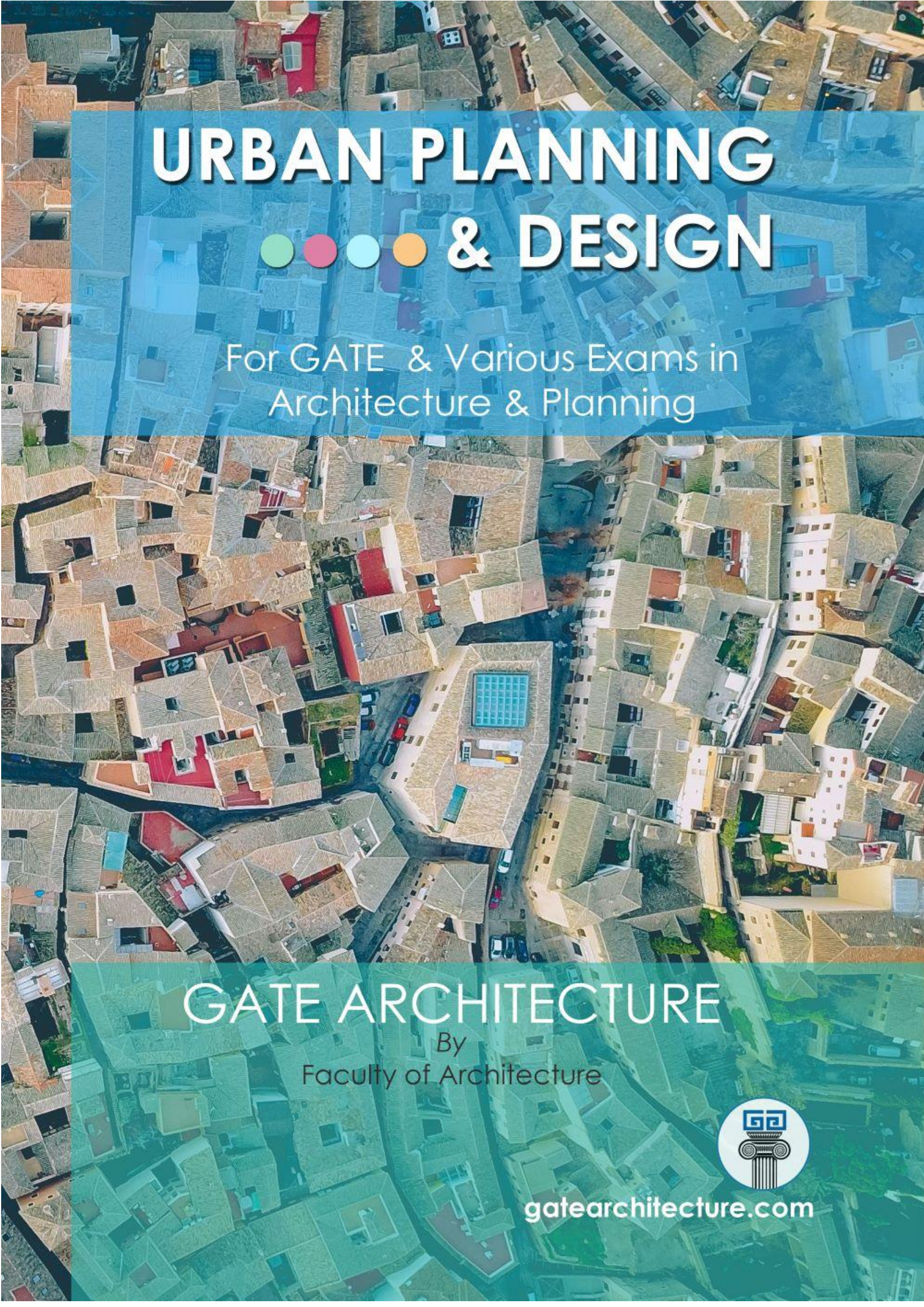


URBAN PLANNING & DESIGN

For GATE & Various Exams in Architecture & Planning

GATE ARCHITECTURE

By

Faculty of Architecture

gatearchitecture.com

Introduction

We have covered most of the topics relevant to this book in a very detailed yet concise manner. However, some topics are better described in our GATE QUESTION BANK (in both Color and B&W editions). Therefore, we recommend to read this book along with our GATE QUESTION BANK even if you are preparing for various other competitive examinations. This book is prepared strictly based on GATE syllabus.

SYLLABUS GATE 2023

Architecture and Planning (AR): New Pattern

New

The Paper contains General Aptitude (GA) section (15 Marks) as applicable for all papers of GATE 2023.
The Paper consists of two parts covering the syllabus: Part A (60 marks) and Part B (25 marks).
Part A is compulsory for all the candidates.
Part B contains two **optional** sections**:** Part B1 (Architecture) and Part B2 (Planning).
Candidates have to choose any one of these during the examination! (Part B1 or Part B2)

Highlighted texts below are the syllabus part from which questions were asked in GATE AR 2023 and the superscripts are the question numbers.

Part A: General
Section 1: Architecture, Planning and Design
Architectural Graphics[11]; Visual composition in 2D and 3D [(48 Nume.)]; Computer application in Architecture and Planning[13]; Anthropometrics; Organization of space[23]; Circulation- horizontal and vertical; Space Standards; Universal design[26]; Building byelaws; Codes and standards;

Section 2: Construction and Management
Project management techniques e.g. PERT, CPM [(46 Nume.)] etc.; Estimation[(45 Nume.)] and Specification; Professional practice and ethics[12, 36]; Form and Structure; Principles and design of disaster resistant structures; Temporary structures for rehabilitation;

Section 3: Environmental Planning and Design
Natural and man-made ecosystem[16, 28]; Ecological principles; Environmental considerations in Planning and design; Environmental pollution- types, causes[19, 27], controls and abatement strategies; Sustainable development[33], goals[34] and strategies[20]; Climate change and built environment; Climate responsive design;

Section 4: Urban Design, landscape and Conservation
Historical and modern examples of urban design; Elements of urban built environment –urban form, spaces, structure, pattern, fabric, texture, grain etc.; Concepts and theories of urban design[17]; Principles, tools and techniques of urban design; Public spaces, character, spatial qualities and Sense of Place; Urban design interventions for sustainable development and transportation; Development controls – FAR, densities and building byelaws[30].; Urban renewal and conservation; heritage conservation[14, 25]; historical public spaces and gardens[22, 38]; Landscape design; Site planning;

Section 5: Planning process
Salient concepts, theories and principles of urban planning; concepts of cities - Eco-City, Smart City; Concepts and theories by trendsetting planners and designers[21,31]; Ekistics; Urban sociology; Social, Economic and environmental cost benefit analysis[41]; Methods of non-spatial and spatial data analysis; Development guidelines such as URDPFI[15, 76];

Section 6: Housing
Housing typologies; Concepts, principles and examples of neighbourhood; Residential densities[32]; Affordable Housing[71]; Real estate valuation [(47 Nume., 49 Nume.);]

Section 7: Services and Infrastructure
Firefighting Systems[24]; Building Safety and Security systems[35]; Building Management Systems; Water treatment; Water supply and distribution system; Water harvesting systems[39, (44 Nume.)]; Principles, Planning and Design of storm water drainage system; Sewage disposal methods[37]; Methods of solid waste management[40] - collection, transportation and disposal; Recycling and Reuse of solid
Waste[42]; Land-use – transportation - urban form inter-relationships; Design of roads, intersections, grade separators and parking areas; Hierarchy of roads and level of service; Para-transits and other modes of transportation, Pedestrian and slow-moving traffic planning;

Part B1: Architecture
Section B1.1: History and Contemporary Architecture
Principles of Art and Architecture; World History of Architecture[57]: Egyptian, Greco-Roman classical period, Byzantine, Gothic, Renaissance, Baroque-Rococo, etc.; Recent trends in Contemporary Architecture: Art nouveau[56], Art Deco, Eclecticism, International styles, Post Modernism, Deconstruction in architecture, etc.; Influence of Modern art and Design in Architecture;

Indian vernacular and traditional Architecture[53], Oriental Architecture; Works of renowned national and international architects[29, 58, 60];

Section B1.2: Building Construction and Structural systems
Building construction techniques, methods and details; Building systems and prefabrication of building elements; Principles of Modular Coordination[51]; Construction planning and equipment; Building material characteristics and applications[50, 55]; Principles of strength of materials[64]; Alternative building materials; Foundations; Design of structural elements with different materials; Elastic and Limit State design; Structural systems[65]; Principles of Pre-stressing; High Rise and Long Span structures, gravity and lateral load resisting systems;

Section B1.3: Building Services and Sustainability
Solar architecture[61]; Thermal[54], visual[62] and acoustic comfort in built environments[52]; Natural and Mechanical ventilation in buildings; Air-Conditioning systems; Sustainable building strategies; Building Performance Simulation and Evaluation; Intelligent Buildings; Water supply; Sewerage and drainage systems[63]; Sanitary fittings and fixtures; Plumbing systems[59]; Principles of internal and external drainage system; Principles of electrification of buildings; Elevators and Escalators - standards and uses;

Part B2: Planning
Section B2.1: Regional and Settlement Planning
Regional delineation; settlement hierarchy; Types and hierarchy of plans; Various schemes and programs of central government[67]; Transit Oriented Development (TOD), SEZ, SRZ etc.; Public Perception and user behaviour[66]; National Housing Policies, Programs and Schemes.; Slums, Squatters and informal housing; Standards for housing and community facilities; Housing for special areas and needs;

Section B2.2: Planning Techniques and Management
Application of G.I.S and Remote Sensing techniques in urban and regional planning[77, 79]; Tools and techniques of Surveys[72] – Physical, Topographical[80], Land use and Socio-economic Surveys; Urban Economics, Law of demand and supply of land and its use in planning; Graphic presentation of spatial data; Local self-governance[43], Panchayati Raj institutions[78]; Planning Legislation and implementation[74] – Land Acquisition Act, PPP etc.; Decision support system[18] and Land Information System; Urban geography and econometrics; Management of Infrastructure Projects; Demography and equity in planning;

Section B2.3: Infrastructure Planning
Process and Principles of Transportation Planning[73] and Traffic Engineering; Road capacity and Travel demand forecasting[70, (81 Nume.)]; Traffic survey methods, Traffic flow Analysis[68]; Traffic analyses and design considerations[75]; Traffic and transport management and control in urban areas; Mass transportation planning; Intelligent Transportation Systems; Urban and Rural Infrastructure System Network.

General Aptitude (15 marks)
Verbal Aptitude
Basic English grammar: tenses[1], articles, adjectives, prepositions, conjunctions, verb-noun agreement[2], and other parts of speech
Basic vocabulary: words, idioms, and phrases in context Reading and comprehension[6] Narrative sequencing[8]

Quantitative Aptitude
Data interpretation: data graphs (bar graphs, pie charts[3], and other graphs representing data), 2-and 3-dimensional plots[10], maps, and tables
Numerical computation[7] and estimation: ratios, percentages, powers, exponents and logarithms, permutations and combinations[9], and series
Mensuration and geometry Elementary statistics and probability

Analytical Aptitude
Logic: deduction and induction, Analogy, Numerical relations and reasoning[4,5]

Spatial Aptitude
Transformation of shapes: translation, rotation, scaling, mirroring, assembling, and grouping Paper folding, cutting, and patterns in 2 and 3 dimensions

Content

(Based on GATE Syllabus)

1.1 Architectural Graphics

Architectural Graphics focuses on the techniques, methodologies, and graphic tools used in conveying architectural ideas. It deals with equipment (including software for vector and non-vector graphics) and materials, architectural drafting and drawing. Topics include tonal values, media and techniques, value/texture rendition, material rendition, shades and shadows, people, furniture and graphic representation symbols.

Important terms:
The depth of a receding surface: It refers to the z-axis of an object, as opposed to the object's x-axis or y-axis, (its width and height). There are two main ways to discover the depth of a receding surf ace. One way is to use diagonal lines with a scale that recedes. The second way is through the use of a scale on the base-line or parallel to it. The first method is often used in free-hand sketching such as a foreshortened row of fence posts.

Accelerated perspective: An intentional exaggeration of perspective often in a stage setting to permit a shallower than appears actual stage depth.

Aerial perspective, atmospheric perspective: Often employed in painting, aerial perspective is the way in which an illusion of space and depth is created through the use of atmospheric techniques. These techniques include making forms in the background region with less contrast and softer edges than those in the forefront of the picture plane. Often in atmospheric perspective there exists a change from warmer hues to cool hues. In general, warmer colors come forward, and cooler colors recede (advancing and retreating color). The atmospheric effect in a picture is due to the degree of moisture suspended in the air. Painters especially employ atmospheric perspective by using clouds or inserting mists in various value tones among the middle areas of the picture plane and introducing fainter tones in the far distance. Aerial perspective is often used together with linear perspective to create a strong sense of spatial depth in the picture.

Aerial View: Also known as a bird's eye view. This is the viewpoint seen at a high elevation. It involves the vanishing point/s and horizon line being positioned on the upper portion of an image. It is usually used in reference to a landscape or a cityscape. (Aerial view is not the same thing as aerial perspective.)

All-over composition: A style of painting in which the entire surf ace of the piece is worked on in a more or less uniform way, and the normal way of treating composition (with the picture having a center, top or bottom) is not considered. The term was originally used in response to Jackson Pollock's drip paintings. Later the term was used to refer to other pieces that refrain from the usual compositional approaches. In this way, the Impressionists "liberated" artists from a decided center of interest - and not necessarily to one of no composition - but rather to multiple or all-over points in the picture plane.

Angular perspective: Angular perspective is a type of linear perspective. All categories of linear perspective include a horizon line and a stationary point (the position of the observer). In two-point perspective, there exist two points from which an object's lines radiate from; the sides of the object vanish to one of two vanishing points on the horizon line. An object's vertical lines do not relate to the perspective rules of the horizontal lines. By changing the vanishing points of the object, one can make increase or decrease the size of the object. Angular perspective is the same as two-point perspective.

Axis: An axis is a line that runs straight through something in order to show the direction and movement of something. The line is purely conceptual – it is often used as a helpful tool for artists.

Center Vanishing Points (CVP): The point located on the horizon line that connects to the observation point. Usually, it is at this point where the horizon line and centerline intersect each other. It is also at this point where lines parallel to the picture plane disappear.

Centerline (CL): A line, marked as "CL," that is drawn down the middle of a drafting.

Cone of vision: It is the visual region displayed by a drawing that relates to a person's normal vision without his/her peripheral vision. In a nutshell, the cone of vision is the area of sight – or the angle of sight. For example, if a person wanted to see the entire theatre stage, usually a cone of vision is 60 degrees is required, so a person would need to sit far enough back to achieve this degree of vision.

Convergence: Convergence in a drawing or painting refers to linear perspective. In linear perspective, all lines that are parallel converge together as they run along to a point at a person's eye level (also known as the horizon line) in the picture place. This phenomenon is known as "convergence."

Curvilinear perspective: A perspective view in which straight lines appear to be curved. Close-up and wide-angle views commonly relate to the perspective.

Diminution: It occurs in linear perspective; it involves objects becoming smaller and smaller as the space between the viewer and the object increases.

Eye Level: Eye level refers to the height a viewer's eyes are positioned in relation to the ground. There are various eye levels.

Fore shortening: An illusion of the eye, creating the effect that objects become smaller the further away they are, and become larger the closer they are to the viewer. Foreshortening is used in drawing in order to create a sense of depth and make objects appear to exist spatially to each other.

2.1 Natural and man-made ecosystem

Ecosystem

An ecosystem is a structural and functional unit of nature and it comprises abiotic and biotic components. Abiotic components are inorganic materials- air, water and soil, whereas biotic components are producers, consumers and decomposers. Each ecosystem has characteristic physical structure resulting from interaction amongst abiotic and biotic components. Species composition and stratification are the two main structural features of an ecosystem. Based on source of nutrition every organism occupies a place in an ecosystem.

Organisation of Life

Various levels of organization exist in the living systems starting from the molecules such as DNA (genes) to the whole biosphere. The levels of organization are as follows: Genes → Cell → organ → organism → Species Population → Community → Ecosystem → Biome → Biosphere

Biotic Interactions in Ecosystems

The biological community in an area or ecosystem is a complex network of interactions. The interaction that occurs among different individuals of the same species is called intraspecific interaction while the interaction among individuals of different species in a community is termed as interspecific interaction.

Possible biological interactions between two species:	
Type of interaction	*Effects of interaction*
Amensalism	One species is inhibited while the other species is unaffected
Predation	Predator-prey relationship: one species (predator) benefits while the second species (prey) is harmed and inhibited.
Parasitism	Beneficial to one species (parasite) and harmful to the other species (host).
Competition	Adversely affects both species
Commensalism	One species (the commensal benefits, while the other species has neutral Interactions)
Neutralism	Neither species affects the other (the host) is neither harmed nor inhibited
Mutualism	Interaction is favourable to both species

Productivity, decomposition, energy flow, and nutrient cycling are the four important components of an ecosystem. Primary productivity is the rate of capture of solar energy or biomass production of the producers. It is divided into two types: gross primary productivity (GPP) and net primary productivity (NPP). Rate of capture of solar energy or total production of organic matter is called as GPP. NPP is the remaining biomass or the energy left after utilisation of producers. Secondary productivity is the rate of assimilation of food energy by the consumers. In decomposition, complex organic compounds of detritus are converted to carbon dioxide, water and inorganic nutrients by the decomposers. Decomposition involves three processes, namely fragmentation of detritus, leaching and catabolism.

Energy flow is unidirectional. First, plants capture solar energy and then, food is transferred from the producers to decomposers. Organisms of different trophic levels in nature are connected to each other for food or energy relationship forming a food chain. The storage and movement of nutrient elements through the various components of the ecosystem is called nutrient cycling; nutrients are repeatedly used through this process. Nutrient cycling is of two types—gaseous and sedimentary. Atmosphere or hydrosphere is the reservoir for the gaseous type of cycle (carbon), whereas Earth's crust is the reservoir for sedimentary type (phosphorus). Products of ecosystem processes are named as ecosystem services, e.g., purification of air and water by forests.

The biotic community is dynamic and undergoes changes with the passage of time. These changes are sequentially ordered and constitute ecological succession. Succession begins with invasion of a bare lifeless area by pioneers which later pave way for successors and ultimately a stable climax community is formed. The climax community remains stable as long as the environment remains unchanged.

Natural ecosystem	**Artificial ecosystem**
Consists of many species of plants and animals	Species diversity is low
Genetic diversity is very high	Genetic diversity is very low
Sunlight is the energy source for plants and this energy drives all biological cycles	Sunlight is the ultimate energy source for plants but artificial fertilizers and other nutrients are externally supplied to the soil
Food chains are long and complex	Food chains are simple and often incomplete as other species are killed as pests or weeds
Ecological succession takes place over time	No ecological succession
Natural nutrient cycling	Incomplete nutrient cycling
Naturally sustainable	Unsustainable as most fertilizers are made from non-renewable fossil fuels, and they add to water pollution, biomagnification and other ecological disturbance

Visual Impact Assessment (VIA): It is an evaluation of the visual impact of resource development proposals on forest landscape. Landscape and Visual Impact Assessment (LVIA): Landscape and visual impacts are two separate but closely related elements. 'Landscape' refers to the appearance of the land, including its, shape, texture and colours. It also reflects the way these components combine to create specific patterns and pictures that are distinctive to certain areas. Landscape is not just a visual, phenomenon it relies on a number of other features/influences that will have shaped its character. For example, topography, geology, ecology, land management and architecture all play a part in the formation of a landscape.

2.4 Environmental pollution- types, causes, controls and abatement strategies

Pollution

Pollution refers to any undesirable change in the physical, chemical or biological characteristics of our environment, i.e. air, water and soil that may or will adversely affect humans or other species and life support systems of our biosphere directly or indirectly. A substance whose introduction into a resource damages the latter's usefulness is called a pollutant. Pollutants are grouped into two broad categories: i) biodegradable pollutants and ii) non-biodegradable pollutants. Non-biodegradable pollutants such as heavy metals, pesticides, move through the food chain and may get magnified to dangerous levels in higher trophic level organisms. Some of these combine with other compounds and produce toxic substances. However, biodegradable materials such as human and animal wastes, agro-based residues and fertilisers can also pose a threat if their quantities or inputs exceed the assimilative capacity of the environment.

Air pollution

The major constituents of air N_2, O_2 and inert gases that comprises about 99.9% have not changed. But some minor and trace constituents such as sulphur dioxide (SO_2), oxides of nitrogen N_2O, NO, NO_2 (NOx), methane (CH_4), chlorofluorocarbons (CFCs) along with carbon dioxide (CO_2) inburnt hydrocarbon and Suspended Particulate Matter (SPM) have increased. Note that the various oxides of nitrogen can be represented as NOx.

Primary pollutants - Pollutants released into the environment as a result of some natural and/or human activity, e.g., carbon dioxide, carbon monoxide, oxides of nitrogen, sulphur dioxide, suspended particulate matter and hydrocarbons.

Secondary pollutants-Pollutants formed by the chemical interaction of primary pollutants with atmospheric gases and moisture, often catalysed by sunlight are known as secondary pollutants e.g. ozone (O_3), peroxyacyl nitrates (PAN), aldehyde, sulphuric acid and nitric acid. These are formed by reactions given below:

NO_2 + sunlight → NO + O
$O_2 + O \rightarrow O3$
HC (Hydrocarbon) + O → R^0 Hydrocarbon (radical) + RCHO (aldehyde)
HC + $O_3 \rightarrow RCO_2$ + RCHO
$RCO_2 + NO_2 + O_2 \rightarrow$ peroxyacyl nitrate
$SO_2 + H_2O \rightarrow H_2SO_4$ (sulphuric acid)
$NO + O \rightarrow NO_2$
$NO_2 + H_2O \rightarrow HNO_3$ (nitric acid)

Major air pollutants and their sources:	
Pollutants	*Sources*
Oxides of Carbon CO_2 and CO	• Use of coal and oil for energy • Production, manufacturing and transport • Biomass burning - burning of forests and grasslands for pasture and cropland
Oxides of Sulphur SO_2 and SO_3	• Burning of coal containing sulphur • Ore smelting - for extraction of metals like Cu (Copper) and Fe (Iron) from their sulphide ores • Industrial processes • Municipal incineration
Oxides of Nitrogen N_2O, NO and NO_2	• Use of petrol and diesel for transport vehicles • Burning of fuel at the stationary sources • Nitrogen Fertilisers • Burning of biomas
Methane and Other Hydrocarbon	• Burning of fossil fuel • Rice cultivation • Breeding of domestic animals • Burning of forests and grassland • Municipal land fill • Microbial activity of sewage
Suspended Particulate Matter (SPM)	• Formation of soot, smoke on burning of coal • Transport vehicles - raise dust and release smoke

like cholera, dysentery, typhoid, jaundice and worm infection are still the major public health problems in developing countries.

Excess of nitrate in drinking water causes methamoglobinemia. Nitrate converts haemoglobin to methaemoglobin-oxidised (Fe^{3+}) form of haemoglobin which is non- functional. Nitrate can be fatal to human, especially infants under three months. 1 Such infants are called "blue babies".

Fluoride toothpastes are used to prevent dental decay but excess causes mottled teeth, stiffening of joints and hardened bones called skeletal fluorosis or knock knees disease. The deformity of knees may lead to total inability to move.

Land Pollution

Land is polluted with dumping of solid wastes generated in the household and manufacturing units. Some examples of such wastes are given below:

Domestic wastes: Kitchen garbage, other household rubbish, broken bottles and crockery, waste tin cans, plastic bottles, cloth rags, pieces of papers, straw-board boxes, ash etc. These are also generated by commercial establishments.

Industrial wastes: Slag from blast furnace, fly-ash, lime sludge, brine mud, metal scraps, copper slag from large industries or ash, waste from tanneries, dyes, scrapes of wool, thread and paper, plastics and many other wastes from small scale industries.

In addition to the above, domestic and industrial effluents disposed on land, run-off from agricultural fields and sewage also cause land pollution.

Noise Pollution

Noise is unwanted sound or excessively high levels of sound. Noise pollution is not only an annoyance, but at sufficiently high levels, it may cause loss of hearing. Noise pollution has grown because of increased use of technology. The main sources of noise are: road traffic, railways, industrial operations, construction work, aircrafts, military artillery and ammunition and household electrical appliances.

Sound or noise can affect us because of its loudness and pitch or frequency. Frequency is the number of cycles per second called Hertz (Hz). For example, a radio station uses certain frequencies for the broadcast. The human ear is sensitive to the sound of frequency in the range of 20 to 2000Hz. Loudness is measured in decibel scale (dB), a tenfold increase in sound intensity is represented as 10 dB increase on scale. Noise is measured by sound level meter. The sound level meter basically consists of a high-quality microphone and amplifier. It has a calibrated attenuator weighting network and a meter calibrated to indicate sound level over the range of 40-120dB.

Sound Intensity Factor	**Sound Level dB**	**Sound Sources**	**Effects**	
			Perceived Loudness	**Damage to Hearing**
10^{18}	180	Rocket engine	Painful	Traumatic injury
10^{17}	170		Painful	
10^{16}	160		Painful	
10^{15}	150	Jet plane at takeoff	Painful	
10^{14}	140		Painful	
10^{13}	130	Maximum recorded rock music	Painful	
10^{12}	120	Thunderclap	Uncomfortably loud	Injurious range, irreversible damage
10^{11}	110		Uncomfortably loud	Progressive loss of hearing
10^{10}	100	Construction work, Newspaper press	Uncomfortably loud	
10^{9}	90	Mixer grinder	Very loud	Damage begins afterlong exposure
10^{8}	80	Garbage disposal	Very loud	
10^{7}	70	Vacuum cleaner, Ordinary conversation	Moderately loud	
10^{6}	60	Air conditioner 6m away	Moderately loud	
10^{5}	50	Living room	Moderately loud	
10^{4}	40		Quiet	
10^{3}	30	Library, Soft whisper	Quiet	
10^{2}	20	Broadcasting studio	Very quiet	
10	10	Rustling leaf	Barely audible	
0	0	Threshold of hearing		
Different sounds on Decibel scale				
Source: Turk et al. (1978), Environmental Science, Philadelphia: Saunders, p. 523				

Cuthbert criticises the conventional classification of theory. “It must also be observed that theory is divided into two fundamental uses, first as explanation and secondly as praxis. While there is no clear and necessary relationship between these two functions, there is a tendency within the environmental professions in general and urban design in particular, to conflate one with the other” (Cuthbert, 2001, p. 302).

Cuthbert’s criticism is highly informed by Marxian thinkers such as Manuel Castells, David Harvey and Ross King. In this sense, he echoes such Marxist political economy in urban design domain. It could be asked whether Cuthbert made any new theory or not. Nevertheless, his contribution and criticisms is of importance for this research.

Urban design theorist, problems and methods of building theory

Theorist	**Focus of theory**	**Problem**	**Field from which theory is borrowed**	**To which urban design precedes it refers**	**Methods of building theory**
Lynch	Image of city	Legibility of cities	Psychology		Case study testifies the five elements
Lynch (Good City Form)	Normative urban theories	What is good design and bad design		Lynch	Common sense, (history of) urban form studies
Jacobs	Urbanity	Unliveable cities	Economy, sociology	Bacon	Personal experiments of the city, common sense
Gosling	Urban design knowledge	What is urban design		Lynch, Cullen, Jacobs	Studying the knowledge
Cullen	Visual aspects	Ugly built environments	Architecture		Observing the historical cities
Hillier	Morphology	Social function of urban form	Mathematics, sociology		Abstracting cities to mathematical concepts; inducing the findings
Alexander	Process design	Holistic urban environments			A group experiment of designing a place (common sense as validating tools)
Lang	Making behavioural theory	Lack of a theoretical framework for behavioural design	Environmental studies, philosophy	Lynch	Applying behavioural studies to the built environment theories
Moudon	Fields of study in urban design	Vagueness of urban design arguments and references			Classification of the fields of study in urban design
Ellin	Historical/intell ectual trends in urban design		Intellectual historical studies		Studying the historical trend, effects and movement in relation to urban design
Cuthbert	Political economic-laden theory of urban design	Weak connection between political economy and urban design	Sociology, economy, philosophy		Criticizing urban design theory based on political economics
Lang	Typology of procedures, products and paradigms	Structuring he knowledge		Ellin, Lang	Proposing a typology, supporting it by case studies
Madanipour	Connection between urban design and social science	Lack of understanding of urban design as socio-spatial field	Social science, planning, architecture		Studying the condition of knowledge and forces in urban change

Source: Hooman Foroughmand Araabi, 2016

- Hazard Assessment and Risk Management
- Forecasting Impacts
- Restoration planning
- Site Selection
- Facilities Planning
- Management Planning
- Master planning

Derelict land: It is a portion of land that has become damaged by industrial or other development and is beyond beneficial use without treatment. Example: Marble mine where all marbles have been excavated.
Types of dereliction:

- Deep Mining
- Disused Railway Lines and Bridges
- Industries
- Waste Piles and Dumps

There are three ways for treatment of derelict land:

- Reclamation
- Restoration
- Conservation

Reclamation is returning of disturbed lands to a form in which the lands may be of beneficial use.
Restoration is returning of a disturbed site as closely as possible to pre-disturbance conditions and functions.
Conservation is to prevent further deterioration of land resources.

Reclamation methods:

- Removal of blight
- Reshaping the disfigured earth
- Restoring the topsoil section
    - Stage I: Preventing further degradation
    - Stage II: Rebuilding the top soil sections
- Reestablishing the natural covers
- Identifying land use

Case study: Ecological Restoration of a Basalt Quarry, Timba, Gujarat

Figure: A 200-acre exhausted basalt quarry in Timba. Basalt deposits were mined up to depth of 20m. Vegetation were in poor condition. Unwanted stones and quarry dust were heaped all over.

Ecological restoration of the Basalt quarry was undertaken with following objectives:

- To convert the total quarry into a natural woodland and return the area back to the nature.
- Restoration period -Eight years from 1977 to 1985.
- To convert the total quarry into a natural woodland.

Restoration process:

- To establish a vegetation cover of grasses, herbs and creeper plants as quickly as possible
    - enable humus formation
    - help in conserving the soil moisture and rain water
- An indigenous plant mix was identified based on the study of the vegetation pattern
- Seedlings of trees were planted in shallow pits using the available organic matter
- A nearby seasonal stream was diverted to fill the quarry
- Other plants, grasses and shrubs not originally planted made their appearance in the third and fourth year.

analysis, one needs to identify the problem and define purpose of the analysis. It requires step – by – step procedures to arrive at the conclusions. The following spatial analysis operation may be undertaken using GIS:
(i) Overlay analysis
(ii) Buffer analysis
(iii) Network analysis
(iv) Digital Terrain Model However, under the constraints of time and space only the overlay and buffer analysis operations will be dealt herewith.

Choose the right answer from the four alternatives given below:
(i) The spatial data are characterised by the following forms of appearance:
(a) Positional (b) Linear (c) Areal (d) All the above forms

(ii) Which one of the following operations requires analysis module software?
(a) Data storage (b) Data display (c) Data output (d) Buffering

(iii) Which one of the following is disadvantage of Raster data format?
(a) Simple data structure (b) Easy and efficient overlaying
(c) Compatible with remote sensing imagery (d) Difficult network analysis

(iv) Which one of the following is an advantage of Vector data format?
(a) Complex data structure (b) Difficult overlay operations
(c) Lack of compatibility with remote sensing data (d) Compact data structure

(v) Urban change detection is effectively undertaken in GIS core using:
(a) Overlay operations (b) Proximity analysis (c) Network analysis (d) Buffering

4.8 Development guidelines such as URDPFI

URDPFI stands for Urban and Regional Development Plans Formulation and Implementation. It was prepared in 1996 which is essentially formulating guidelines for preparation of spatial development plans and resource mobilization plans of small, medium and large sized urban centres. It promotes efficient implementation mechanisms and innovative techniques for promotion of planned spatio-economic development of urban areas.
The URDPFI is a vast document compiled in two volumes. It is available in govt. of India website: https://mohua.gov.in

URDPFI Guidelines Volume I	URDPFI Guidelines Volume II

The Census 2011 and 2001 give useful indicators for the trends in urbanisation in India.

Trends in Urbanisation 2001-2011:

Class	Definition (Population)	Census 2001			Census 2011			Decade Growth Rate 2001 - 2011	
		No. of Towns	Population	% of Urban Population	No. of Towns	Population	% of Urban Population	No. of Towns	Population
Class I	>1 lakh	394	196.3	68.7	468	264.9	70.2	18.8	34.9
Of which,-									
Below Mn+	1 to 10 lakh	359	88.0	30.8	415	104.2	27.6	15.6	18.4
Million Plus cities	>10 lakh	35	108.3	37.9	53	160.7	42.6	51.4	48.4
Of which,-									
Mega cities@	>1 crore	3	42.5	14.9	3	48.8	12.9	0.0	14.8
Class II	50k to <100k	496	27.8	9.7	605	41.3	11.0	22.0	48.7
Class III	20K to <50k	1388	35.2	12.2	1905	58.2	15.4	37.2	65.5
Class IV	10k to <20k	1561	19.5	6.8	2233	31.9	8.5	43.0	63.8
Class V	5k to <10k	1041	6.7	2.4	2187	15.9	4.2	110.1	138.7
Class VI	<5k	234	0.7	0.2	498	2.0	0.5	112.8	180.1
Total		5161	286.1	100.0	7933	377.1	109.8	53.7	31.8
Statutory Towns		3799	265.1	92.7	4041	318.5	84.5	6.4	20.2
Non-Statutory Census Towns & UAs		1362	21.0	7.3	3892	58.6	15.5	185.8	179.0
Total Urban Population		5161	286.1	100.0	7933	377.1	100	53.7	31.8

Source: Census of India; URDPFI Guidelines Volume I, Page no. 1

6.5 Transit Oriented Development (TOD)

Transit Oriented Development (TOD)
The integration of land use with transport systems is called "Transit Oriented Development", which is essentially "any development, macro or micro that is focused around a transit node, and facilitates complete ease of access to the transit facility thereby inducing people to prefer to walk and use public transportation over personal modes of transport". This entails planning for compact cities and reducing urban sprawl and dependency on the large scale developments in the periphery which induce shift from non-motorized to motorized modes of travel. Approach to TOD highly depends on establishing mixed landuse zone as part of strategic densification.
The policy includes:
Network & Connectivity: Disperse high traffic volumes over multiple parallel streets rather than concentrating traffic on few major arterial roads. Create a fine network of streets through urban design that provides choice of routes for all modes, reducing distances between places as well as journey times.
Last mile connectivity: Provide fast, convenient interchange options and spatial provision for various modes of Intermediate Public Transport (IPT) at Multimodal Transit Station for seamless travel. Provide multiple mode choices for last-mile connectivity at various prices and comfort levels. Also, if possible, eliminate the need of IPT by design and engineering.
Pedestrian access: Provide the shortest direct route to pedestrians and non- motorised modes to station as well as between building blocks.
High Density, Mixed Income Development: Compact neighborhoods for shorter commutes and equity for all sections of society. Mix of compatible use to promote 24 hour activity.
Streetscape Design: Urban places should be designed for enjoyment, relaxation and equity. Pedestrian and bicycle friendly designated space for all activities. Keeping in view the prevention of heat island effects from wide and open streets, by proper street and landscaping.
Promote Place Making to Create a Sense of Place: Focus on promoting liveability, quality and uniqueness of each space.
Direct Business to TOD Locations: Create transit services to regional job centers, focus job creation investments in transit serviced locations.
Public facilities at nodes of public transport: Plan for public facilities such as schools, universities, sport facilities, stadiums, theatres and concert halls around nodes of public transport.
Function/Activities at nodes of public transport: Promote multi-functional developments around nodes that are otherwise deserted in the evening or at night. Plan a mix of different types of users and inhabitants to create a lively and safe place.

6.6 SEZ

Special Economic Zone (SEZ)
The Act provides for drastic simplification of procedures and for single window clearance on matters relating to central as well as state governments for generating additional economic activity; promoting exports of goods and services, investment for domestic and foreign sources; creating employment opportunities; and developing infrastructure facilities. Single Window SEZ approval mechanism is provided through a 19 member inter-ministerial SEZ Board of Approval (BoA). The Board of Approval is the apex body. The powers & function of BoA is granting of approvals, rejecting or modifying proposals submitted for establishment of Special Economic Zones and provision of infrastructure. Once approved the Central Government notifies the area of the SEZ and units are allowed to be set up in the SEZ. Each SEZ is headed by a Development Commissioner.

The first SEZ creation proposal came from Gujarat State to set up SEZ in Kandla. Subsequently, the proposal came from other states of India.

As many as 439 SEZs have been approved in principle out of which 198 have been notified till 8 March, 2008.The highest approval were accorded to state of Maharashtra followed by Andhra Pradesh and Tamil Nadu Most of these are located in coastal areas where transportation and other supporting infrastructure facilities are available for export processing. As can be seen from the details of the 439 SEZs in India, the smaller ones constitute major proportion of SEZs. 19 SEZs have area more than 1000 hectares and covering more than half of the total area under SEZs. Only 26 SEZs have area between 200 and 500 hectares.

Impact on Regional Development
The distribution of medium and large SEZs (50 hectares and above) by major districts shows that nearly three-quarters of all approved SEZs are located in four States - Andhra Pradesh, Gujarat, Maharashtra and Tamil Nadu. These states are all relatively well developed States with high industrial capacity. These are also highly urbanized. Obviously, investment is channelized to areas of high levels of industry and investment which further propels these states to showcase their 'success' further.

Issues for Discussion
About 50 to 70 new cities or satellite cities will come up in and around the medium and large size SEZs and the population of these new cities will range between 5-10 lakhs. These raises two very important issues for urban development authorities in India: (a) urban management; and (b) regional planning.
(a) Urban Management
SEZs management is delegated to the Development Commissioners and the participation of local as well as State Government will be marginal. Key challenges in the SEZs programme thus will be decentralisation and delegation of powers to local and State Governments and ensuring their participation in the management of the entities. These are essential actions needed for long term success of SEZs. A representative of MOUD is only a member of the Board of Approvals. MOUD needs to explore if the

• Accumulation for a time interval is the total of number of vehicles in the bays 1 to 12 for that time interval. Accumulation for first time interval of 15 minutes = 1+1+1+1+1+0+0+1+1+1+1+1 = 10
• Parking volume = Sum of the turnover in all the bays = 27 vehicles
• Average duration is the average time for which the parking lot was used by the vehicles. It can be calculated as sum of the accumulation for each time interval × time interval divided by the parking volume = (10+11+9+11) × 15/ 27 = 22.78 minutes/vehicle.

8.5 Traffic and transport management and control in urban areas

There are mainly two control devices (Traffic signs and road marking) that are used to control traffic.

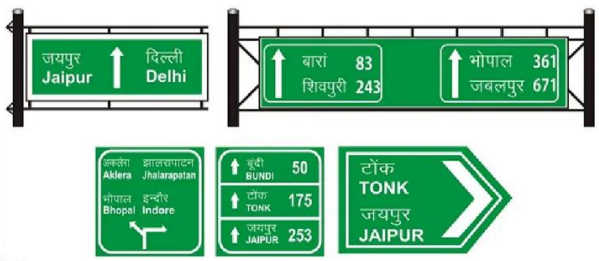
Traffic signs
• The control device should fulfill a need
• It should command attention from the road users
• It should convey a clear, simple meaning
• Road users must respect the signs
The control device should provide adequate time for proper response from the road users

Important elements of traffic signs
• Color: Most common colors are red, green, yellow, orange, blue, brown etc.
– Red :Almost always, red means stop! A red traffic sign either signals you to stop your vehicle or prohibits entry.
– Green : Green means go! A green traffic sign signals that you can proceed, or provides you with direction on where to proceed.
– Yellow : Yellow stands for caution. A yellow traffic sign serves as a general warning.
– Black and White : Black and white traffic signs provide posted regulations (i.e., speed limits).
– Orange : Slow down, Likely to encounter construction or road maintenance ahead

• Shape: Octagonal for STOP, Triangle for YIELD
– An octagon signals the need to stop.
–An upside down triangle always means “yield.
– Horizontal rectangles typically provide guidance to drivers.
– Vertical rectangle usually serves as regulatory notices

• Legend: It should be short, simple and specific

Types of traffic signs
• **Regulatory signs:** These signs require the driver to obey the signs for the safety of other road users
• **Warning signs:** These signs are for the safety of oneself who is driving and advice the drivers to obey these signs
• **Informative signs:** These signs provide information to the driver about the facilities available ahead, and the route and distance to reach the specific destinations
• **Work zone signs:** These type of signs are used to give warning to the road users when some construction work is going on the road

<table>
<tr><th colspan="2">Traffic signs</th></tr>
<tr><td>Regulatory signs
• Also called as Mandatory Signs. If the driver fails to obey them, the control agency has the right to take legal action against the driver
• Speed, movement, parking, pedestrian etc.
  </td><td>Warning signs
• Also called as cautionary Signs. They advise the driver to obey the rules. These signs are meant for the own safety of drivers.
  </td></tr>
<tr><td>Informative signs
• Also called as Guide Signs. These are predominantly meant for the drivers who are unfamiliar to the place. The guide signs are redundant for the users who are accustomed to the location.
  </td><td>Work zone signs
 
• For work on road site.</td></tr>
</table>

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End of review. Thank you for your time.