand, who later became one of the most luminous stars of the theoretical geography firmament, had served as a research assistant to Kant during 1945-1946—a contact that proved most rewarding since at that time Hagerstrand was himself engaged in research on the processes of migration. Later, under the association of the Swedish ethnologist Sigfrid Stevanson, Hagerstrand had shifted attention to-the study of the processes of innovation diffusion with the aid of mathematical and statistical methods that were then just coming into vogue. His doctoral dissertation submitted in 1953 (later translated as *Innovation Diffusion as a Spatial Process* by Pred in 1968) had examined the spread of certain innovations (agricultural and others) in a part of central Sweden. Hagerstrand's focus on *process* marked a significant break with the regional tradition in that it drew attention to the role of time. It also marked a clear beginning towards a theoretical geography concerned with formulation of general concepts. Hagerstrand wrote that although his own research had concerned a small area in a part of Sweden, it should be viewed as a building block for further researches on diffusion processes in order to arrive at more general theores (Hagerstrand, 1953/1968, p.1).

Under Haggerstrand's leadership, his department at Lund soon became a premier centre in theoretical-mathematical geography. Hagerstrand interacted with workers engaged in similar type of work at the university of Washington at Seattle where he was a visiting lecturer in 1959. Richard Morrill had studied under him at Lund, and wrote Iris dissertation on migration and growth of urban settlements there (Morrill, 1965). Bunge's path-breaking *Theoretical Geography* (1962) was published as a monograph under the Lund Studies in Geography series. During the 1960s, Hagerstrand developed his model of "time-space geography" focusing on space-time patterns and the processes which result when individuals are seen to draw upon space and time as resources essential to the realization of particular projects that compete with each other for the limited resources of time and space. (For a review of space-time geography, *see* Carlstein, Parkes, and Thrift, 1978.)

Whereas new geography as the science of spatial analysis dominated by a theoretical-quantitative perspective had become universally accepted in North American universities by the end of 1950s (so that writing in 1963, Burton had declared that the "quantitative revolution" in geography was over) outside the U.S.A., Canada, and Sweden, the *revolution was* hardly visible as a wave. The first textbook on statistical methods for the use of undergraduates that had appeared in Britain in 1963 (Gregory, 1963), was more in the nature of an isolated event, than part of any general movement toward making geography a positivist science. A focused emphasis in this direction was first started at the University of Cambridge under the joint leadership of Chorley (a geomorphologist who had received training in the United States) and Haggett (a human geographer who also had spent some time in the United States and had experienced firsthand the new spirit in American geography). The joint effort of the two scholars had resulted in two highly influential edited volumes: *Frontiers in Geographical Teaching* (1965) and *Models in Geography (1967).*

The first book was based On a course of lectures given at Cambridge in 1963 with a view to informing geography teachers about "recent developments and advances" in the subject. Several of its chapters were written on tacit "recognition of the need for a complete and radical reevaluation of the traditional approaches both to geography and to geographical teaching in Britain" (p. 365). Its purpose was to underline the importance of "theoretical models" in geographical teaching which, the editors lamented, had "been markedly barren of such models, partly as a reslult of the interest which has centred largely on the unique and special qualities of geographical phenomena" (p. 367). The editors strongly pleaded that geographers should do away with the false dichotomy between regional and systematic studies through a fusion of the ideas of "models" and "regions". An epilogue underlined that the prevailing inertia in geographical teaching and research had arisen from "the failure to recognize the multivariate nature of geography", and from "the neglect of the strong geometrical tradition in geography" which (the editors' pointed out) had been basic to the Greek conception of the subject. The editors emphasized that "Geometry not only offers a chance of welding aspects of human and physical geography in a new working partnership, but revives the central role of cartography in relation to the two. Our solution then is to press for a reestablishment of the tripartite balance in geography by building up the neglected geometrical side of the discipline" (pp. 382-383).

Models in Geography was a logical extension of the *Frontiers* volume. Contributors to this volume had been asked by the editors "to discuss the role of model-building within their own fields of research", so that the volume presented a synthesis of the work done in geography by the adherents of the quantitative-theoretical stream. The volume was widely received in the countries of the British Commonwealth as a declaration of a crusade against old idiographic geography built around the concept of regions as unique entities; and as a declaration of faith in new geography structured around the methods and goals of positivist science. The volume served to demonstrate how scientific methods were (or could be) used in the study of systematic aspects of the discipline?

8.4.2 The Regional Concept and Regional Geography

The concept of region is one of the most fundamental concepts in geography. For a long time it has been the principal organizing principle in geographical work. Yet, as in the case of a host of familiar ideas, "the concept of region floats away when one tries to grasp it, and disappears when one looks directly at it and tries to focus. Like the ideas of Time and Art it is so obvious yet so difficult to define, but equally so useful, so much part of geography" (Minshull, 1967, p. 13), that a definition must be attempted. However, owing to the ill-defined nature of the concept, there has never been a commonly accepted definition of "region", so that in a wide-ranging survey of this concept in the late 1930s, two non-geographers, Odum and Moore, had collected as many as 40 different definitions. Such a wide variety of definitions of a single concept under-lined the fact that the concept of region has been somewhat personal and special to each major practitioner. Among geographers, region has been variously defined as:

A domain where many dissimilar beings, artificially brought together, have subsequently adapted themselves to a common existence.

- P. Vidal de la Blache

A complex of land, water, air, plant, animal and man regarded in their special relationships as Together constituting a definite, characteristic portion of the earth's surface.

- A.J. Herbertson

An-area characterized by similar surface features and which is ….. contrasted by neighbouring Areas.

- N.M. Fenneman

An area delineated on the basis of general homogeneity of land character and occupance.

- R.S. Platt

A geographic area united culturally, united at first economically and later by consensus Of thought, education, recreation etc. which distinguishes it from other areas.

- K. Youn

Although a source of considerable confusion to the student, the great variety of definition underlines the usefulness and strength of the concept of region, which is required by every serious student of geography, and which has proved quite capable of growth and adaptation as directions in geographical research changed over time, from the preclassical focus on the physical environment to the concept of geography as integrated discipline of man-environment relationships in particular places, to the Hettnerian concept of geography as the study of areal differentiation and regional systems.

The Region

The Whittlesey Committee on regional geography which drafted the document on regional geography published in James and jones (1954) clarifying the concept of region in geography observed that:

Any segment or portion of the earth's surface is a region if it is homogeneous in terms of such an areal grouping. Its homogeneity is determined by criteria formulated for the purpose of sorting from the whole range of earth phenomena the items required to express or illuminate a particular grouping, areally cohesive, So defined, *a region is not an object, either self-determined or nature-given. It is an intellectual concept, an entity for the purpose of thought, created by the selection of certain features that are relevant to an areal interest or problem and by disregard of all features that are considered to be irrelevant* (Whittlesey in James and jones, 1954, p.30, italics added).

But, as one author put it, there is, of course, only one region-the surface of the earth -on which mankind finds its home, "although much effort is devoted by geographers towards the study of this diversified environment as a whole, it has long seemed necessary by methods of 'special' or 'regional geography', to study its component parts", so that although nature abhors lines, geographers "appear to adore them, so busily do they engage themselves in delimiting on their maps allegedly significant areas called 'regions'" (East, editorial preface to Minshull, 1967, pp. 9-11).

The term "regional geography" had originally been used to distinguish a new teaching method from the traditional political geography in which an encyclopedic collection of data, organized by political units, was presented to be memorized by the student. In this sense regions represented just another type of unit area- "just another receptacle", as James called it-so that to many the region appeared as *omnium gatherum* of information about particular areas. Wright (1965) branded it as the "trash can approach", in the sense that it appeared to him to consist of describing the contents of an arbitrarily defined "container" (James, 1972, p. 461), so that many felt that in the absence of a sound philosophical basis as a branch of learning, regional geography, as taught and as written, had presumed too much and achieved too little (East, op cit.) In an influential paper, Kimble (1951) discussed "The Inadequacy of the Regional Concept", wherein he suggested that "regional geographers may perhaps be trying to put boundaries that do not exist around areas that do not matter".

Kinds of Regions

The Whittlesey Committee has identified a variety of different kinds of regions. The most fundamental division is that between *formal* (or uniform) and *functional* (or nodal) regions. The uniform region represents a discrete distribution that is defined in terms of specified criteria, and is homogeneous throughout in terms of the chosen criteria. The definition of such regions may be based either in terms of single features or in terms of a well-defined association of several selected features. The *functional* region, on the other hand, is defined in terms of the functional zone (the area of influence) around a given node (a city or town) or several related nodes. Such a region represents areas functionally tied to the specified node. The most important factor in the definition of the functional region, therefore, involves the measurement of movements from a central place to his hinterland.

Functional Regions

Hartshorne did indeed underline the significance of the concept of functional region, but most of the discussion about regions, until after the Second World War, was concerned with the formal (i.e., single feature) region. In geographic practice, Dickinson's *City Region and Regionalism* (1974) had marked a major development in regional theory. Gregory wrote,

What was novel about Dickinson's formulation was its break from physical geography and the physical environment … and following from this, its provision of a central regionalizing principle that lies behind the "spatial structure of society" (Gregory, 1981)

Dickinson's city-region was

An area of interrelated activities, kindred interests and common organizations, brought into being through the medium of the routes which bind it to the urban centres (Dickinson, 1947, cited in Gregory, 1981, p. 285).

Such a concept of region as spatial organization through movements was further advanced (and reinforced) by A.K. Philbrick (1975) who maintained that the task of human geography was to "analyse the areal structure of human occupance independent of the natural environment" and through "the functional organization of human occupance in area". Both Dickinson and Philbrick had been greatly influenced by Christaller's "central place theory". The works of Christaller, Dickinson and Philbrick together "formed the springboard for the eventual translation of functional regions into spatial systems" (Gregory, op. cit.).

Generic vs. Specific Regions

A distinguished committee of the Geographical Association in U.K. had published a widely acclaimed report of "Classifications of Regions of the World" (*Geography*, 1937). The committee (whose members included Roxby, Stamp, Unstead and Myres-the last named, a historian) dis-tinguished between two types of regions: "regions which fall into types … may be said ti be of *generic* character", and "Single regions, large or small, which possess a well-marked geographical individuality may be called *specific* as distinct from generic regions" (see Dickinson, 1976, pp. 144-147). The distinction drawn by the Committee is essentially one between the *single-feature regions* that represent a type, and the *total-feature* or *total-topic region* that stand out as non-repetitive and unique examples.

"Compage": A Kind of Uniform Region

In a paper entitled "Southern Rhodesia: An African Compage", Whittlesey (1956) put forward the idea of "*compage*" as a kind of uniform region defined in terms of all the features, natural and man-made, that are related to the human occupance of the area. This represented an important conceptual progress in the study of regional geography. As Minshull (1970) wrote: those who suggest that the study of specific regions is beyond the powers of one man may well have the ill-defined total-topic region in mind; the fact is that most successful regional geographers have been concerned with what Whittlesey named as compage.

Natural Regions

In geography, we accept the single-feature regions such as those based on relief, climate, soil or vegetation, or any other related elements as partial representations of reality-as models of reality-just as students of biology do in respect of their diagrams of the human body. On a worldwide pattern, it has long been recognized that in respect of soil, vegetation or climate the single-feature regions reveal some kind of intimately related repetitive patterns recurring in different continents. On this basis world patterns of distribution of climate, vegetation and soil types have long been recognized.

Herbertson's Scheme of Natural Regions

It had generally been believed that irrespective of differences in detail, a close interrelationship existed between the global patterns of the three related elements. Owing to the apparent influence of climate over vegetation, and of these two together on soil; soil, vegetation and climate have often been combined to form "natural" regions. A grand scheme of natural regions on a global scale, by combining single-feature regions of important physical determinants of plant and animal life, was proposed by A.J. Herbertson in 1905. Herbertson's scheme of natural regions became an important tool in the teaching of geography in the educational institutions in Britain and the other countries of the British Commonwealth (as it was then called). In the course of time the so-called natural regions (subsequently called "major regions") taught in the school, became established in the students mind as accepted fact.

Herbertson's scheme of natural region was greatly influenced by belief in the principles of vitalist biology. It is true, that Herbertson himself did not devote much attention to the human geography of his regions, though the following statement in his 1905 presentation clearly suggested that the natural regions proposed by him could provide a useful background to the study of human groups inhabiting them:

> By comparing the histories of the same race in two different regions; or of a succession of races in the same region, it should be possible to arrive at some knowledge of the invariable effect of a type of environment on its inhabitants and permit some estimation of the non-environmental factors in human development.

Previous Year Question Paper-III

Unit – 8

Sub Unit – 4

December - 14

1. Match List-I with List-II and select the correct answer from the codes given below :

List-I (Authors)	List-II (Books)
I. Haggerstrand	A. Theoretical Geography
II. Gilbert White	B. Geographical dimensions of innovations
III. Walter Isard	C. Human response to Floods
IV. William Bunge	D. Methods of regional analysis

Codes : I II III IV

(1) A C B D

(2) D B A C

(3) C D B A

(4) B C D A

2. Which one of the following authors developed the theory of social physics to create the field of macro geography ?

(1) Stewart and Warntz (2) Jackson and Smith

(3) Shevky and Bell (4) Jones and Eyles

3. Edward L. Ullman's 1957 study on commodity flows to study spatial interaction and regional economic

structure was based on economy of which country ?

(1) Europe (2) U.S.A.

(3) U.K. (4) Australia

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
7.	26	D	8.4.2
8.	51	A	8.4.2
9.	53	B	8.4.2

PAPER-II

January- 17

1. What are the three basic aspects for spatial interaction as described in Edward Ullman's model ?

(1) Human behaviour, Transferability, Convenience

(2) Surplus-deficit relationship, Community specific relationship, Complementarity

(3) Complementarity, Intervening opportunity, Transferability

(4) Residential neighbourhood, Complementary, Convenience

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	31	C	8.4.2

PAPER-III

July- 16

1. Carta-Marina is

(1) A cartographic instrument used by Arab geographers

(2) A book authored by Al-Masudi.

(3) A map of America prepared by Wald Simular.

(4) An age succeeding to "Age of Discovery".

2. Match List – I with List – II and select the correct answer using the codes given below :

List – I	**List – II**
I. Haggerstrand	A. Theoretical geography
II. William Bunge	B. Geographical dissemination of Innovation
III. Gilbert White	C. Methods of regional analysis
IV. Walter Isard	D. Human responses to floods

Codes :

	I	II	III	IV
(1)	D	B	A	C
(2)	C	A	B	D
(3)	A	C	B	D
(4)	B	A	D	C

2.Given below are two statements, one labelled as Assertion (A) and other labelled as Reason (R) . Select

your answer from the codes given below :

Assertion (A) : Social indicator movement was quickly developed in 1960s in the USA.

Reason (R) : It grew in response to rise of a wide range of social problems in US society.

Codes :

(1) Both (A) and (R) are true and (R) is the correct explanation of (A).

(2) Both (A) and (R) are true, but (R) is not the correct explanation of (A).

(3) (A) is true, but (R) is false.

(4) (A) is false, but (R) is true.

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	50	C	8.4.2
2.	53	D	8.4.2
3.	54	A	8.4.2

PAPER-II

July- 16

1. Which one of the following scholars believed that "every deliberate action must start in the mind, the realm of thought. It must be conceived and rehearsed in the realm of thought before it can take place in the physical…."

(1) Lewis Mumford (2) Patrick Geddes

(3) Chadwich (4) Benton MacKaye

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	38	D	8.4.2

PAPER-II

December- 15

1. Match List – I with List – II and select the correct answer from the codes given below:

List-I (Concepts)	List – II (Geographers)
(A) Semple	(i) Systematic Geography
(B) Brunches	(ii) Concentric Zone Theory
(C) Davis	(iii) (Old) Determinism
(D) Burges	(iv) Possibilism

Codes: (A) (B) (C) (D)

(1) (i) (ii) (iii) (iv)

(2) (iv) (iii) (ii) (i)

(3) (iii) (iv) (i) (ii)

(4) (iii) (iv) (ii) (i)

2. Match List-I with List –II and select the correct answer from the codes given below:

List – I (Year of publication)	List – II (Books Name)
(A) 1907	(i) Conflict, power and politics in the City
(B) 1911	(ii) American History and its Geographical condition
(C) 1973	(iii) Influences of Geographical Environmen
(D) 1903	(iv) The Pulse of Asia

Codes: (A) (B) (C) (D)

(1) (i) (iv) (ii) (iii)

(2) (ii) (i) (iii) (iv)

(3) (iv) (iii) (i) (ii)

(4) (iii) (ii) (iv) (i)

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	18	C	8.4.2
2.	46	C	8.4.2

PAPER-II

June- 15

1.Who is regarded as the father of Human Geography?

(1) Ratzel (2) Blache

(3) Trewartha (4) Vallaux

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	16	C	8.4.2

PAPER-III

June- 14

1. Match List-I with List-II and select thecorrect answer using the codes given below :

List – I	**List – II**
i. T. Haggerstrand	a. Theoretical Geography
ii. William Bunge	b. Geographic Dissemination of Innovations
iii. Gilbert White	c. Methods of Regional Analysis
iv. Walter Isard	d. Human Reponses to Floods

Codes :

	a	b	c	d
(A)	ii	i	iv	iii
(B)	ii	iii	iv	i
(C)	iv	ii	iii	i
(D)	iii	iv	i	ii

2. Match following List-I and List-II and select the correct answer from the codes given below :

List – I (Books)	**List_– II (Authors)**
a. The Nature ofGeography	i. D. Harvey
b. The Urban Question	ii. P. Haggett
c. Social Justice and the City	iii. R. Hart - shorne
d. Locational Analysis in Human Geography.	iv. M. Castells

Codes :

	a	b	c	d
(A)	iv	i	ii	iii
(B)	iii	iv	i	ii
(C)	i	ii	iii	iv
(D)	ii	iii	iv	i

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	26	A	8.4.2
2.	36	B	8.4.2

PAPER-II

December- 14

1. "The Principles of Human Geography" was authored by

(A) E. Huntington (B) H.H. Borrow

(C) F. Ratzel (D) E.C. Semple

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	16	A	8.4.2

PAPER-III

December- 14

1. Who wrote the book 'Civilization and Climate' ?

(A) Jafferson (B) Semple

(C) Trewartha (D) Huntington

2. The term 'anthropogeographic' was coined by Ratzel and was used by him for the

(A) Geography of man in terms of individuals and races.

(B) Geography of man and his works in relation to earth's surface.

(C) Organic theory of society and state.

(D) Study of harmonious reciprocal relation of man and nature.

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	24	D	8.4.2
2.	25	B	8.4.1

SUB UNIT-5

Dualism

8.5. The Problem of Dualities and How it was Resolved:

In his introduction to : *American Geography: Inventory and Prospect (1954)* containing mid-century reviews on the status and content of American geography, prepared by members of the Whittlessey Committee, commissioned by the Association of American Geographers, Presten James Lamented:

Almost all scholars who have thought deeply about the nature of geography agree on the essential unity of the field. The dualities which have been popular in the past, such as regional as opposed to topical geography, or physical as opposed to human geography, seem to have obscured rather than illuminated the nature of the discipline. The … separation between physical and human aspects continues to hinder full and balanced development of geography…This separation resulted from the 19th century attempt to divide all knowledge into science, meaning natural science, social studies, and humanities. Such a division is intolerable for geographers for they must deal with man as well as that which is not man and the two are intimately intermixed wherever man has been on the earth. Geography which has to do with places on the earth, simply cannot be made to fit into so arbitrary of classification of knowledge. Actually there is only one kind of geography (James,p.25 as in Dikshit, 1994).

From the earliest times, geography had been pursues as a unified field of study focused on the earth surface as the home of man, so that it included simultaneously the study of both the physical environment as well as the life of human communities in relation to the physical environment. All this had suddenly changed following the 19th century move to divide knowledge about the earth into a series of systematic sciences, so that the study of the physical environment got divided into the domains of a series of systematic sciences, each focused on some particular aspect of the environment and each paying exclusive attention to the processes involved in the mechanics of that aspect. Thus, in one go geography had lost a major part of its subject matter. All that was left for it to focus attention on was the study of the horizontal earth-the earth surface, defined as the thin zone extending as far below the earth surface as man has been able to penetrate, and as far above the surface as man normally goes. This zone has been the universe of all human activities, except for space explorations.

Geography after Humboldt and Ritter Developments in Germany

8.5.1 RISE OF DUALISM BETWEEN PHYSICAL AND HUMAN GEOGRAOHY

Oscar Peschel (1826-1875)

For about twenty years before his death in 1875, Oscer Peschel had been the leading academic geographer in Germany. He had raised some fundamental questions concerning the nature of geography, and was critical of the approaches of both Humboldt and Ritter. Peschel is described by some as the last great geographer before the discipline was finally overtaken by the impact of Darwinian ideas. Although most of Peschel's own works had appeared in print after the publication of Darwin's *The Origin of Species* (1859), the implication of Darwinian ideas in the interpretation of earthbound phenomena and human societies had as yet not been fully realized.

Peschel had started his career as a journalist in 1849, and was the editor of *Ausland* from 1854 to 1870 when he was pursuaded to take up appointment as professor of geography at the university of Leipzig in 1871. During his editorship of *Ausland*, he had regularly published articles on lands and peoples of the world with a view to promoting geographical knowledge among the reading public. He wrote extensively on the history of ancient geography, and on the basis of this expertise he was invited by the historical commission of the Royal Academy of Sciences to write a book on the history of geography as part of series on the history of science in Germany. This book was published under the tital *Geschishte der Erdkunde* in 1865. It was this book that attracted attention to him as an academic geographer. From 1866 onward he published a number of methodological articles in which he took issue with Humboldt and Ritter. These methodological papers were collected and published as a book in 1870 under the title *Neue Probleme der Vergleichenden Erdkunde*. As the Belgian geographer Michotte wrote: "It has been justly said that with this work the scientific spirit reentered geography" (cited in Hartshorne, 1939, p.88).

Peschel was very critical of Ritter's method of comparative geography (*vergleichenden erdkunde*), especially his practice of comparing entire continents or large segments of them. Peschel noted that since continents and large areal units contained great deal of internal diversity (one quite different from the others) they could not be compared in the proper scientific sense. Comparison was possible only in respect of clearly identifiable features or characteristics, such as particular types of landforms, climatic types, or distribution of plant cover. He demonstrated it with reference to his own study of fjord coasts. His study fjords had revealed that this type of coastal topography is characteristic of the western margins of the continents in the higher latitudes. On the basis of this comparative study, he was able to explain that the fjord topography was the end result of abandoned valleys of former glaciers.

Peschel insisted that comparative geography should have a definite method and purpose: The geographer pursuing comparative study should seek (with the help of large-scale maps) similar physical features in different parts of the earth's surface, compare their characteristics and origins, and try to relate them all genetically (following the method of comparative anatomy). Peschel thus laid a sound basis for comparative research in geography. His method required the student to begin by studying topographic maps with a view to identifying "homologies" (i.e., landforms of similar types), and then try to trace their origins in each of the areas when they occur. Owing to limitations of data and knowledge about the work of agents of erosion, and the nature of regional geology, studies pursued by this method had not always been successful; but that was no fault of Peschel's methodology.

Peschel (1879) attempted to establish physical geography as a science. He was critical of Ritter for having neglected physical geography, and he criticized Humboldt for not having attempted a scientific classification of landforms. He was also critical of Humboldt for creating the impression that general geography could be equated with the entirety of natural science.

Ritter was further decried for holding a teleological view about the nature and origins of earth phenomena, and for having subordinated geography to history by presenting his own works essentially to serve as a tool for better understanding of history.

Peschel believed that physical and human geography constituted two entirely separate domains of knowledge, and as such two could not form part of a single science. He was thus, originator of dualism between physical and human geography, and was strongly of the view that geography should be pursued primarily as a study of the physical phenomena of the earth. His methodological stand regarding distinction between physical and human in the study of geography notwithstanding, Peschel had made in-depth study of the geographical distribution of the races and cultures of mankind. It is indeed ironical that his book entitled *The Races of Mankind: Their Geographical Distribution* (1876) is the only work of Peschel available in English translation today (Dickinson, 1969, pp. 56-58).

8.5.2. CRISIS OF IDENTITY AND ATTEMPTS AT RESOLUTION:

The basic premise of the division of knowledge between a set of systematic disciplines was the fundamental division between man and nature, so that while the "sciences" focused on different aspects of the natural environments, the study of man become the exclusive domain of the social sciences and humanities. There appeared little scope for combining the study of both man and nature in a single discipline. This had created a genuine crisis of identity for geography as an autonomous field of learning focused on the study of the earth surface as the human habitat, since the study of the earth surface required simultaneous attention to both man and nature. Thus logically, geography could claim the staus neither as science nor as social science or humanities, and seemed to hang somewhere in-between. This was source of much confusion in the formative years of geography as a modern discipline. The crisis could be resolved only in the 1880s through the efforts of many scholars, most particularly Ratzel, and Richthofen in Germany, and Vidal de la Blache in France.

While Ratzel atried to resolve the problem of duality between man and nature by focusing on the study of man's relationship with nature, Richthofen and Vidal de la Blache attempted to resolve the issue through redefining geography as a chorological discipline focused on the study of the earth-surface through the study of its component parts-each in his own way.

8.5.3. Geography as study of Man-Environment Relationship:

Ratzel's approach to the problem of duality between man and nature in geography was two-fold. The first volume of his *Anthropogeographie* had approached the problem through the measurement of consistent relationship between man and environment. It had focused on the role of the physical environment in shaping the life of communities in particular places. The theoretical basis behind this approach was that a particular set of physical environment is consistently associated with a specific pattern of human response since the natural environment was supposed to exercise a controlling influence on man's life upon the earth.

The second volume of Ratzel's *Anthropogeographie* which carried the sub title "The Geographical Distribution of Mankind", approached the problem from the reverse perspective, that is, from man to nature, rather than nature to man that was adopted in the first volume. In the second volume, Ratzel paid focused attention to the role on human migration and diffusion of cultural traits in determining the life styles of people in different places, rather than seeking their origin in the influences exerted by the local natural environment. The migrany societies, he maintained, carried their memories, traditions, and skills with them so that the pattern of life of human groups in their new area of inhabitance had resulted from the combined influence of two sets of forces-one, the local physical environment, and the other their remembered culture and technmology. As a contemporary French geographer Louis Raveneau wrote, Ratzel had taken a stand "between physical geography, sometimes predominant or exclusive, and science of man which neglects so easily the framework in which man moves and the space in which he lives". Looked thus Ratzel had presented a most wholesome approach to geography-in which both physical and cultural elements were accorded equal importance.

As Dickinson (1969, p.71) noted, Ratzel recognized ethnographic groups as geographic assemblages of inter-related phenomena, and he had sought to explain them not as in situ developments of similar phenomena in different parts of the earth, but as the result of spread and splintering of ideas and phenomena by successive migrations through the march of history. Thus, Ratzel's perspective on man environment relationships was a wholesome one, in which while due importance was accorded to the influence of nature on man, the key role played by the settler population's culture and technology in appropriating the environment was not neglected. Thus, Ratzel was by no means a crude determinist. Unfortunately, it was Ratzel of the first volume of his *Anthropogeographie* (1882) rather than the second (published nine years later) that was popularized in the English speaking world through the highly popular writings of his former Americal student Ellen Churchil Semple (1903,1911). Thus, inspite of himself, Ratzel came to be recognized as a determinist.

8.5.4. Geography as Chorology:

The chorological concept of geography as developed in the post-1871 period, in Germany, was greatly facilitated by the need of the newly emergent German Empire, which needed information about lands and people across the globe, partly to facilitate administration in its colonies, and partly to seek opportunities to establish new colonies. Professors appointed to organize the newly started departments of geography, while engaged in the pursuit of acquiring the required knowledge about the lands and people in different parts of the earth, soon came to the realization that both the environmental as well as society phenomena in different parts of the earth surface occur in particular-spatial/areal contexts, and it is the spatial contexts that determine their precise nature. It was noted that many of the essential characteristics of the local phenomena were caused by their areal association with all the other important aspects of the local environment (physical and cultural) taken together, so that the complexion of areal association varies from place to place. This was the basic premise behind the concept of geography as chorology focused on the study of particular areas or regions wherein, the complex variety of things and events were examined in the spatial context of their unsystematic groupings as parts of the great man-environment system.

The chorological paradigm was most cogently put forth by Richthofen in his inaugural address at the time of his appointment to the Chair of Geography at the University of Leipzig in 1883, wherein, he underlined that the goal of geography was to explore the relationship of man to the physical earth and the biotic features associated with it in particular segments of the earth surface. This theme was further refined by Hettner, and had got adopted as the standard procedure in the study of regions. This was also the core idea behind Hartshorne's masterly *Nature of Geography* (1939) which contributed to establish regional study as the dominant concern of geography well past 1950s, though early in the 1950s rumblings against the predominantly descriptive and exceptionalist perspective of chorology had begun to surface (e.g.,Schaefer, 1953), and by around 1960 with the arrival of the quantitative modes of analysis and inference, the anti-chorology chorus rose to crescendo that greatly transformed the thought process in geography. Within chorological persuasion itself there was controversy regrading regional vs. systematic geography, though the debate was far from conflictual since it was soon realized that the two types of study together contributed to make geography a wholesome discipline.

8.5.5. Attempts to Define Geography as Physical Geography and as Landscape Study:

While Richthofen was trying to project geography as unified study of physical and non-physical elements in well-defined spatial segments (regions), others like Peschel (1826-1875) insisted that the study of man and nature could not be combined as the subject matter of a single discipline, and that geography should be projected primarily as the study of physical geography. This viewpoint was more forthrightly expresses by Gerland in his 1887 essay in which he insisted that *Since man and his activities could not be put to scientific analysis, man should be taken out of the purview of geography altogether.* Thus, as Hartshorne (1939, p.97) noted, in the latter half of the 19th century, under the influence of specialized sciences, geography, for a time, appeared divided into two irreconciliable halves, one natural science and the other social science.

This idea of dualism between physical and human geography was further emphasized by Schluter (1872-1952) who suggested that geography should focus on the study of landscapes which he defined as the totality of the "visual perception" of an area. Such a perspective, he believed, could raise geography to the level of other systematic sciences. The point to note is, that since Schluter laid focus only on the visual features of areas, the non-material contents of areas-such as political organization, religious-cultural beliefs, economic institutions and the like, lay outside his concept of geography as a discipline.

The landscape study promoted by Sauer at Berkeley was of a different kind. These studies drew attention to the role played by the human agency in transforming the natural landscapes into cultural landscapes in particular areas. The Berkeley studies were pursued under the over-arching concept of geography as chorology.

8.5.6. Post-1960 Developments: Shift in Focus from Areal to Spatial:

A major source of dissatisfaction with the chorological model of geography as marchalled by Hartshone (1939) lay in that: "it favoured (although it did not demand logically) a goal of investigation independent of the goal of other sciences,…[it] saw geography as an end in itself rather than in the broader context as a contributor to a larger scientific goal" (Ackerman, 1963). The tone of widespread dissatisfaction was et in motion by Schaefer (1953) who criticized the chorological viewpoint as "exceptionalist" and emphasized that all sciences study unique events which they seek to explain in terms of general laws, and so should we do in geography. He advocated geography to focus attention on "spatial arrangments of phenomena" rather than on the phenomena themselves, in order that geography could develop pattern laws as contrasted to process laws of the systematic sciences. This prepared the ground for change of geographical perspective from areal to spatial, and from study of areal integration to spatial interaction, from description to analysis and thereby contributed to the transformation of geography as spatial science focused on developing pattern laws that could explain how different types of spatial patterns are generated. Various quantitative techniques were adopted as the primary tools of analysis.

8.5.7. Shift in Focus from Objectives to Perceived Reality: Behavioural vs. Humanistic Geography:

By the end of 1960s, precision in research through increased use of quantitative techniques had been widely accepted. The profession now began to take stock of the gains and losses of the "quantitative revolution", and the spatial science paradigm of spatial behavious based on the concept of economic rationality. It was widely felt that the spatial models developed by spatial science had failed to relate to real life situations. Geographers in increasing numbers were convinced that it is not the objective reality (the reality as it exists), rather the reality as it is perceived by the decision makers that leads to action. As a result, the concept of economic rationality was discarded in favour of behavioural theories of decision-making. This shifted the geographers primary source of inspiration from economics to the behavioural sciences, most particularly to social psychology. Simultaneously attention shifted from the study of spatial patterns per se to the understanding to societal behavior that generated those patterns. This change in focus was hailed as the rise of yet another new geography called "behavioural geography". Though in reality what had happened was: "gradual emergence and consolidation of a set of approaches that aim[ed] to increase the scope of geographical explanation by seeking fuller understanding of the processes that underpin real-world behavior" (Gold,1980, p.1). Behavioural geography did not bring a revolution away from spatial science; it became an attachment to it, so that it was "business as usual".

Two different types of behavioural studies were pursued. One, empirical studies focused on deriving theories of spatial behavior; and two, studies with pronouncedly humanistic orientation. The latter focused on description and literal reconstruction of life events with a view to revealing the meaning of the environment to the decision makers. This latter stream was identified as "humanistic geography".

The two sets of studies share a general concern for interpreting observable behavior in terms of what goes in the mind of the decision maker; but in humanistic research, unlike in behavioural, the so-called scientific goals of replicable and verifiable measurement are discarded in favour of understanding the world as senn through the eyes of the individuals whoe behavior is being investigated. It is focused on "understanding meaning, value, and human significance of life events" (Buttimer, 1978). Unlike behavioural geography, humanistic geography did not represent an adjunct to geography as spatial science. In fact it was started in definite opposition to the dehumanizing characteristics of scientific rationality of the spatial science paradigm. Besides, as Johnston (1983, p.4) wrote, in humanistic geography the intent is "to reorient human geography toward more humanistic stance, to resurrect its synthetic character, and to emphasize the study to unique events rather than the spuriously general".

In humanistic geography, attempt was made to make man- the human being- the very core of geographical work, to make geography" people geography, about real people, and for the people" (Smith, 1977,p.370); to make geography as discipline "concerned with the social organization of space rather than spatial organization of society" (Gregory, 1981). Such a changed perspective on the nature of geography has led to increased concern for the human condition, for quality of life, social inequalities, distributive justice, and informed concern for the quality of environment; so that geography today stands out as a full fledged member of the social science fraternity, sharing common interest in the resolution of societal issues, wherever the disciplinary perspective of geography is relavant in the resolution of the problem under investigation.

Other minor points of contention related regarding the relationship between pattern vs. process, i.e. the place of the historical perspective in geographical work as the question of also quality vs. quantity in geographical research which had got resolved in the natural course of the discipline's progress.

To conclude, the seeming contrasts in geographical perspectives in the past have proved on closer thought as subordinate part and counter part of a broader reality. Thus:

The dictionary of regional and topical studies resolves itself in the larger concept of regional approach; site and situation are two aspects of place; and space and time are intertwined realtions of reality. In addition, nature receives meaning through culture; function and form supplement each other as do quantitative and qualitative data. Properly understood, these dictionaries are not divisive splits in the system of geographic thought, rather they reflect complementary aspects or approaches, enriching our insights into earth as the world of man (Broek, 1965; pp.187-188, in Dikshit, 1994).

8.5.8. The Quantitative Revolution in Geography: The Search for Scientific Method

The shift in the focus of geographical studies during the mid-1950s and the early 1960s inevitably involved a major change—a revolution—in the nature of geographical work. It was clear that the new concept of geography as the science of spatial analysis of phenomena on the earth's surface with a pronounced commitment to theory, needed a new set of methodologies for explanation. In the initial stages of the changeover, however, few attempts were made at programmatic statement on how research should be conducted, even though there was a widely felt need of a handbook on quantitative models of explanation based on mathematical and statistical procedures, though these were being increasingly made use of in the new researches coming from the leading centres of quantitative-spatial geography. In his widely referred essay *Geography as a Fundamental Discipline*, Ackerman (1958) had observed that if any single theme may be used to characterize the developments in contemporary geography in the 1950s,

that theme would be one of illuminating covariant relations among earth features (p. 7).... Although the simpler forms of statistical aids have characterized geographic distribution analysis in the past, the discipline is commencing to turn to more complex statistical methods—an entirely logical development. The use of explanatory models and regression, correlation, variance and covariance may be expected to be increasingly more frequent in the field (p. 11).

However, Ackerman conceded that much fundamental research in geography could not be law-giving in the strict sense. Geography was, nevertheless, required to be concerned with a high level of generalization in order that its result could give meaning to other research efforts that may follow it. Geographical research must have a "block-building character".

For this it was necessary that geographical studies became more precise and accurate and this could be most effectively accomplished by greater and more judicious use of quantitative methods, since "accurate study depends on quantification" (p. 30). Ackerman's essay was widely read and appreciated as an earnest and timely call for geography to develop a theoretical orientation through increased application of quantitative techniques of explanation, and to focus on research in the nature of building blocks that could serve as leads to further conceptual advance and theory.

In sum, the all-important instrument for bringing about the required change in perspectives in geographical work from regional-idiographic to systematic-nomothetic was *quantification*, that is, increased use of advanced mathematical and statistical techniques. Hence, the mid-1950s changeover in the philosophy and methodology of geography has been generally referred to as the *quantitative revolution.* Quantification was the key to the "radical transformation of spirit and purpose" that geography underwent in the mid-fifties to early sixties. This disciplinary transformation of geography was part of "a process shared by many other disciplines where established order had been overthrown by a rapid conversion to a mathematical approach", wrote the Canadian geographer Ian Burton (1963) in his widely referred paper that traced the course of the quantitative revolution and discussed its consequences for the discipline. The following paragraphs are based on Burton's paper.

The movement that led to the quantitative revolution in geography was begun by physicists and mathematicians. It first transformed the physical and then the biological sciences, and by the 1950s,.was strongly represented in most of the social sciences. This movement was part of the general spread and growth of modes of scientific analysis into a world of scholarship formerly dominated by a concern with the exceptional and the unique. As Burton noted, geography has long been a "following" rather than a "leading" discipline, in that the main currents of thought adopted at various stages in the development of geography have had their origins in other fields. Thus the mechanistic approach in the nineteenth century science had found expression in a deterministic cause and effect approach to the study of man-environment relationships. There was a similar mechanistic flavour in much of the recent work of quantifiers. It was as if geography was reemerging after having lapsed into idiogyaphy which had followed its retreat from environmental determinism. Although quantification in geography had been mechanistic in orientation, the new techniques being used were, in line with the prevailing trend in contemporary science, probabilistic. They were drawn from statistics which, in the words of Bronowski, "replaces the concept of inevitable effect by that of probable trend". As the "revolution", progressed, the use and purpose of quantification became more and more indeterministic.

The movement towards quantification in geography had already begun in the 1940s; it gained momentum following the classic statements of Ackerman and Schaefer in favour of making geography more theoretical and systematic in nature, it had reached its *culmination* between 1957-1960 and was 'according to Burton, over by 1963, the year Burton wrote his paper. As Burton wrote:

An *intellectual revolution* is *over* when accepted ideas have been overthrown or have been modified to include new ideas. An *intellectual revolution is over* when the revolutionary ideas themselves become a part of conventional wisdom. When Ackerman, Hartshorne, and Spate are in substantial agree- ment about something, then we are talking about the conventional wisdom.

The reference to Hartshorne here is to his 1959 statement that geographic work needed generic concepts and that it needed to determine correlation of phenomena with the maximum level of certainty. Both these purposes could be "best accomplished if the phenomena can be fully and correctly described by quantitative measurements and these can be subjected to statistical comparisons through the logic of mathematics" wrote Hartshorne (1959, p. 161). The reference to Spate was to his 1960 paper on "Quantity and Quality in Geography" in the *Annals,* A.A.G.

The incidence and growth of the quantitative revolution was greatly influenced by the three most talked about publications of that period namely the *Theory of Games and Economic Behaviour* (1944) by Von Neuman (a mathematician) and Morgenstern (an economists); the volume on *Cybernetics* (1948) by Nobert Weiner, which had underlined the necessity for crossing academic boundaries in order to arrive at really meaningful results; and *Human Behaviour and the Principle of Least Effort* by Zipf (1949). A fourth significant influence came from the physicist J.W. Stewart (already discussed) who had published his influential paper entitled "Empirical Mathematical Rules Concerning Distribution and Equilibrium of Population" in the *Geographical Review* in 1947.

While quantification was easily adopted in the study of physical geography—geomorphology, climatology, and biogeography—consider- able resistance was encountered to its use in the field of human geography. This was not surprising, since in view of the possibilist tradition underlining the role of human choice, it was here that the revolution ran up against the notion of unpredictability of human behaviour. The resistance had, however been slowly overcome by the end of the 1950s, since around this time it had come to be widely recognized that "A social science which recognizes random behaviour at the microcosmic level and predictable order at the macrocosmic level is a logical outgrowth of the quantitative revolution" (Burton, 1963).

The quantitative revolution in geography was inspired by a genuine need to make the discipline more scientific, and theoretical in orientation. Dissatisfaction with idiographic geography of areal differentiation lay at its root; and the development of a theoretically oriented geography was its major consequence. As Burton put it:

Theory provides the sieve through which myriads of facts are sorted, and without it facts remain a meaningless jumble. Theory provides the measure against which exceptional and unusual events can be recognized. In a world without theory, there are no exceptions; everything is unique. This is why theory is so important.

It is true that the need to develop theory preceded the quantitative revolution, but quantification had added point to the need, and it offered a technique whereby theory could be developed and improved.

Though the quantitative revolution had, in a sense, been over by the early 1960s, there had been few focused discussions on the philosophy and methods of "new" geography that could serve as a guide for the new practitioners. Bunge's 1962 monograph on *Theoretical Geography* was the first to fulfill this need. Bunge identified geometry as the mathematics of space, and hence the language of new geography as spatial science. The book remained the standard reference on the subject (and a second edition had come out in 1966, *also see:* Bunge, 1979) until a more comprehensive guide to the methods and philosophy of new geography as a positivist science was published in 1969 in the form of Harvey's *Explanation in Geography.*

Previous Year Question Paper-III

Unit – 8

Sub Unit – 5

December - 14

1. Stop and go determinism was postulated by whom ?

(1) Humboldt (2) Jean Brunhes

(3) Griffith Taylor (4) Ratzel

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
10.	29	C	8.5

PAPER-II

November – 1

1. Who among the following defined Geography as discovery of predictive patterns during Quantitative revolution period ?

(1) P. Hagget (2) W. Bunge (3) D. Harvey (4) R.J. Chorley

2. Match List-I with the List-II and select the correct answer from the code given below :

List – I (Ideology)	List – II (Proponent)
(a) Probabilism	(i) Humboldt
(b) Stop-and-go determinism	(ii) Ritter
(c) Systematic Geography	(iii) Griffith Taylor
(d) Modern Geography	(iv) O.H.K. Spate

Code :

	(a)	(b)	(c)	(d)
(1)	(i)	(iii)	(ii)	(iv)
(2)	(iii)	(iv)	(i)	(ii)
(3)	(iv)	(iii)	(i)	(ii)
(4)	(ii)	(iii)	(iv)	(i)

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	17	B	8.5.8
2.	20	C	8.5, 8.5.1, 1, 2, 3, 4, 5, 6

PAPER-II

July- 17

1. 'The same environment carries different meanings to people with different ways of living and culture'. This
statement is related to which one of the following concepts ?
(1) Probabilism (2) Determinism
(3) Possibilism (4) Stop and Go determinism

2. Which school of thought first developed the idea of possibilism ?
(1) Russian school (2) German School (3) British School (4) French School

3. "The dominant idea of all geographical progress is that of terrestrial unity". This statement is attributed to:
(1) Friedrich Ratzel (2) Vidal-de-la-Blache
(3) R ichard Hartshorne (4) Jean Brunhes

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	37	C	8.5.2, 3, 7
2.	38	D	8.5.2, 3,7
3.	39	B	8.5.2, 3, 7

PAPER-II

July- 16

1. Who is regarded as the father of Regional Science ?

   (1) Louis Lefeber (2) Walter Isard

   (3) Harvey S. Perloff (4) John M. Cumberland

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	37	B	

PAPER-III

June- 14

1. In the development of Quantitative Revolution, a new field of study called 'Social Physics' stating that

"dimensions of society are analogous to the physical dimensions and include numbers of people, distance

and time" was introduced by

(A) J. Q. Stewart (B) Edward Ullman

(C) W.L. Garrison (D) William Warntz

2. Given below are two statements, one laballed as Assertion (A), and the other labelled as Reason (R) :

Assertion_(A) : The major Thrust of Quantitative Revolution is to bring law making, model building and

Theorization in Geography.

Reason (R) : After the second world war, young geographers discarded the empirical, descriptive and

gazetteer type of Geography by using the mathematical language rather than the language of literature.

Select your answer from the codes given below :

Codes :

(A) (A) is correct but (R) is wrong.

(B) (A) is wrong but (R) is correct.

(C) Both (A) and (R) are correct and (R) is the correct explanation of (A**).**

(D) Both (A) and (R) are wrong.

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	24	A	8.5.8
2.	25	C	8.5.8

PAPER-III GEOGRAPHY

December- 14

1. Who among the following is the protagonist of Neo-Determinism ?

(A) Blache (B) Griffith Taylor

(C) Bruhnes (D) Saur

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	27	B	8.5

SUB UNIT-6

Paradigm and Perspectives in Geography

8.6.1 BEHAVIOURAL GEOGRAPHY

The approach to man-environment relationships that many geographers adopted in the late 1960s as part of the movement towards behaviouralism in geography, had four distinguishing features: First, it started with the premise that the environmental cognitions upon which people act may differ markedly from the true nature of the real world. This implied that space possesses a dual character, one as the *objective environment* (or reality as it exists in nature), and the other as a *behavioural environment* (that is, reality as it is perceived by the decision-maker). The behavioural geographer focused attention on the environment as perceived. Secondly, behavioural geographers asserted that the individual shapes, as well as responds to his physical and social environments. Such an assertion implied that behaviour is not just the end product of a chain of events but also the start of new sequences. Thirdly, behavioural geographers tended to focus upon individual behaviour rather than to approach problems at the level of the social group. This was with a view to comprehending the mental processes involved in reaching decisions. A large number of such studies focused on the behaviour of individuals could provide the raw material for inductive generalizations. Lastly, behavioural geography was "multidisciplinary" in outlook in that as a relative newcomer to behaviouralism, behavioural geography looked to the other behavioural sciences to provide insights into the behavioural processes involved (Gold, 1980, pp. 4-5).

Beginnings of the Behavioural Movement:

Decision Process in Spatial Context

Though several geographers had, from time to time, drawn attention to the role and importance of perception in the study of human behaviour, and in the process of transformation of physical landscapes into cultural landscapes (e.g., Sauer, Wright, White, and Kirk), the work that proved seminal in the starting the behavioural movement as an "alternative" to the normative approach to theory was a paper by Julain Wolpert entitled "The Decision Process in a Spatial Context", published in the Annals, A.A.G. in 1964. The paper was based on his Ph.D. thesis submitted at the University of Wisconsin. It had appeared at a time when many new geographers were looking for an alternative to the normative model of geography as the science of spatial analysis built around the concept of economic rationality and profit-maximizing behaviour. The paper was built around the results of a field study of agricultural land-use in a part of Sweden. The author compared the actual labour productivity of farms with what could have been achieved under optimizing decision-making by the farmers acting as rational economic persons, and found that there was upto 40 per cent less productivity than the expected level. The lower than expected level of productivity was explained as a result of the farmers' lower aspiration level which was itself a reflection of their economic and social environment, that is, the context which motivated them to act differently from the theoretical economic man. Wolpert criticized the prevailing axiom of economic man in contemporary geography, and suggested that in geographical work on economic behaviour, "Allowance must be made for man's finite abilities to perceive and store information, to compute optimal solutions, and to predict the outcome of future events, even if profit were his only goal".

The distance-reducing spatial science paradigm of the post-Second World War geography was rooted in the works of economists who wished to extend the range of economic analysis by incorporating the spatial dimension. The basic inspiration for behavioural geography also was derived from certain contemporary developments in economics. Around 190, many scholars in economics had begun to question the axiom of economic rationality in human behaviour. In an influential paper. Simon (1956) had seriously questions the basic postulate of economic man as a rational and profit-maximizing individual. Simon asserted that decision-makers have bounded rather than perfect knowledge of their environment and as such, they

operate within conditions of uncertainty. To Simon it was inevitable that owing to their bounded knowledge, the decision-maker's rationality is also bounded. As such, it was unlikely that an entrepreneur could achieve more than a satisfactory (as against optimal, profit-maximizing) outcome to a given economic problem.

Wolpert's research reported in his 1964 paper was designed to test whether decision-making in the case of his sample accorded to Simom's "satisficing" model or to the "optimizing" mode of the economic rationality school. He concluded that his investigation gave support to the theory of *satisficing behaviour* as against the theory of *economic rationality*. Wolpert noted that in his sample the farmers' decisions were reached in a situation of incomplete knowledge, so that their rationality was bounded. Besides, the decision-behaviour of the farmers was found to reflect not only the apparently available alternatives, but their own perception of those alternatives, as well as the consequences of their possible outcomes. Also important in their decision, was the role of the farmers' system of values and their degree of aversion to taking risk.

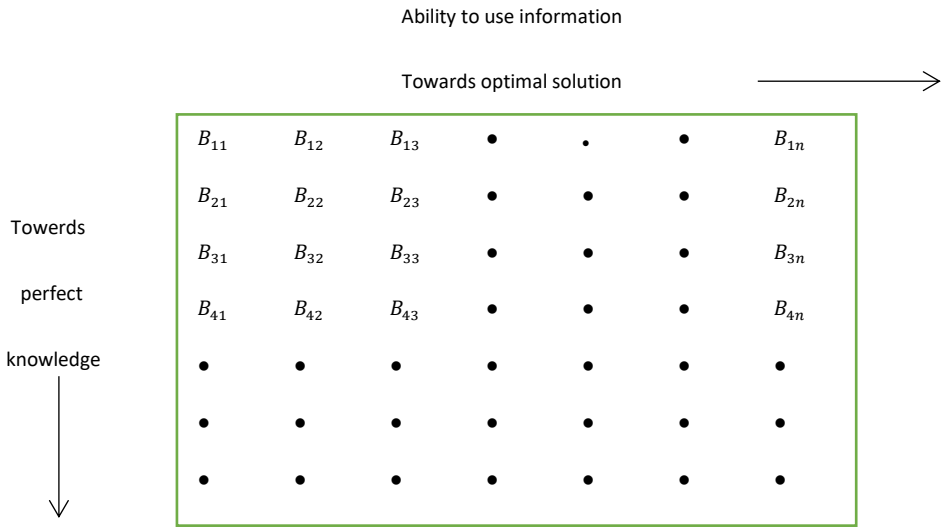
In another paper published in 1965, Wolpert reported the result of another study on the behavioural aspects of the decision to migrate with a view to presenting a further test of validity of the satisficing model of human behaviour. His analysis showed that the *gravity model of distance-decay* (pursued by the spatial scientists) was not adequate in explaining actual migration flower. His own research suggested that full understanding of the migrants' decision to migrate would require consideration of the set of places of which the migrant would require consideration of the set of places of which the migrant is aware (that is, a consideration of his *action-space*), the desirability and usefulness of each place to the migrant (i.e., *place utility*), and his *motivation* and goals, and the *stage* he has reached in his life cycle. The concept of *place-utility* proved quite attractive so that before long a good number of studies on decision to migrate were conceptualized within the *stress-satisfaction* formulation derived from Wolpert's work (1965, 1966). The stress-satisfaction framework argued that the basis of any decision to migrate is the migrant's belief that the level of satisfaction available elsewhere is greater then what is available at the present place of residence.

Subsequently, the satisficing behaviour model was also used in the study of political decision-making, such as a decision to locate some public facility (e.g., a hospital) within a city. Such decisions were found to be frequently the outcome of some compromise between the available alternatives rather than optimal solutions. Thus, Wolpert (1970) concluded that

Rather than being an optimal, a rational, or even a satisfactory locational decision produced by resolution of conflicting judgements, the decision is perhaps merely the expression of rejection of elements powerful enough to enforce their decision that another location must not be used. He found that locational decisions are in reality

more the product of stress responses than the end result of a dispassionate and considered selection of alternatives posited by the classical normative approaches or even Simon scheme of bounded rationality.

A further advance was made by Pred (1967, 1969) who used information availability and the varying skills with which to use the information, in devising a "behavioural matrix" of locational decision-making (Fig. 6.1). In any given case, the decision-maker can be assigned a position in that matrix according to the amount of knowledge he possesses, and the skills he has acquired in its use. Thus, a position near the bottom of the matrix would indicate that the entrepreneur would have a greater chance of making a good locational decision than a competitor who may be characterized by a position near the top left of the matrix. However, this matrix only indicated the probable outcome, since there is a possibility that an entrepreneur with very limited skill and information may arrived at a better location solution than one who possesses greater ability and information though it is unlikely to be so most of the time.



The behavioural matrix (after pred, 1967, p.25)

The attempt to incorporate probability into locational analysis (by Pred and other) was an important step toward toning down the "neo-environmentalism" of the spatio-economic models. Various probability-based theories were used to explain and predict locational decisions. The two most important ones were the *game theory* (used as a numerical means to simulate the probable strategies of various participants against uncertainties of their environment) and the *information theory*. Probability offered an opportunity to approximate the idiosyncracies and inconstancies of real-world decision-making, and thus fitted easily into the paradigm of quantitative geography (Gold, 1980, pp. 32-33)

To sum up, Wolpert's various papers (1964, 1965, 1967, 1970) on the satisficing model of decision-making behaviour had contributed to heralding the arrival of a behavioural movement in geography. By the second half of the 1960s, a new branch of geography, termed "behavioural geography" had begun to be identified, so that a special session on behavioural geography was organized at the 1968 meeting of the Association of American Geographers. The papers presented at the session were published the following year under the joint editorship of Cox

and Golledge (1969). The editors described behavioural geography as a subfield of geography "united by a concern for building of geographic theory on the basis of postulates regarding human behaviour". The topics discussed in the volume related to decision-making in spatial contexts, some of which had been exemplified in the recent researches of Wolpert and his associates. So great was the excitement at behavioural thinking in geographical work that many were led to believe that geography had experienced yet another "revolution" *the behavioural revolution*.

Study of Mental Maps

The aspect of behavioural analysis that was most enthusiastically adopted by geographers during this period was the concept of *mental map*, also called the *geographies of the mind*. The seminal influence in this regard came from a paper by Peter Gould (1966) wherein he had argued that since locational decisions were guided by how the decision-maker perceived the quality of his environment, it was necessary for the geographer to map out the mental image of the environment on the basis of which a decision was taken. The theme was more fully developed in Gould and White (1974). Other important publications on this theme included Downs (1970), Downs and Stea (173, 1977), and Saarinen (1979).

8.6.2 Humanistic Geography

As noted earlier, a fundamental distinction may be drawn between two types of behavioural studies pursued in the 1960s: (1) empirical studies oriented toward deriving theories of spatial behaviour, and (2) studies with pronouncedly humanistic orientation. The former group, focused on pursuing objectively verifiable measurement and intersubjective concensus (generalization), was identified as *behavioural geography*; and the latter group concerned in the main with description and literal reconstruction with a view to revealing the self-evident meaning of the environment to the decision-makers, was identified as *humanistic geography*.

Though humanistic geography shared with behavioural geography a general concern for interpreting observable behaviour in terms of what goes on in the mind, in humanistic research (unlike in behavioural) the "scientific" goals of replicable and verifiable measurement were generally discarded in favour of emphasis on understanding the world as seen through the eyes of the individual whose behaviour was under investigation. *Humanistic geography, therefore, may be defined as an approach to human geography which is distinguished by the central and active role it accords to human awareness, human agency, and human creativity*. Viewed thus, humanist geography is simultaneously an attempt toward "understanding meaning, value, and human significance of life events" (Buttimer, 1978), as well as "an expansive view of what the human person is and can do" (Thun, 1976).

The conceptual difference between behavioural geography and the humanistic approach to geography is considered so fundamental in nature that some scholars have described the two perspectives-behavioural and humanistic-as "antithetical". Johnston summed this up by stating that behavioural geography treats man as a response to stimuli, so that it is concerned with identification of how different individuals respond to particular stimuli (and how the same individual responds to the same stimuli in different situations). By isolating the correlated nature of these varying responses, the behavioural geographers have attempted to build models and theories that can predict the probable impact of a given stimulus. The end product of behavioural research is an input to environmental planning with a view to moulding things in a desired manner. As contrasted to this, humanistic geography treats man as an individual ceaselessly interacting with his environment and, in that process, transforming both himself and his milieu. The interaction between an individual and his environment is viewed as a particular case, and not as an example of some scientifically defined model of behaviour.

8.6.2.1 The Radical (Marxist) Stream

Owing to the absence of a Marxist tradition in American social science, the rise of a genuinely radical perspective in that country was a delayed process. This was all the more true of the discipline of human geography wherein political awareness was at a particularly low ebb, so that:

> Even the call for more social relevancy was at first greeted with scepticism and hostility…. Therefore, in this conservative, self-protective little corner of science, "radical" geography took a liberal form for a time, with interest focused on bringing the discipline back into the form of crucial events and applying geographic skills to the immediate practical problems faced by the oppressed groups (Peet, 1977, pp. 15 – 16).

The first conspicuous attempt to radicalize human geography research was pioneered by American geographer William Bunge (the author of the once famous *Theoretical Geography*, 1962), who, in 1968, founded the Society for Human Exploration at Detroit, with its declared objective to induce geographers to take expeditions to the poorest and the most depressed areas with a view to obtaining unbiased firsthand information about them. It was believed that by becoming a person of the region in question, the geographer, by virtue of the experience gained, shall be able to appreciate better the kind of inputs required to improve the lot of the local residents. Such a participatory fieldwork prepares the geographer to take to *planning with* the people rather than *planning for* them. Although the methodology of research developed by the Society of Human Exploration received considerable attention from discerning intellectuals, for a variety of reasons (including the American establishment's inherent distate for socialistic ideas), Bunge's project could not materialize in its entirety, so that his lead to set a new approach to geographical work remained unfulfilled, though the Society did manage to publish a few reports on its explorations.

Another related development starting around this time was that articles began to appear regularly in Antipode (the new journal of radical geography) in which the dominant focus was on the problems of the poorest and most deprived sections of society. Paper and other presentations were motivated with the view to help stop (or at least delay) plans for urban renewal, likely to cause large-scale dislocation of the poor, and to prevent large-size institutions from acquiring inner-city land. As Peet (1977, p. 15 wrote, these articles could be described as "the concept of expeditions writ large".

The actual breakthrough for Marxist thinking in geography had come only in early 1970s. The first geographer to initiate a new beginning in this line of thought, and who succeeded in creating a new trend representing the change over from the dominantly liberal to the Marxist perspective, ghetto formation, had found the existing theories in geography to be quite inadequate for understanding the problem of ghetto formation in American cities. Harvey was convinced that the problem could be effectively attacked only at its source, that is, by eliminating the market-mechanism as the primary regulator of land-use. He pleaded that geographers should adopt a revolutionary perspective thoroughly grounded in the ground reality of the phenomenon that the researcher may seek to investigate. In his view, a Marxist approach to the study of social reality offered the soundest basis for critical examination of the deleterious consequences of the capitalistic system of social organization. In a critique of Harvey's paper, Folke (1972) presented a forceful case for Marxist perspective in geographical work, a perspective that offered a methodological alternative to the currently dominant liberal perspective in geography and the social sciences in general, one which was focused on "the values and interests of the ruling class." Thus,

> From 1972 onwards the emphasis of radical geography changed from an attempt to engage the discipline in socially relevant research to an attempt to construct a radical philosophical and theoretical base for a socially and politically engaged discipline. This base was increasingly found in Marxian theory (Peet, 1977, p. 17).

In this change over, Harvey's own *Social justice and the City* (1973) played a major role. (This book emphasized the need for changeover through a number of semi-autobiographical essays. The book also represented Harvey's own conversion from liberalism to Marxism.)

Harvey rejected Kuhn's (1962), then highly popular, model of scientific development, and its central premise that progress in science is independent of the enveloping material conditions obtaining in the society in question. According to Harvey (1973, p. 125),

> the driving force behind paradigm formation in the social sciences is the desire to Manipulate and control human activity in the interest of man. Immediately the Question arises as to who is going to control whom, in whose interest the controlling is going to be exercised, and if the control is going to be exercised in the interest of all, who is going to take it upon himself to define that public interest

In Harvey's view, the Marxian theory provided "the key to understanding capitalist production from the position of those not in control of the means of production". He maintained that through the Marxian theory the researcher is made aware of the roots of the present social system and the mechanism through which social inequalities are created and perpetuated; and that with the adoption of the Marxist approach to the study of social problems, the geographer can no longer remain a detached observer. Instead, he becomes politically more aware, and gets actively involved in the creation of a more just society.

From around 1974, many of the proponents of social relevance in geographical work had begun to explore Marxist literature to seek guidance for conducting more socially relevant research, with the result that redical geography now became progressively more and more closely identified with the Marxist approach to human problems. Such a development inevitably led to the final parting of the ways between the Liberals and the Radicals. The former began t be labelled by the latter as preservers of status quo (since from a Marxist critical perspective, researches conducted by the liberals tended to view societal problems as resulting from immediate causes, so that such scholars proposed ameliorative programmes of action without questioning the underlying system that had generated and perpetuated societal inequities in the first place).

In line with the general trend in new disciplinary movements, radical geography had initially advanced as a negative reaction to the geographical establishment of the 1960s, which had conceptualized geography as a "fragment of science specializing on spatial arrangement and man's relationship to the physical environment". According to Peet (1977, pp. 17-18), two main aspects of this relationship (between man and the physical environment) became the special target of criticism. These were:

> First that the relationship is with a body of science whose function is Ideological protection of a social and economic system owned and controlled by a ruling minority of its members. Second, that because of this, science has fragmented and, in the particular case of geography, its relationship with the rest of science has to be made obscure. The result is a politically safe, isolated discipline which deals with only a fragment of knowledge; within this fragment, geographers try to find "causes" of the problems they observe in what is the spatial distribution of the results of far deeper social causes.

The Marxist critique, therefore, proposed first, to make geography more obviously part of holistic science (and thus to do away with the artificial barriers between fields of learning); and secondly, to make science (including geography) act "on behalf of the construction of a social and economic system owned and controlled by all the people contained within it".

As Smith wrote, few if any geographers will question the discipline's right to an independent existence. It is necessary for geographers to remember, however, that the spatial or areal perspective imbued by our disciplinary training may often impose blinkers that obscure the role and operation of "non-geographical" factors. Such a narrow "geographical" view of societal problems "risks unconsciously supporting status quo, by failing to identify root causes. *Geography must stand or fall by its demonstrated capacity to enhance human well-being, and not by virtue of its convenience to the existing organization of society and academia"* (Smith, 1977, p. 368). He voiced a word of caution to guard against the potential for familiarity with Marx growing into a fashion effect similar to the one that had accompanied the quantitative revolution in the 1960s: "Marx may have been able to dissect the operation of a capitalist economy, polity and society that we so often miss today. But Marx does not hold the key to every modern problem in complex pluralistic societies" (Smith, 1977, p. 368). Philosophical and methodological rigidity in seeking resolution of societal problems is restrictive of human initiative. Social science research must remain open to alternative perspectives which must not be condemned without giving them try.

8.6.3. FEMINIST GEOGRAPHY:

The term feminist geography subsumes perspectives on feminist politics and the theoris that explore gender relations in society, as applied to the study of gender relations in geography. Interest in the study of feminism dates back to the mid-1970s. it drew inspiration from the women's movements in the west in the 1960s as part of the radicalization of societal perspectives. Feminist geography in thus part of the radical-Marxist orientation of human geography following the "relevance revolution" of that decade. As the Women and Geography Study Group of Institute of British Geographers (1984) put it, "In common with other approaches in geography which are critical of mainstream work", feminist geography tries to "analyse and understand why women reamin in subordinate position" in society and the professions. To the feminist geographers, implications of gender in the study of geographer are at least as important as the implications of any other social or economic factor which transforms society and space.

Feminist geographers use the term gender to refere to socially created distinction between feminity and masculinity, while the term sex is used to refer to the biological defferences between men and women. Thus the IBG group fdefined feminist geography as "a geography which explicitly takes into account the socially creates gender structure of society; and in which a commitment, both towards real equality, in the long term, is expressed".

A feature common to all feminist argument is that the differences in social positions of men and women systematically work to the advantage of men so that women and men in fact have unequal power, opportunities, and social status. Feminist geography aims at exploring the ways in which current practices in society might be changed in order to release women from the state of subordination. *Studies aimed at examining differences in spatial behavious patterns of men and women are decried, since:* at its worst, this can simply lead to a proliferation of topics in…*the discipline in which the spotlight is simple turned on to women: as in, for example, "women and development", "women and transport geography", "women and housing"…At its best, such work amy document and demonstrate the social inequalities facing women, but it will not explain why these have arisen [women and geography study group (WGSG), 1984,p.25].*

Radical Feminism:

Distiction is sought to be drawn between radical feminism and socialist feminism. Radical feminism considers the subordination of women by men as the primary inequality in human society. It is argued that the division of labour between men and women had preceded (and given birth to) the division of labour between class and race. The radical feminists insist that elimination of sexual oppression (subordination) should form the cornerstone of attempts to eliminate other types of oppressions in society. The radicals insist that men and women form (at the present) the two fundamental classes in society. Just as Marx urged the working classes to seize control over the means of production so also the radical feminists (like Firestone, 1971) insist that women must seize control over the means of biological reproduction in order that they are freed from male domination. However, in this entire process emphasis has to be given to gender roles rather than sexual roles. The root cause of the oppression of women in society

is traced to the system of patriarchy which is defined as a set of social norms of relation between men and women which establishes a pattern of interdependence and solidarity between then which functions in favour of male domination over females. From such a antagonistic classes irrespective of divisions on either side on the basis of age, race and income status. The adherents of radical feminism emphasize that male domination of the man-women relationship has resulted in restricting women largely to the private sphere where they are made to carry out many personal services for men-services which remain largely unreciprocated-apart from having to carry the burden of child rearing. Patriarchy, therefore, works to ensure that the vast majority of women remain legally and economically dependent on their men. This process of subordination through patriarchy begins early in life so that little girls are allowed far less freedom of movement than boys of the same age, and the process becomes all the more visible at the adolescent stage. Radical feminists appear united in viewing men as the enemy in their struggle for women's liberation; they insist on examining women's and men's behavior in terms of interrelationships between the two genders, setting aside other types of cleavages in society.

8.6.4. THE MEANING OF MODERN VERSUS POST-MODERN GEOGRAPHIES:

It is currently fashionable to talk of modernism and post-modernism in social discourse though precise meanings of the two terms are not always clear; so that one commentator described them as "the buzzwords of the 1980s". Important issues are, however, at stake so that the debate on post-modernism cannot be dismissed simply as "the product of disciplinary politicking, in which ascendant academics are once again jostling for new stalls in the intellectual marketplace", or as "little more than the cultural logic of late capitalism, the designer label on the baggage of flexible accumulation" (Gregory,1989,p.348).

The two terms are closely interrelated so that it is not possible to understand post-modernism without due reference to the history and nature of modernity. Following the *Dictionary of Human Geography* (1994), *modernity* may be described as "A particular constellation of power, knowledge and social practices which first emerged in Europe in the sixteenth and seventeenth centuries and the forms and structures of which changed over time and extended themselves over space until, by the middle of the seventeenth century, they constituted the dominant social order on the planet". Toward the end of the eighteenth century "the idea of being modern came to be associated not only with novelty but, more particularly, with looking forward rather than backward: with the so-called "Enlightenment project" of reason, rationality and progress towards truth, beauty and just life". In the middle of the nineteenth century, Marx and Engels found an essential connection between modernity and the revolutionary dynamics of capitalism under the impact of which "All fixed, fast-frozen relations, with their train of ancient and venerable prejudices, are swept away, all new formed ones become antiquated before they can ossify. All that is solid melts into air", wrote Marx and Engels.

As noted earlier, the beginings of the modern world system are traced back to the sixteenth century, beginning in Europe, and organized around market exchange at international scale. But the process was greatly intensified through the nineteenth and the twentieth centuries through global scale of economic operations, so that modernity became identified as the system of market-based political-economic structure and organizations. Thus, by the second half of the twentieth century, a, profound crisis of identity and representation had begun to be felt all around-in the arts, humanities, and the social sciences-particularly in the Western metropolises and the colonial capitals, owing to the accelerated pace of time-space compression. By the end of the 1950s, the modern way of viewing phenomena in terms of Cartesian coordinates had begun to be questioned,separation between palce and space begun to be drawn, and the idea of bounded cultures through which one could journey out and analyse other cultures appeared no longer relevant (Clifford,1988,p.2). All this called for new approaches to explanation of social reality- approaches focused on space specificity, that is, approaches beyond the modernist tradition of universalism. This had marked the beginning of post-modernism in social thought. There are constrasting perspectives on the plus and minus sides of modernity, as defined above.

As Gregory wrote, one set of commentators holds that:

…modernity was an unqualified human good which promised to banish ignorance, misery and despotism; to free human begins from myth and superstition, disease and hunger, oppression and arbitrary rule. In the middle years of the twentieth century these assumptions culminated in models of modernization, and development programmes which sought to remake the so called traditional world in the image of the West (Gregory, 1994a).

But as critics have noted, these blessings were a mixed lot, sice modernism had been closely interwined with the processes and objectives of colonialism and repressive imperialism, besides ethnocentrism rooted in European cultural values and perspectives:

To other commentators, therefore, modernity has always had its dark side, many of them argued (in different ways) that European modernity installed new grids of power and surveillance which, in Max Weber's well-known image, confined human agency consciousness and creativity within an "iron cage" of bureaucracy and regulation (Gregory, op.cit).

Giddens (1990) has drawn attention to four major institutional dimensions of modernity: surveillance, industrialism, capitalism, and military power. He has also proposed an equivalent nexus of political strategies wherein the interwining of the local and the global scales, and of life-pilitics and emancipatory politics are underlined.

Modernity, Modernization and Modernism:

The Social Science Context:

In a social scientific context Berman (1982) refers to modernity as "a mode of vital experience", a collective sharing of a particularized sense of "self and others", and of "life's possibilities and perils". "Modernity is thus comprised of both context and conjecture, the specificity of being alive in the world at a particular time and place, a vital sense of what is contemporary. As such, it becomes a useful general term to capture the specific and changing meaning of the three most basic and formative dimensions of human existence: space, time, and being; the spatial, temporal, and social orders of human life" (Soja, 1989a,pp.320-321).

The concept of modernity is intimately related to the multiple reconfigurations of social life that have punctuated the historical geography of capitalism since the sixteenth century. In this context, modernization refers to "the many different processes of structural change associated with the ability of capitalism to develp and survive, to reproduce successfully its fundamental social relations of production and distinctive divisions of labour". As Soja (op.cit) points out, "these restructuring processes are continuous, but they become especially critical and accelerated during periods of deep and systematic global crisis" like the one we have entered since around late 1960s. such periodically intensified modernizing episodes of capitalism are, in the words of Berman (1982, p.16) shaped by:

...the industrialization of production, which transforms scientific knowledge into technology, creates new environments and destroys lod ones, speeds up the whole tempo of life, generates new forms of corporate power and class struggle; immense demographic upheaval, severing millions of people from their ancestral habitats, hurtling them halfway across the world into new lives; rapid and often cataclysmic urban growth; systems of mass communications, dynamics in their development, enveloping and binding together the most diverse people and societies; increasingly powerful national states, bureaucratically structured and operated, constantly striving to expand their powers; mass movements of people and peoples challenging their political and economic rules, striving to gain control over their lives; finally, bearing and driving all these people and institutions along, an ever expanding, drastically fluctuating capitalist world market.

In broad terms, *modernism "*refers to the cultural, ideological, reflective and … theory-forming reactions to modernization and restructuring… Modernism is thus the explicitly evaluative, culture-shaping and situated consciousness of modernity and is itself roughly able to be split into periods in conjunction with the historical rhythms of intensified capitalist crisis, restructuring and modernization"(Soja, 1989a, also see Soja, 1989b).

8.6.5 ON THE NATURE OF POSITIVIST EXPLANATION

The origins of positivism go back to the nineteenth century French social philosopher Auguste Comte (1798-1857) who believed that the methods of the natural sciences could with equal profit be applied to the study of social phenomena. This implied that: general laws can be developed in the social sciences; these laws (like the laws in the natural sciences) may provide social scientists a basis for prediction; which can be used to manipulate causal variables with a view to bringing about desired improvements in society through social-economic planning.

Comte had put forward his ideas in the form of private lectures in his apartments at Paris. The lectures were attended among others by Humboldt, then nearly sixty. Comte's lectures were published as a book entitled *Cours de Philosophic Positive* in 1829. Comte's philosophy of positivism incorporated the following basic precepts:

- All scientific knowledge must be based on direct experience of an immediate reality, since direct observation is the surest guarantee that the knowledge acquired is scientific. The direct experience of reality should be complemented by *la certitude*, that is, the unity of scientific method. This implied that the different branches of knowledge were distinguished by their object of study (i.e., the subject matter) and not their method. In other words, sciences differ from one another in *what* they study rather than *how* they study.

- The concept of unity of the scientific method required *le precis*, that is, a common scientific goal of formulating testable theories. This implied that there was no place for subjective value-judgements in scientific inquiry since, being based on ethical assertions, value judgements are not products of scientific observation; and are as such, not verifiable.

- Positivist view of science incorporated the principle of *I'utile*, which meant that all scientific knowledge must serve some useful purpose—it should be utilizable, it should be a means to an end, and a tool for social engineering.

- The fifth precept was *le relative*, which meant that scientific knowledge is essentially unfinished and relative, because knowledge keeps progressing by gradual unification of theories which in turn enhance man's awareness of social laws. Greater awareness demands more comprehensive theory.

This was the original view of positivism that had dominated scientific thinking for almost a century. However, what is generally referred to as logical positivism (or logical empiricism) since around early 1950s, is a body of principles developed by a group of philosophers at the University of Vienna in the 1920s and 1930s. They accepted the basic scheme of Comte but codified its principles for the conduct of scientific inquiry in order that it could lead to well-founded generalizations and theories.

As a set of scientific principles, logical positivism is concerned with acquisition of knowledge in the form of general statements obtained through accepted scientific procedures of observation and analysis, that can be used in manipulating phenomena with a view to bringing about the desired results. This was the general concept of science that the positivists believed in. This concept incorporated a set of three related doctrines: *Scientism,* i.e., the claim that the positivist method is the only true method for obtaining knowledge; *scientific politics,* which means that positivism is the key to rational solution of all problems of society—it is the fundamental premise behind the concept of social engineering; and *value-freedom,* which means that scientific judgements are objective and independent of moral or political commitments.

As a philosophy and methodology, positivism had been developed almost entirely through the efforts of natural scientists with a view to improving the quality of research in the natural science. As such, the application of the principles of positivist thought to the social sciences came to be regarded as the doctrine of "naturalism", which implied that problems of social organization could be studied by using the methods of science. The fundamental tenets of this doctrine are:

- All social phenomena involving human decision have a definite cause which can be identified and verified. This is known as the principle of *causation.*
- Decision-making results from the operation of a set of behavioural laws to which individuals in society conform. This is called the principle of *behaviourism,* which means that a given stimulus under given circumstances will produce a particular response (so that behaviour can be predicted).
- Social reality is an objective reality comprising individual behaviour and its results, which can be observed and recorded in an objective manner through the use of universally accepted scientific procedures. This is known as the principle of *realism.*
- The scientist is a disinterested observer who can stand outside the social phenomenon he is inquiring into (even though in his day-to-day life he may be part of it). This is known as the principle of *disinterested observation.*

- Like other organisms in nature, human society is an organic whole (having a definite structure) which changes in a determinate manner, according to certain observable laws. This is known as the principle of *functionalism*, and implies that various elements in society occupy a particular location and perform a related function within it.
- The laws and theories of positivist social science can be used in moulding society in a desired direction either by changing the laws which operate in particular circumstances, or by changing the circumstances in which laws will operate. This is known as the doctrine of *social engineering.*

8.6.5.1 Logical Positivism and Human Geography

Though logical positivism became widely accepted as a working principle in human geography only in the 1950s, the introduction of the principles of positivist science in Anglo-American geography may be traced back to Carl Sauer's essay on the *Morphology of Landscape* (1925) wherein he had declared that "causal geography" had had its day, and that geography could then on be established as a "positive science". Sauer wrote that "one need not seek for something beyond the phenomena; they themselves are the lore *(Lehre)"*, that is, laws. Many geographers (including Hartshorne) found it difficult to accept the proposition that scientific explanation in geography should be restricted to the phenomenal level. The search for causal laws had begun to be avoided, because: In the minds of many geographers causality was still uncomfortably close to the discredited thesis of environmental determinism, ... Hartshorne was, therefore, anxious to present geography as a science concerned with the functional integration of phenomena" rather than with "the *processes* of particular kinds of phenomena". This reaffirmed its commitment to the discovery of spatial associations (Gregory 1978, p. 30).

Hartshorne described geography as a "naive science" which looked at "things as they are actually arranged and related" (Hartshorne, 1939, p. 594). This meant that although geography could operate at a non- phenomenal level, it continued to be confined to the demonstration of regularities—simple correlations—and was not to be permitted to disclose causal relations. The result was that despite its positivist mould, geography continued as an essentially idiographic (or exceptionalist) discipline.

Human geography was one of the last of the social sciences to adopt positivist approaches on a wide scale. There were several reasons for this. Geography had very weak links with the other social sciences until relatively recently; the discipline's main links to the natural sciences, through physical geography, were with geology in which positivism was not dominant; and owing to its firm base in the humanities (alongside a nonsocial scientific history) and exceptionalist philosophy, it failed to adapt the positivist methodology. Thus, although Schaefer's paper "had opened the door to the premises of logical positivism, their admission into the discipline was slow and, as it were, through several side entrances rather than up the main steps" (Gregory, 1978, p. 32).

One of the most significant innovations of logical positivism was its recognition of the basic distinction between *analytic* and *synthetic* statements. Analytic statements are defined as *a priori* propositions whose truth is guaranteed by their internal definitions (i.e., tautologies). Analytic statements constitute the domain of the "formal sciences" (logic and mathematics) which play a vital role in maintaining the coherence of the systems of *synthetic statements*, whose truth has to be established empirically through the conventional method of hypothesis testing. This innovation signified a major break with the Comtean model in that it accepted that some statements could be validated without actual experience and observation, and thereby conferred upon the deductive mode of explanation a high scientific respectability.

Though the new geography as spatial science was cast in the logical- positivist mould, much work in the discipline depended on inductive- statistical rather than deductive-mathematical methods of explanation, irrespective of the discipline's overriding concern with derivation, validation, and integration of general theorems of spatial organization. The debate over exceptionalism had given legitimacy to, and established the superiority of, the nomothetic perspective vis-a-vis the idiographic concept of the discipline that was pursued under geography as chorology. The search for theory led to inter-disciplinary explorations, so that a number of theories from the other social sciences (economics, psychology, and sociology)—where logical positivism had already become an accepted principle and was yielding fruitful results—were incorporated in the new theoretical formulations about spatial structures.

As Bowen (1970, 1979, 1981) noted, both Kant and Humboldt had rejected brute empiricism of Comte's positivist view of science. Still, much of the subsequent development of geography as a science had remained dominated by an undeclared acceptance of some of the Comtean assumptions. This explains why at the time that "new geography", cast into the logical-positivist mould, had appeared on the scene in the 1950s, many a discerning scholar had found it "less of a radical departure than logical extension of ideas which were already generally accepted by many geographers" (Guelke, 1978). Whereas in chorological geography, the student had to choose between a systematic (i.e., lawmaking) perspective vis-a-vis the goal of description of areal integration in particular places viewed as unique examples of their kind (i.e., idiographic-regional study), in new geography as spatial science, theory and generalization were enshrined as the focused objective of the discipline. As Guelke wrote, Schaefer's insistence on the need for geographers to develop laws had "created a major crisis within the discipline" then dominated by the Hartshonian concept of geography as "areal differentiation". However, in view of the fact that the world of learning was currently permeated by the spirit of law-seeking science, it was not surprising that most geographers opted for geography as a lawmaking (or law-seeking) science. As Harvey wrote.

> ...the student of history and geography is faced with two alternatives. He can either bury his head ostrichlike, in the sand grains of an idiographic human history, conducted over unique geographic spaces, scowl upon broad generalization, and produce a masterly descriptive thesis on what happened when, where. Or he can become a scientist and attempt, by normal procedures of scientific investigation, to verify, reject, or modify, the stimulating and exciting ideas which his predecessors presented him with (Harvey, 1967, p.551).

PAPER-III

November – 17

Unit – 8

1. Who among the following emphasized on the behavioural environment in Geography ?

(1) Johnston (2) Kirk (3) Gregory (4) Burton

2. Who among the following developed the concept of mental map ?

(1) Gould and White (2) Boulding and Haggerstrand

(3) Downs and Stea (4) Saarinen

3. "Space is Socially or Culturally Constructed " is the view under :

(1) Behaviouralism (2) Logical Positivism

(3) Structuralism (4) Post Modernism

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
11.	25	B	8.6.1
12.	26	A	8.6.1
13.	29	D	8.6.4

PAPER-II

January- 17

1. The concept of 'paradigm' was propounded by

(1) Peet (2) Haggett (3) Kant (4) Kuhn

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	18	D	8.6.2, 8.6.2.1

PAPER-II

July- 17

1. Which one among the following perspectives was responsible for redicap transformation in the sprit and purpose of geography ?

(1) Structuralism (2) Post-modernism

(3) Humanism (4) Quantification

2. Who among the following scholars emphasized on the behavioural approach in Geography ?

(1) Johnston (2) Kirk (3) Burton (4) Gregory

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	40	D	8.6.2.1
2.	35	B	8.6.1

PAPER-III

July- 16

1. Who founded the Humanistic school of geography ?

(1) Wolpert (2) Tuan

(3) Kirk (4) Harvey

2. Which of the following statements is not true about Humanism in Geography ?

(1) Humanism does not treat humans as machines.

(2) Humanistic geography gives importance to human awareness, human consciousness and human duality.

(3) Humanists accept the reduction of space and place to geometrical concepts of surface.

(4) Humanism developed and criticised positivism and quantitative revolution.

3. “Social processes explain the spatial organization”, this statement pertains to

(1) Humanism (2) Marxism

(3) Positivism (4) Behaviourlism

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	28	B	8.6.2
2.	49	D	8.6.2
3.	52	B	8.6.2.1

PAPER-II

July- 16

1. Which one of the followings is the philosophical basis of Quantitative revolution ?

   (1) Positivism (2) Existentialism

   (3) Idealism (4) Probabalism

2. Who among the following developed the concept of 'Mental Map' ?

   (1) Downs and Stea (2) Saarinen

   (3) Gould and White (4) Boulding and Haggerstrand

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	17	A	8.6.5.1
2.	20	C	8.6.1

PAPER-II

December- 15

1.Who among of the following is associated with the concept of 'Mental Map' ?

(1) P. Geddes (2) F. Perroux

(3) Lynch (4) Friedmann

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	17	A	8.6.1

PAPER-III

December- 15

1. 'There is a strong relationship between environment, image and decision making.' This statement pertains to:

(1) Humanism (2) Behaviouralism

(3) Radicalism (4) Welfare Approach

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	26	B	8.6.1

PAPER-III

June- 15

2. Who among the following scholars is not related with behavioural geography?

(1) W.K. Kink (2) Peter Gould

(3) Yi Fu Twan (4) Gilbert White

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	31	C	8.6.1

PAPER-II

June- 15

1. Match List-I wiith List-II and select the correct answer from the codes given below:

List-I (Approches)	List-II (Contributors)
(a) Neo-Determinism	(i) D.M. Smith
(b) Welfare	(ii) Guman Olsson
(c) Behavioral	(iii) Griffith Taylor
(d) Modern Humanist	(iv) William Kirk

Codes:

	(A)	(B)	(C)	(D)
(1)	(i)	(ii)	(iii)	(iv)
(2)	(iii)	(i)	(iv)	(ii)
(3)	(iv)	(iii)	(ii)	(i)
(4)	(ii)	(iv)	(i)	(iii)

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	17	B	8.6.1, 8.6.2

PAPER-III

June- 14

1. Which one of the following statements is not true about Humanism in Geography.

(A) Humanism does not treat humansas machines.

(B) Humanistic geography gives importance to human awareness,human consciousness and human creativity.

(C) Humanists accept the reduction of space and place to geometrical concepts of surface.

(D) Humanism developed as criticism against positivism and quantitative revolution.

2. Match List-I with List-II and select the correct answer using the codes given below :

List– I (Philosophical approaches)	**List – II (Advocates)**
i. Idealistic	a. Relph
ii. Phenomenological	b. Harris and Guelke
iii. Radical	c. Smith
iv. Welfare	d. Bunge

Codes :

	a	b	c	d
(A)	iv	ii	i	iii
(B)	ii	i	iv	iii
(C)	iii	iv	ii	i
(D)	ii	iii	i	iv

3. Welfare approach in geographic studies emphasises spatial variation in–

(A) Socio-Economic development (B) Public-private partnership in development

(C) Infrastructural development (D) Quality of life

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	28	D	8.6.2
2.	29	B	8.6.1, 8.6.2, 8.6.3
3.	73	D	8.6.1, 8.6.2, 8.6.3

PAPER-II

December- 14

1. The philosophical view advocating that man is responsible for making his own nature is known as

(A) Positivism (B) Functionalism

(C) Existentialism (D) Pragmatism

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	20	A	8.6.2

PAPER-II

November – 17

Unit – 8

EXTRA QUESTION

1. Which one of the following pairs does not match correctly ?

(1) P. Hagget - Geography a modern synthesis

(2) G.P. Marsh - Explanation in Geography

(3) P.E. James - All possible worlds

(4) Abler, Adams and Gould - Spatial organizations

Answer with Reference

SL. NO.	QUESTION NO.	ANSWER	REFERENCE NO.
1.	19	B	