

---

# UNIT 1 LANDSCAPING : PRINCIPLES, ELEMENTS AND ADORNMENTS

---

## Structure

### 1.0 Objectives

### 1.1 Introduction

### 1.2 Principles, Elements, Garden Features, and Garden Adornments

#### 1.2.1 Basic principles

1.2.1.1 Proportion

1.2.1.2 Balance and Order

1.2.1.3 Repetition

1.2.1.4 Simplicity

1.2.1.5 Unity

1.2.1.6 Transition

1.2.1.7 Rhythm

1.2.1.8 Focalization

#### 1.2.2 Elements

1.2.2.1 Line

1.2.2.2 Focal Point or Emphasis

1.2.2.3 Form

1.2.2.4 Texture

1.2.2.5 Colour

1.2.2.6 Variety

1.2.2.7 Grouping

1.2.2.8 Mass

1.2.2.9 Scale

1.2.2.10 Sequence

#### 1.2.3 Various Garden Features

1.2.3.1 Garden Walls or Fencing and Entrance or Gate

1.2.3.2 Dry Wall

1.2.3.3 Paved Garden

1.2.3.4 Terrace or Terrace Gardening and Roof Gardening

1.2.3.5 Hanging Baskets, Verticals and Plant Containers

1.2.3.6 Arches, Pergola, Arbour and Trellises, and Screens

1.2.3.7 Hedge and Topiary, Bonsai and Edging

1.2.3.8 Borders (Annual, Herbaceous and Shrubbery or Mix)

1.2.3.9 Trees, Shrubs and Climbers

1.2.3.10 Carpet or Design Bedding, Flower Beds and Sunken Garden

1.2.3.11 Bog and Water Garden

1.2.3.12 Rockery or Rock Garden

1.2.3.13 Bandstand, Gazebo, Gatehouse, Lath House and Thatched Huts,  
Conservatory and Greenhouse

#### 1.2.4 Garden Adornments

1.2.4.1 Walks (Paths, Pavements, Steps, Stepping Stones), Drives and Roads

- 1.2.4.2 Garden Seats and Straddle Stones
- 1.2.4.3 Ornamental Stone Basins or Tubs, Urns and Vases and/or Wells
- 1.2.4.4 Ornamental Rocks or Stones
- 1.2.4.5 Ornamental Pillars or Towers, Statues, and Bird Baths & Bird Houses
- 1.2.4.6 Sundials
- 1.2.4.7 Floral Clocks
- 1.2.4.8 Hills, Water, Watercourses, Waterfalls, Streams, Fountains, Culvert and Bridge Work, Islands, and Light
- 1.2.4.9 Plant Stands
- 1.2.4.10 Stone or Japanese Lanterns

- 1.3 Let Us Sum Up
- 1.4 Key Words
- 1.5 Further References
- 1.6 Answers to Check Your Progress Exercises

---

## 1.0 OBJECTIVES

---

After going through this unit, you will be in a position to:

- explain various terms used in landscape gardening,
- describe various elements of landscape gardening,
- identify various garden features to be installed or constructed for creating a garden,
- know about various garden adornments necessary for landscaping a piece of given land, and
- explain bio-aesthetic planning and city pollutions.

---

## 1.1 INTRODUCTION

---

Landscaping combines elements of art and science to create a functional, aesthetically pleasing extension of indoor living to the outdoors. One initial purpose of landscape design is to blend man’s technology (house or building) into the natural surroundings. To work toward a desirable landscape horticulturist must have a working knowledge of art elements and design principles.

The “art” is always changing as the plants grow, environmental conditions change, and people use the space. For this reason, landscape designers use a design process that systematically considers all aspects of the land, the environment, the growing plants, and the needs of the user to ensure a visually pleasing, functional, and ecologically healthy design. The design process begins by determining the needs and desires of the user and the conditions of the site. With this information, the designer then organizes the plants and hardscape materials, which are collectively referred to as the features. The features can be physically described by the visual qualities of line, form, color, texture, and visual weight – the elements of design. The principles are the fundamental concepts of composition – proportion, order, repetition, and unity – that serve as guidelines to arrange or organize the features to create an aesthetically pleasing or beautiful landscape. Knowledge of the elements and principles of design is essential to designing a landscape and working through the design process.

Moreover, landscape plants also improve environment by using CO<sub>2</sub> for photosynthesis and by release of oxygen. Even the turf area of 250 m<sup>2</sup> release enough oxygen for a family of four. Apart from soft landscape (use of plants), the landscaping involves **hardscape** (physical features) which includes fences, retaining walls, paving (walks or paths) and drives, terraces, patios, irrigation systems and water features, and lighting. **Landscape gardening** is the application of garden forms, methods and materials for improving the landscape in a way that it also blends with the surrounding landscape, and creates scenic beauty in a poetical form. **Landscape design** is the practice of creating a plan to make the best use of available space in the most attractive manner. The people associated with landscape design fall either into the group of **landscape architects** who are trained in designing the functional plans on the interrelationship of people and their surroundings through their talents in engineering, graphic arts and architectural technology, or in the group of **landscape designer** who are trained in the art and principles of design and the science (the identification of plants and their cultural requirements) of growing ornamental plants.

Landscaping is a best alternative where through judicious use of horticultural plants we can purify the air which we breathe in. Through judicious planting even noise pollution can be checked. Even inside the house, through proper interiorscaping we can purify the air. Inside the house we can put indoor plants, on the roof all sorts of ornamental plants, along side the roads and streets various trees (small and large, flowering and non-flowering), shrubs and climbers, and elsewhere in the city by creating various good parks and gardens, which will function as the city lungs apart from giving a picturesque view for recreation, shade and shelter, will also serve as a place of solace, meditation, tranquillity and achievement.

Looking into the requirements of an individual or for public utility, the gardens may be of various kinds, viz., **family garden** [usually formal in design with a safe space for children playing, and having flower borders, fruits and vegetables, and a terrace, courtyard or **patio** (a paved area adjoining a house used for entertaining the guest, for extra sitting or for outdoor dining and recreation or a roofless inner courtyard, normally with no lawn, for sitting out in the morning or evening and an informal eating place which is special in the sense that it has variety of ornamentals in containers, viz., rare plants, herbs, bulbs, dwarfed trees, fruit trees and shrubs which can be moved with convenience for creating shade or light, and all around climbers as specimens on railings or in the form of trellis, pergola or arbour, if space permits a small fenced pool at a quite illuminated place, and artificial lighting), **roof gardens and balconies** are also laid out similar to patios except that such gardens are quite exposed to sun and wind though balconies are more shaded and where pots and troughs of trailing plants are also kept on the brackets and shelves of the house wall, **formal outdoor living room garden** with limited space having steps, low walls, often with raised pool and container plants, **open-plan garden** on the ground normally sloping away from the house from where surrounding landscape is viewed and where on the terraces, fruits and vegetables may also be grown apart from growing ornamentals in containers, **formal gardens** where land is forced to fit the plans, are simple, symmetrical and well proportioned, punctuated with the large beds of lawn, and marked out with low evergreen hedges and filled in with annual bedding plants (**parterres**, which were very popular during Victorian and Edwardian periods, especially in municipal parks and gardens, though it is confused with knot gardens

but these are larger and consist of regular and flat flower beds planted with compact and colourful bedding plants interspersed with gravels of different hues in decorative pattern under a particular design outlined with neatly trimmed low hedges, especially evergreens trimmed into globes or pyramids or preferably in formal shapes but these should be commensurate to the size of the house or adjoining terrace), **knot gardens** which was very popular in 16<sup>th</sup> century, based on knots and strap-work pattern of English Elizabethan and Tudor needlework and plaster ceiling decorations, is in fact a form of interlacing bands and abstract patterns prepared with colourful plants, coloured gravels or sand outlined with low and well clipped hedges whose beauty can be viewed from an elevated place, raised terrace or from the window of the house, **topiary** is the living sculpture made in the form of a bird, an animal or various other shapes (spiral, pyramid, sphere, cone, etc.) often in the formal gardens or sometimes in informal gardens but not in the naturalistic or wild garden, to add height, shape and sculptural interest, and a **topiary garden** is that where various suitable trees and shrubs in groups in a sizeable area proportionate to the design are shaped into tall globes, rectangles, pyramids, spirals and various other shapes, and this may be a focal point in the garden, **secluded sanctuary garden** or **sunken garden** which is rugged in appearance and is generally screened by planting various climbers, or through pergola or arbour to maintain privacy, **cottage garden** which is informal in layout with or without water feature and contains many unusual and interesting plants, may be utilitarian planted with fruits, vegetables, herbs, shrubs, flowers often fragrant ones, sometimes lawns, all crowded in a very small area, and has paths made from cobbles, gravels or bricks or edged with pansies, sweet alyssum, dwarf antirrhinums, pinks, lavender, etc., **woodland garden** (normally a subject of temperate climate) can be made by planting shrubs, bulbs (anemone, cyclamen, fritillaria, snowdrops, tulips, etc.), herbaceous plants, and near the woodland streams various bromeliads, primroses, foxgloves, orchids, etc. conveniently below the naturally grouped trees and where paths are made in zigzag fashion so that it merges with that environment, **wildlife and conservation garden** which may even be quite large in area and which provides alternate natural habitat for a wide range of plants including the endangered species as well as certain fauna like dragonflies, butterflies and other insects, frogs, various species of migratory or otherwise birds and so on but such gardens should have sufficient food and an ever-filled pond for the flora and fauna to survive, **pasture and meadow gardens** which are planted with the local perennial ornamentals so that these may naturalize in meadows and in grassland, and **water gardens** which may be formal or informal and planted with marginal, deep water, floating and submerged aquatics, and oxygenators with some suitable ornamental fishes.

Through bio-aesthetic planning, a term coined by **Prof. Lancelot Hogben**, we can create parks and gardens by proper utilization of available flora and fauna (non-carnivorous or non-violent animals and beautiful migratory or otherwise locally found birds) for an added recreation, where people may have natural attraction and where children may also like to frequent their visits out of curiosity. **Prof. Abercrombie** has described planning as “conscious exercise of the powers of combination and design, and not a question of unconfined growth, even though the latter may produce fortuitously happy results”. In the words of late **Dr. M.S. Randhawa**, a well known naturalist of the 20<sup>th</sup> century in India, “for the healthy and balanced development of a nation, wealth in the form of material goods and food are no doubt necessary, but a beautiful environment is just as essential”.

---

## 1.2 PRINCIPLES, ELEMENTS, GARDEN FEATURES, AND GARDEN ADORNMENTS

---

### 1.2.1 Basic Principles

It is important to understand that the principles of design must be applied at all of the levels that people will experience the landscape. Design principles guide designers in organizing elements for a visually pleasing landscape. A harmonious composition can be achieved through the principles of proportion, order, repetition, and unity. All of the principles are related, and applying one principle helps achieve the others. Physical and psychological comforts are two important concepts in design that are achieved through use of these principles.

People feel more psychologically comfortable in a landscape that has order and repetition. Organized landscapes with predictable patterns (signs of human care) are easier to “read” and tend to make people feel at ease. Psychological comfort is also affected by the sense of pleasure that a viewer perceives from a unified or harmonious landscape. Users feel more physically comfortable, function better, and feel more secure in a landscape with proportions compatible to human scale.

**The basic principles of landscape design are as under :**

#### 1.2.1.1 Proportion

Proportion refers to the size of parts of the design in relation to each other and to the design as a whole. Relative proportion is the size of an object in relation to other objects. Absolute proportion is the scale or size of an object. An important absolute scale in design is the human scale (size of the human body) because the size of other objects is considered relative to humans. Plant material, garden structures, and ornaments should be considered relative to human scale. Other important relative proportions include the size of the house, yard, and the area to be planted. Proportion in landscape design usually relates to people and their activities. For example a three-foot pool would be lost in a large open lawn but would fit beautifully into a small private area. And of course, a colossal fountain would dominate a private garden but could enhance a large city plaza.

#### 1.2.1.2 Balance and Order

Balance is the concept of equal visual attraction and weight, usually around a real or imaginary central axis. Form, color, size, and texture all affect balance. Balance can be symmetrical, asymmetrical, or perspective. In formal balance (symmetrical), the mass or weight or numbers of objects on either side of a central axis should be exactly the same. Plants are frequently clipped, lines tend to be straight, and edges are clearly defined. For asymmetrical balance, plants should be irregularly placed on either side of an imaginary axis so that the mass or weight on either side of the axis appears to be balanced. Curved lines, obscure and merging edges and natural contours identify asymmetry in the garden. Perspective balance is concerned with the balance of the foreground, mid-ground, and background. When looking at a composition, the objects in front usually have greater visual weight because they are closer to the viewer. This can be balanced, if desired, by using larger objects, brighter colors, or coarse texture in the background. In most cases, either the foreground or background should be

dominant. Order generally refers to the spatial layout or organization of the design and is most often achieved through balance. Order can also be achieved by massing features or elements into distinct groups and arranging them around a central point.

### **1.2.1.3 Repetition**

Repetition refers to the repeated use of features like plants with identical shape, line, form, texture and/or color. Too much repetition creates monotony but when used effectively can lead to rhythm, focalization or emphasis. Unity can be achieved better by no other means than repetition. Repetition can be made more interesting by using alternation, which is a minor change in the sequence on a regular basis. An example might be a row of vase-shaped plants and pyramidal plants in an ordered sequence.

### **1.2.1.4 Simplicity**

Simplicity goes hand-in-hand with repetition and can be achieved by elimination of unnecessary detail. Too much variety or detail creates confusion of perception. Simplicity is the reduction of a design to its simplest, functional form, which avoids unnecessary cost and maintenance.

### **1.2.1.5 Unity**

Unity means that all parts of the composition or landscape go together; they fit. A natural feeling evolves when each activity area belongs to and blends with the entire landscape. Everything selected for a landscape must complement the central scheme and must, above all, serve some functional purpose. The simplest way to create unity is through the use of a design theme or a design style. Design themes and styles have a well-defined set of features that have maintained their popularity over time because they are visually pleasing to many.

### **1.2.1.6 Transition**

Transition is gradual change. Transition can be obtained by the arrangement of objects with varying textures, forms, or sizes in a logical sequential order. For example, coarse to medium to fine textures, round to oval to linear structural forms, or cylindrical to globular to prostrate plants. Transition from shorter to taller plants and from fine to coarse textures would unframe the scene and makes it appear closer, like a painting on a wall. Generally, transition assists in the gradual movement of a viewer's eye to the design and within it.

### **1.2.1.7 Rhythm**

Rhythm is achieved when the elements of a design create a feeling of motion which leads the viewer's eye through or even beyond the designed area. Tools like color schemes, line and form can be repeated to attain rhythm in landscape design. Rhythm reduces confusion in the design. Rhythm is expressed through the placement of plants, park furniture, etc., either individually or as group. For example, several benches could be placed at regular indentations along a shrub border. If every other bench was replaced with an attractive piece of sculpture, rhythm would be created that would relieve any monotony from the overuse of one landscape component.



**Fig. 1: Repetitious use of sculpture in landscape reduces monotony and results in the establishment of rhythm.**

### 1.2.1.8 Focalization

Focalization involves the leading of visual observation toward a feature by placement of this feature at the vanishing point between radial or approaching lines. Generally, weaker or flowing lines of focalization are desirable in the residential landscape. Focalization can be adjusted by plant materials along the lines to create symmetrical or asymmetrical focalization. Asymmetrical focalization is indirect while symmetrical focalization is more direct, creating stronger focalization. Since focalization can be used to direct attention to a point, traffic in an area is usually directed to that point. Therefore, focalization could be used to direct traffic in a garden area.

### 1.2.2 Elements

Simplicity is the essence of design. How a designer creatively combines plant material and other design components into a simple, unified scheme is always an exciting challenge.

In the landscape palette, the designer is dealing with living plants that are subject to a myriad of weather conditions, different soil types, insect and disease problems, and a host of other environmental and physical circumstances. The landscape artist must deal with plants that celebrate the seasons with the unfurling of leaves in spring, the aroma and visual delight of ephemeral flowers, and the bareness of branches in winter. Change in the landscape is never constant as the seasons come and go. How the designer



**Fig. 2: Simplicity is the essence of design**

successfully combines plants and other material components in the Landscape Planting Plan involves paying careful attention to detail, a thorough knowledge of practical horticulture, and a good understanding of the basic principles and elements of design. The designer faces the challenge of creating a plan that is pleasing to the senses and that visually, functionally and aesthetically improves the appearance of the landscape at an affordable cost.

**The elements of landscape design are as under:**

### **1.2.2.1 Line**

Lines are a powerful tool for the designer because they can be used to create an infinite variety of shapes and forms, and they control movement of the eye and the body. Landscape designers use lines to create patterns, develop spaces, create forms, control movement, establish dominance, and create a cohesive theme in a landscape. In curvilinear design, lines should be dramatic, done with a sense of flamboyancy and be very expressive in their shape. Curvilinear lines that have weak, scallopy edges will not be visually interesting or pleasing to the eye. Curvilinear, meandering lines suggest a naturalistic look that invites the user to casually stroll through and experience the landscape.

On the other hand, linear lines such as those found in a straight hedge or the edges of paving materials suggest quick, direct movement. Angled lines can create opportunities for creating the “bones or the framework of the landscape”. Lines that interconnect at right angles create an opportunity for reflection, stopping or sitting. Through skillful use of lines in the landscape, the designer is able to direct the attention of the viewer to a focal point.

### **1.2.2.2 Focal Point or Emphasis**

Through the use of emphasis, eye movement is directed towards a center of interest that takes a position of prominence in the landscape. This could be a single tree, a beautifully designed water feature, a piece of sculpture, or a collection of ericaceous plants that automatically draw the eye to this point of interest. Open lawn areas, paths and strategically placed plants can lead the eye to the principal feature without distraction. Plantings should be placed to easily lead the eye to this center of heightened interest.



**Fig. 3: Sculpture / maze garden in Japan. Elevated pieces of sculpture create emphasis in the landscape.**



Secondary features of landscape interest can also be created. In this case, while these components are beneficial in contributing to the unity of the site and tying the total composition of the site together, they have considerably less overall impact than the focal point.

### 1.2.2.3 Form

Form relates to the natural shape of the plant. . Form is found in both hardscape and plants, and it is typically the dominant visual element that spatially organizes the landscape and often determines the style of the garden. The form of structures, plant beds, and garden ornaments also determines the overall form theme of the garden. For example, a plant that is very fastigiate or upright in its habit of growth is said to have a vertical or aspiring form. Ginkgo biloba “Princeton Sentry”- Princeton Sentry Ginkgo- is a good example of this form.

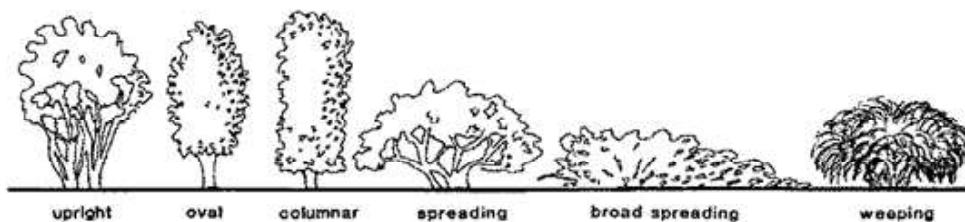


Fig. 4 : Form refers to the shape and structure of a plant or mass of plants.

Other plants that are spreading in their habit of growth are said to have a horizontal or spreading form. A shrub example of this form is *Taxus x media* “Hillii”-Hill’s Yew- and a tree example is *Quercus palustris*- Pin Oak. The Hill’s Yew could be effectively used as a hedge to provide special definition between two properties. When horizontal forms are placed together as is the case in the hedge, the individual vertical forms take on a horizontal profile.

Weeping, drooping of pendulous forms can also be used to create softer lines or as interesting accents in the garden. *Fagus sylvatica* “Purple Fountain” – Purple fountain Beech- is an excellent example of this form.

### 1.2.2.4 Texture

Texture refers to how coarse or fine the surface of the plant or hardscape material feels or looks. Texture is used to provide variety, interest, and contrast. The plant’s foliage, flowers, bark, and overall branching pattern all have texture. The size and shape of the leaves often determines the perceived texture of the plant. A plant can generally be described as having a coarse, medium, or fine texture.

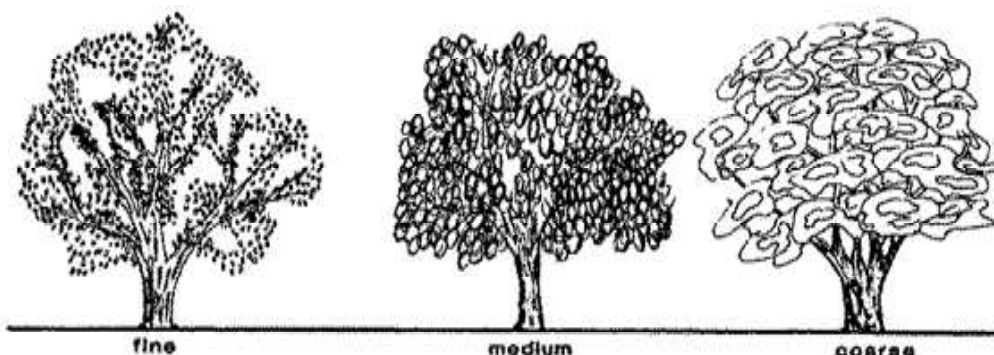


Fig. 5: The texture of plants differs as the relationships between the leaves, the twigs and the branches differ.

When using ornamental grasses for example, a gradation of textures from fine to medium to coarse could be as follows:

Texture in the landscape depends upon the distance from which the plant is viewed by the observer. In distant views, the overall mass of the plant is the dominating feature and the fineness or softness of a leaf or branching pattern is lost.



**Fig. 6: *Fagus grandifolia* (American Beech) smooth bark texture.**

In terms of the overall planting plan, texture must balance in relationship to the axis. Weight on one side should equal the mass on the other side of the axis. For example, much fine texture- as the case would be in using *Buxus*- is required to balance relatively little coarse texture, as the case would be in the use of *Viburnum rhytidophyllum*, the Leather leaf *Viburnum*. Intermediate plants are recommended to provide the necessary transition from one textural extreme to the other.

### **1.2.2.5 Colour**

Color in plant material and hardscape adds interest and variety to the landscape. Color is the most conspicuous element in the landscape and is usually the focus of most homeowners; however, it is also the most temporary element, usually lasting only a few weeks a year for individual plants. The use of color is guided by color theory (use of the color wheel) to create color schemes. A simple description of the color wheel includes the three primary colors of red, blue, and yellow; the three secondary colors (a mix of two primaries) of green, orange, and violet; and six tertiary colors (a mix of one adjacent primary and secondary color), such as red-orange.

Color theory explains the relationship of colors to each other and how they should be used in a composition. The basic color schemes are monochromatic, analogous,

and complementary. Colour theory is a very complex and very personal matter that expresses individual taste and feelings.

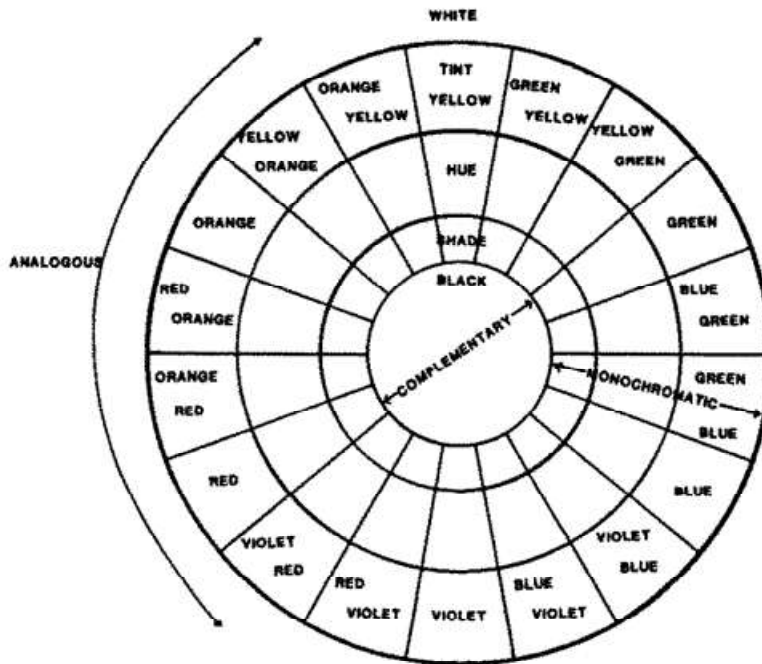


Fig. 7: A color wheel can be used to explain color variations.

Warm colours such as reds, oranges and yellows tend to advance towards the viewer while blues, violets and greens tend to recede into the landscape. Warm colours read well and affect the eye more quickly than do cool colours. When using warm colours, they should be used in sequence which must be smooth and gradual. For example, red to scarlet to orange scarlet to orange to bronze to orange yellow to yellow to pale yellow to cream to white. Consideration of the use of colour in plantings requires a thorough, practical understanding of the personality of the plants. To vigorously use colour and effective colour combinations requires a thorough knowledge of plants, their colours and seasonal changes with detail of twig, leaf, flower and fruit as well as principles of colour.

### 1.2.2.6 Variety

Variety is the spice of life. In terms of landscape, it is often important to remember that a variety of lines, forms, textures and colours is required in order to achieve an interesting landscape. Without variety in both the use of 'hard' and 'soft' landscape materials, this can lead to unfavorable results.

### 1.2.2.7 Grouping

Much greater appeal is achieved when odd numbers of plants are used in the landscape. Groupings of three, five, seven, nine plants etc., will create a strong feeling of mass and a bold landscape statement. Plants should be irregularly spaced and every effort should be made to avoid placement of plants in an equilateral triangle. When grouping, a designer usually starts with a specimen that establishes the scale of the landscape. Around it are grouped slightly less important plants which complement the specimen in colour, texture and habit of growth. Planting one of this and one of that will create a spotty disjointed feeling.

### 1.2.2.8 Mass

Made up of plants that cannot be seen in their entirety from any one vantage point. Seasonal stability and variety in plant mass is accomplished through a mix of evergreens and deciduous plants. Only rarely should a design consist exclusively of evergreens or deciduous material instead of a mixture of both.

To create a harmonious effect in any group, a designer should strive to properly fit together plant forms, textures and colours into a harmonious whole or mass. Size of any mass or composition depends upon its location in relationship to other factors such as the need for screening, proximity to other groups, etc. Mass can be any size, but smaller masses or clumps are not normally as effective as larger, bolder mass plantings.

### 1.2.2.9 Scale

Good proportion and scale have no hard and fast rules. Generally speaking, it is a matter of “does it look right?” Scale usually bears reference to the size of a thing or object that appears to have a pleasing relationship to other things or to the design as a whole. It essentially relates to some finite measure of universal application or a standard of known dimension.

### 1.2.2.10 Sequence

The effective use of sequence is oftentimes employed to create visual movement in the landscape. It is an important consideration to take into account in the development of the overall planting pattern. For example, sequence could be an orderly natural combination of plant material. In this case, low objects would appear in the foreground, intermediate objects in the middle ground, and tall objects in the background.



Fig. 8: Shalimar Bagh, Kashmir (India)

While it is useful to know the elements and principles of design, it is sometimes difficult to understand how to apply them to your ideas for your yard. Each site presents challenges and opportunities for individual design and expression and requires unique application of the elements and principles. Studying how the elements and principles have been applied in an existing design that appeals to you is a good place to start. The best way to create a good design is to borrow ideas from designs that you find attractive and adapt them to your particular site conditions.

How effectively the designer addresses people's needs and the functional requirements of the site, considers ongoing maintenance requirements and the selection of appropriate plants, efficiency and economics will all combine to measure the aesthetic success of the project. All of the above must be carefully woven together to create an outdoor room that is truly pleasurable and enjoyable on a year round basis. Celebrate the seasons in style. Start the most fascinating of the fine arts by developing a garden that takes into account the above principles and elements of design.

---

### Check Your Progress Exercise 1

**Note :** a) Space is given below for answers.

b) Compare your answer with that given at the end of the unit.

1) Name various elements of landscaping.

.....  
.....  
.....  
.....  
.....

2) Define scale and balance.

.....  
.....  
.....  
.....  
.....

### 1.2.3 Various Garden Features

#### 1.2.3.1 Garden Walls or Fencing and Entrance or Gate

Construction of **walls** is though quite expensive but provides a sense of permanence and excellent boundaries for protection against human interference and animal menace, and offers considerable scope for vertical gardening. Walls are made of stones, bricks or concrete. The height and aspect (design and usefulness) as to what is to be grown on or against the wall determine the purpose for which these are erected. It may be 1.0 to 5.0 metre in height but the low ones are to be fixed with some grills so that the garden becomes secured but not obscured from outside. While choosing the plants, the colour of the foliage and flowers should be in harmony to the colour of the walls. Brick walls harmonize well with whites, greens, dark reds, blues and purples; grey and pale walls are best against yellows, pinks, reds and blues; and dark and gloomy walls may be lightened with golden, silver or variegated ivies but one should be careful as its aerial roots loosen the mortar.

**Fence** is the instant physical boundary of a garden or a divider of one part of the garden from the other, though it may be erected even as a permanent feature.

Fences are available in a wide range of heights and styles. Woods, bamboos, angle irons, cemented poles, wire, wire nettings, chain-link fences, etc. are used for making the fences. Angle irons, wooden or cemented poles are embedded up to a depth of 45-60 cm in the soil firmly with brick pieces or with cement and concrete. The normal distance between two poles is around 3 metres and usual height of such poles is 1.8 metres having vertical holes or rings or hooks at an interval of 30 cm, the basal one being at 22.5 cm only. At every corner, just to give strong support to the pole or angle iron, two more poles are embedded in the soil in a slanting position to give support to the real corner pole so that it may not bend due to stretching force of the wire. Simple wire fencing is quite insecure, hence only barbed wire fencing is recommended. The wires are passed through the hooks or rings of the poles and tightened securely. Six tire fencing keeps the garden quite secure. Wire netting fence though is cheaper than chain-link fence but is not durable. Iron grills in various designs may also be used as fence but is cost prohibitive.

Main **entrance** in the garden should have a marvelous moon gate. Doors and gates have different functions and a different decorative appeal, therefore, these should be constructed in a way which may suggest that it's possible to explore more of the garden. It should be ideally decorative to give an illusion that garden extends beyond its real limits. Front gates welcome visitors hence these should be generally lower and more screen-like in appearance while side and rear ones as serve quite the opposite purpose and protect from intruders hence should be higher and solid. Gates also break monotony of a wall.

### 1.2.3.2 Dry Wall

The banks of the sloping ground formed out of necessity in a garden which becomes an untidy place of grass slopes where frequent trimming is a cumbersome job or where shrubs are planted or covered with ground covers, ivies or periwinkle to hide the place, there is still a better solution of converting it into a wall garden which will provide colour for most part of the year. The **dry wall** consists of roughly trimmed rectangular stones with one flat surface, preferably sandstone or limestone of any reasonable size but from 5 to 20 cm in thickness. Stones are always better than bricks for natural effects and also as they provide moister and cooler root-beds for wall plants. Stones are laid on a firm foundation, inclined slightly backwards so that their back is a bit lower than the front to collect the rain water there for nourishing the roots, with flat surface up in layers in a manner that the centre of the stones of the upper layer lies on the 2.5-7.5 cm crevices left in between two-stones laid immediately below it so that the wall becomes firm and secure. The wall is not constructed exactly vertical but a frontal slope of 6:1 is given and the top of the wall is kept flat so that rain water may reach directly to the roots. The back of the wall should touch the earth. For binding the stones no cement is used, however, a little mud can be used to level the surface where necessary. The dry walls may be independent, visible from all the sides, and may be constructed at a convenient place quite independent from slopes, may be vertical against a vertical surface close to the wall but sloping outward, and semi-vertical or sloppy against slopes for joining two terraces situated at two different levels as on the hills which also slopes outward. Vertically the soil (garden loam, well rotten farmyard manure and leaf mould) should firmly be pushed through the crevices without leaving any air pocket in a way that it touches the slope of the earth supporting the wall. The sowing of seeds along with the

moss inserted into the crevices or planting of *Achimenes*, *Aeschynanthus*, *Alyssum*, *Antirrhinum*, *Bergenia*, *Campanula*, *Conophytum*, *Cotyledon*, *Crassula*, *Dianthus*, *Echeveria*, *Globba*, *Hypericum*, *Oxalis*, *Phlox*, *Primula*, *Sedum*, *Sempervivum*, *Senecio*, *Sternbergia*, *Tillandsia*, *Tradescantia*, *Trillium*, *Tropaeolum*, *Vitadenia*, etc. may be done in September-October in the plains and in February-March in the temperate areas.

### 1.2.3.3 Paved garden

**Paving** means covering a surface with stone, brick, concrete or other hard materials in order to make it suitable for walking or movement (path, road, carriageway, or runway for aircraft). **Pavement** (side-walk) means a paved path for pedestrians alongside a street or road. **Pavilion** is an outdoor structure as summer house or any other ornamental building in a garden. **Patio** is a roofless inner courtyard typical of a Spanish-style house or a paved area adjoining a house for outdoor dining and recreation. **Paving stone** means a large, flat rectangular slab, usually made from concrete or stone, used in making a paved surface. The **paved garden** consists of a path, or any area of whatever size and shape covered with crazy paving or flagstones (slabs of concrete, stones or fine-textured rock that can be split into slabs suitable for use in paving or for making floors), and in the crevices planted with creepers, dwarf rock plants and certain other dwarf ornamentals that are tolerable to more wear and tear, though paved gardens are not used very often. Paved garden complements the surrounding if created in connection with the bog and water garden or rock garden. The site where paved garden is to be constructed should be well drained. The foundation is laid as for any ordinary pathway, over which some 10-15 cm thick layer of good sandy-loam soil is spread and then on this flagstones (to avoid patchy appearance, the majority of them being not less than 25 cm in diameter though for squares, oval and circular spaces, the flagstones may be of any size or shape but not too regular) or rectangular slabs, especially for paths, are laid in an irregular pattern leaving 2-5 cm spaces between the stones or slabs for filling with good loamy soil for planting the suitable ornamentals in small groups or in isolated tufts. **Crazy paving** is pavement of 'irregularly shaped pieces of paving stone fitted together', especially in paths of informal gardens but it should be well and evenly laid to make the walking trouble-free and pleasant. The plants suitable for paved gardens are *Achillea tomentosa*, *Alyssum montanum*, *Arenaria balearica*, *Campanula garganica*, *Catharanthus roseus*, *Corydalis lutea*, *Dianthus deltoides*, *Globularia cordifolia*, *Gypsophila repens*, *Linaria repens*, *Mentha* spp., *Mimulus radicans*, *Oxalis corniculata*, *Portulaca* (perennial), *Saponaria ocymoides*, *Sedum album*, *Sempervivum montanum*, *Setcreasea pallida*, *Trifolium* spp., *Verbena erinoides*, *Viola cornuta*, *Zebrina pendula*, *Zinnia linearis*, etc.

### 1.2.3.4 Terrace or Terrace Gardening and Roof Gardening

Terrace garden is a common feature in the English or Japanese gardens as in those countries large piece of land at one plane may be uncommon so land undulation is tamed in different **terraces** through erecting dry walls, each terrace having the even topography for cultivation. Terrace is a flat cum narrow strip of land (bed for cultivation) created from naturally sloping ground and bounded by a vertical or steep slope in the form of retaining wall built usually with local stones normally without cement; otherwise the land in its natural form would be too steep for cultivation. When the terraces are used for gardening, this is known as **terrace gardening**. The usual method of cultivation of food grains on the

hills of this country, especially Jammu & Kashmir, Himachal Pradesh, Meghalaya, Arunachal Pradesh, Nagaland, Sikkim, largest part of Assam and Tripura, Manipur, Mizoram, in a part of Tamil Nadu, Karnataka, Maharashtra and Kerala, in a small part of Orissa, adjoining part of West Bengal, *viz.*, Darjeeling, etc. is being done only on the terraces as these parts of the country do not have even terrains. Well-proportioned terracing adds more to the architectural interest, breaks the monotony and brings novelty into the garden on sloping sites. But in the plains of India, such terraces may be quite uncommon, hence, its creation would be a bit expensive, as for making this, land will have to be elevated for at least 45 cm from rest of the garden, and if it is made in front of the house it should have a slope of 1:60 towards the house for good drainage and to prevent the running off the flowing water from the house or rain water from the roof to the terrace. A terrace in the house premises is, in fact, an outdoor drawing room, therefore, it should be based on well established lawn bordered with annual flower beds or evergreen edges, and an umbrella-type tree in the centre or elsewhere of a lawn and to the opposite side in the paved terraces a small lily pool protected from outside entry through strong grills where during leisure or in the mornings and evenings the family members can gather for pleasure and enjoyment and for tea parties even with the neighbours and guests. At a suitable corner, the birdbath, sundial or any other stone sculpture may be created, commensurate to the size and shape of the house as well as of the terrace. The terrace in the house premises may also be in the form of paved patios, planted with patches of lawn in between pavings and putting potted specimen plants along the sides. In the garden, it may be constructed in a corner of the hill side view, if any, or on the sides of a hill if it is hilly terrain. Patios and courtyard gardens or the roof gardens, are loosely termed as terraces but in reality the terraces are a series of elevated beds (a terrace is an elevated bed) separated by retaining walls so that the sloppiness of the land is vanished and the land becomes quite even for cultivation. It is a misconception terming a roof garden as a terrace garden. On the hills, the garden made of terraces are visible from the paths but more elegantly from the central place of the lowest terrace or from the centre of the garden where some special feature of accent, especially fountain has been created.

Houses in the cities with a compound and lawn are vanishing and its place is being taken by skyscrapers where scope for conventional gardening is diminished. However, only alternatives left with such dwellings are **roof, balcony and indoor gardening**. Again, here roof gardening becomes a problem as only the top floor resident may have access to the roof, others will have to depend only on indoor and balcony gardening. However, roof garden also provides the same enjoyment as to those of city parks and gardens, except that city gardens are large and even with flower beds and trees while there is no scope for such things on the roof but flower beds can be substituted with tray, trough or box gardening and the tall trees with small shrubs. In exceptional cases and also due to strong intuitional urge, the true flower beds can also be prepared by placing the soil on moisture-proof flooring between the parapet and a wall built on the inner side but the beds directly on the roof is not preferred as in the long run the roof is damaged. However, the good quality polythene sheets with sealed joints will also serve the purpose on which the clayey loam soil at least 40 cm in depth is evenly spread for lawn planting. Moreover, roof gardens are special in the sense that all around other roof gardens as well as the gardening on the ground is also visible from the roof, *vis-à-vis*, it makes a good sky line. Many private houses have such fancies in almost all the cities, some even with lawn and pools as to that of Dr. P. Das at



State Housing Board Colony, Baramunda, Bhubaneswar (Orissa). For roof gardening, at the time of house construction itself the roof should be made moisture proof to avoid seepage, and should be strong enough to support the weight of soil, planted pots, tubs and other containers and also there should be arrangement for proper drainage for draining off rain and excess irrigation water. The roof garden should also have a focal point in the form of a most beautiful shrub such as *Bauhinia galpinii*, a highly floriferous bougainvillea var. Chitra in globular form, a climber like *Holmskioldia sanguinea*, *Passiflora* spp., *Pyrostegia ignea*, *Thunbergia mysorensis* or *Wisteria sinensis* in the form of verticals, one or two vertical gardens, a few bonsai specimens, a pool, a rockery or a lawn, etc. Display of a few hanging baskets with strawberries, *Pilea muscosa*, a few herbs, kalanchoe, freesia, etc. will complement the beauty to such gardens. An extra feature of hanging basket as accent may also be created on the roof against the backdrop of a white, light yellow or lightest pink tall building close to the house so that the feature may look more beautiful as against the backdrop of sky or this feature may be created just close the entry point of the roof. For this purpose, two strong and cylindrical steel poles having a net open length of 3 metres and connected with each other with the same strength of cylindrical pole, may be erected on the two side walls on which baskets should be hanged in a harmonious way at different heights starting from the bottom to the top of the pole. Roof gardens can accommodate all sorts of those ornamentals which can be grown outside except the full grown tall shrubs and trees.

#### 1.2.3.5 Hanging Baskets, Verticals and Plant Containers

**Hanging basket** is a device under which plants are grown suspended through the rafters of the greenhouses, over the balconies, porch ways, verandas, to walls, patios, basement areas and similar places. This device can also be used by hanging the plants from the eaves all around the house, especially in multistoried buildings. This provides colour high up in the garden and softens the hard lines of a wall or building. Special artistic strong wrought iron stands or frames with provision of hooks at different levels (multi-tier system) or with strong rods moulded at different levels in a manner which can support the hanging plants in a multi-tier system, are good where space is a limiting factor. The base of such stands or frames should be heavy enough to support the total weight of many baskets. Materials required for hanging baskets are hanging baskets of various shapes and sizes with chains or rope, coconut fibre liner or sphagnum moss, soil mix or compost, slow-release fertilizer granules, water-retaining granules, trowel, watering can and planting materials. First the baskets should be lined with a thick layer of sphagnum moss or coconut fibre liner and then little filled with an ordinary potting compost (1 part good garden loam, 1 part coarse sand and 2 parts of peat, all by volume), and then addition of fertilizer, and water retaining granules as per manufacturer's instructions, and then the plants are placed in position. Proprietary liner made up of paper pulp or coconut matting is also now available in a variety of shapes and sizes to adapt to all varieties of basket. Now more compost is pressed around each plant and down the sides of the basket for firm bedding, watered and then finally hung at an appropriate place. Just to avoid heaviness of the planted basket, a layer of broken-up expanded polystyrene should be pressed at the bottom of the container which will together provide good drainage to the plants. The plants suitable for hanging baskets are achimenes, *Aeschynanthus speciosus*, *Aporocactus flagelliformis*, *Asparagus sprengeri*, begonias (pendent), *Campanula isophylla*, *Ceropegia haygarthii*, *C. woodii*,

*Chlorophytum comosum*, *Epiphyllum oxypetalum*, ferns (many), *Freesia refracta*, *Fuchsia* (semi-hanging types), ivies, lantanas (quite low growing), *Kalanchoe jongsmanii*, *K. manginii*, *K. pumila*, *Lobelia erinus*, *L. tenuior*, *Nierembergia*, orchids (all the trailing types), pelargoniums (ivy-leaves), petunias (sprawling), *Pilea muscosa*, *Portulaca grandiflorum*, *Primula* spp., *Rhipsalidopsis gaertneri*, *R. rosea*, *Rhipsalis cereuscula*, *Rhoeo discolor*, *Saxifraga sarmentosa*, *Schlumbergera* spp., *Sedum morganianum*, *Senecio* spp., smilax, strawberry, sweet alyssum, *Tagetes patula*, *Tropaeolum majus*, *Verbena x hybrida*, *Viola tricolor*, *V. wittrockiana*, etc.

The trees provide **verticals** in the large gardens but in small gardens it is only small trees, fences and boundary walls which work as vertical elements though fences and walls demarcate the area but never add beauty to the garden. Albeit, the beauty is enhanced when existing fences and walls are covered with beautiful shrubs and climbers, and by creating arches, pergolas and trellises. One should not confuse verticals with vertical gardens. **Vertical garden** means gardening at various vertical levels at one site. For example, the trees in the garden may have ornamental basket plants hanging with the branches at multi-tier system, may have orchids or other epiphytic ornamentals growing on the trunk and branches at all the levels, poles installed in vertical fashion having the top joined with strong horizontal columns as supports for hanging various baskets full of ornamentals with chains at various levels starting from little above the floor or ground up to the top of the horizontal column and this way some five times more plants shall be accommodated if the height of the pole is 2.25 metres. Also there may be plant stands prepared so to accommodate many plants vertically. In multistoreyed buildings, from the eaves of the roofs as well as from the verges of the galleries all around the building from 1<sup>st</sup> floor to last floor (it may be 5<sup>th</sup> or 10<sup>th</sup> or even 30<sup>th</sup> floor), the hanging ornamental plants in various sizes, shapes and colours will present a very special and spectacular view, when viewed from a distance at the ground floor. In polyhouses too, the multi-tier trolleys may be designed to accommodate manifold plants, especially the commercial tissue cultured ones, however, in the temperate regions also the plants may be grown in multi-tier system in the greenhouses. This technique is certainly good for saving the space as well as the labour cost to some extent.

**Plant containers** can be moved anywhere in the garden where the colour is wanted as these add more flexible colour in the garden. Annuals grown in pots can be used instantly wherever they are required for massing or for bordering the paths. Ordinary clay pots are still best as these easily blend up with the surroundings, have access to root aeration and drain out excess water. Besides, glazed China pots good as small ponds in courtyards, ceramic pots, terracotta pots, sea shell pots created by joining many in square or rectangular shapes near a water or rock garden, chimney posts, plastic pots and buckets, wooden trugs and other agricultural baskets, shopping baskets, trays, urns, tubs, specially designed hanging baskets, etc. can also be used as plant containers.

### 1.2.3.6 Arches, Pergola, Arbour and Trellises, and Screens

All these are vertical elements greatly affecting the structure and overall look of the garden. Pergolas and garden buildings give shape to the garden while arches, walkways and trellis screens are used as dividers. **Arch** is a curved structure looking like loosely an inverted U that forms the upper edge of an open space, e.g. a window, a doorway or an entrance, and on such arches certain ornamental

vines including roses are trained. It is also a linking site of one part of the garden to the other. An arch at the entrance of the garden governs the visitor's initial impression of whole of the garden so it should be quite impressive. A **pergola** is one of the oldest architectural frame structure consisting of posts with a latticework roof normally flat, designed to support climbing plants (arbour or vine-supports) but below this the path is created for movement. In other words, the pergola is a series of arches forming a covered walk. Pergolas are first cousins to walkways. Pergola by the Egyptians was initially meant for walking from one part of the house to another or to the garden house. Pergolas make delightful eating areas as these provide shade, shelter and privacy even from overlooking neighbours. The pergola is usually flat-topped (sometimes with bulged top, as per requirement of the design) semi-open roof, supported by equi-distant posts and columns over which normally ornamental vines are trained. Pergolas are made of wooden or bamboo poles (the simplest ones) or being more elaborate with pillars of stones, bricks, steel beams (girders), angle iron or G.I. pipes with wooden or green painted iron rods as cross-members, the height being around 2.0-2.50 metres to permit ample head room for normal growth of the plants and for comfortable walking and the width ranging from 2.0-3.0 metres but not less than one metre in case of small and temporary pergolas. A height of 2.0 metres may be sufficient but when it is planted with wisterias it may require 60 cm more head room. A well laid pergola becomes even a resting place in summer in the tropical areas. **Patio overheads** are also a kind of pergola with one end of the overhead beams fixed to the house or garden wall and these should be high enough to clear the window and the cascading of the vigorous climbers from the beams should not block out the view of the garden. Vine-supports may be of two types: a) treillages (trellis or latticework), ornamental or otherwise, designed perpendicular to the garden in one simple geometric plane whose dimensions, lengths and heights are determined as per its use and design details, and b) pergolas or arbours which are architecturally conceived tunnels over which climbers are grown, and the difference between pergola and arbour lies only in their design details but in arbours normally tops and sides are similar though tops may sometimes be curved instead of being flat. **Arbour**, in fact, is the further development of even earlier used pergola. **Arbour** is a shaded place formed by natural or man-made intermingling of foliage and branches of trees or woody plants grown around a trellis. **Trellis** is a lattice (geometrically crisscrossed framework) pattern of wood, plastic or metal used to support plants having straggling growth or climbers, usually fixed to a wall. The trellises in various panel shapes and sizes (rectangular, integral windows, with pointed, concave or convex tops) can be used to screen off part of the garden, *viz.*, vegetable garden, an eating area or restaurant or any other part of the garden. **Screens** are the fence structures for defining and separating various activity areas and may sometimes work as outdoor rooms. Screens provide shelter and privacy and where the boundary wall is quite low, trellises can be fixed on top of walls and fences will provide extra height over which decorative climbers may be trained. Also wherever the seats are put or constructed, privacy should be created by screening with garden boundary, a hedge or trellis at least one side of the area but for privacy from above the only alternative is to create pergola trained with climbers. Screening one part of the garden from the next, a combination of trees and plants of different heights should be used. Where in the house premises there is an open space which is limiting the impact of the garden and where plants cannot be grown, Japanese images and features by using bamboo and reed screens can be put for good effect.

### 1.2.3.7 Hedge and Topiary, Bonsai and Edging

**Hedge** is a continuous line of shrubs, trees or sometimes climbers planted with the intention of forming a boundary or division in the garden. Hedges and screens are permanent living barriers, define space and provide attractive backgrounds. At one stretch, it consists of all one type of plant. The hedges may be clipped in formal appearance or unclipped for natural look. It may be to any height between 0.3-6.0 metres. The ideal hedge should be i) capable of jostling with its neighbours, ii) should have compact growth and freely branched even from the base so that even cats and dogs may not be able to penetrate through these barriers, iii) should maintain its foliage close to ground even when it has grown to a considerable height, iv) should be amenable to fairly severe pruning and frequent clipping, and v) though not essential but preference should be for the evergreens.

**Topiary** is the art of clipping and training shrubs, trees and climbers to form patterns or artificial forms such as balls, cones, spirals, pyramids, squares, rectangles, various architectural shapes and various animal shapes such as peacocks, pheasants, bears, rabbits, camels, giraffes, elephants and so on, just by clipping them regularly for sustaining the shape, or by training against a wire frame and clipping to maintain the proper shape especially in case of climbers. Though this originated in Britain in formal gardens and the art of topiary was at its peak in 17<sup>th</sup> century but soon after the interest got declined. The plants for topiary should have dense and pliable growth, small leaves and should be amenable to frequent clipping. Suitable plants are *Bougainvillea*, *Buxus sempervirens*, *Casuarina equisetifolia*, *Clerodendron inerme*, *Cupressus macrocarpa*, *C. sempervirens*, *Duranta plumieri*, *Dispirit embryopteris*, *Dodonea viscosa*, *Hibiscus rosa sinensis*, *Lonicera nitida*, *Phyllanthus nivosus*, *Polyalthia longifolia*, *Putranjiva roxburghii*, *Quamoclit lobata*, *Sophora tomentosa*, *Taxus baccata*, *Vernonia elaeagnaeifolia*, etc. Sometimes a series of topiaries at various vertical tiers are created in certain shrubs or trees such as *Casuarina equisetifolia* and *Duranta plumieri* as these are quite amenable to drastic and frequent pruning and clippings.

**Bonsai** is an art of growing miniaturized forms of trees and shrubs in shallow trays by rigorous pruning of roots and branches. It is an age-old Chinese art with Japanese name which means 'tray planting', because such plants are planted in a quite shallow containers (trays) to force the plants surviving on minimum possible nutrients and water. Wealthy Chinese some 2000 years ago (1<sup>st</sup> century A.D.) started growing dwarfs and miniatures in containers, which were respected symbols of age, and were known as 'penjing', meaning 'scene in a tray'. This concept of miniature potted plants travelled to Japan when Buddhism got its way there from China in the 6<sup>th</sup> century A.D. In Japan it was regarded not only a hobby but also status symbol. In Japan this art became very popular some 300 years ago, and was exposed to the West from Japan by Commodore Mathew Perry in 1854. In 1976 at the occasion of United States Bicentennial Celebration, the Japanese people gifted some 350 years old, a magnificent bonsai collection to the States that are still for display at the National Arboretum in Washington, D.C. After 1954, bonsai became a reflection of nature and not a distortion of plants. Now days, it is the piece of a living miniature sculpture. Bonsai plants use nature as its model. The most suitable plant species for making of bonsai are: *Adansonia digitata*, *Adenanthera pavonia*, *Adenium obesum*, *Araucaria excelsa*, bamboos (*Arundinaria nitida*, *Phyllostachys aurea*, *P. nigra*, *P. bambusoides*,

*Sasa veitchii*, etc.), *Bombax malabaricum*, *Bougainvillea*, *Brassaia actinophylla*, *Breynia nivosa*, *Brya ebunus*, *Butea monosperma*, *Callistemon lanceolatus*, *Casuarina equisetifolia*, *Chorisia speciosa*, *Citrus japonica* (Chinese orange), *Cryptomeria*, *Delonix regia*, *Erythrina cristgalli*, *E. parcellii*, *Ficus benghalensis*, *F. benjamina*, *F. infectoria*, *F. lutescens*, *F. macrophylla*, *F. mysorensis*, *F. platypoda*, *F. pumila*, *F. religiosa*, *Fortunella japonica*, , *Hamelia patens*, *Hibiscus rosa-sinensis*, *Hiptage madablota*, *Ixora stricta*, *Jacaranda mimosifolia*, *Kigelia pinnata*, *Malpighia coccigera*, *Mangifera indica*, *Manilkara zapota*, *Melia azedarach*, *Melia azadirachta*, *Michelia champaca*, *Milletia ovalifolia*, *Morus alba*, *Murraya exotica*, *Nandina domestica*, *Pinus densiflora*, *P. roxburghii*, *P. sylvestris*, *P. thunbergii*, *Portulacaria afra*, *Punica granatum*, *P. granatum nana*, *Putranjiva roxburghii*, *Salix babylonica*, *Salix Helvetica*, *Tamarindus indica*, *Thespesia populnea*, *Thuja orientalis*, *Vitis vinifera*, *Wisteria floribunda*, *W. sinensis*, etc.

Various styles in which bonsais are trained are: ‘**upright style**’ (formal upright, informal upright, broom, and windswept or winding i.e. *kyokkuk* style), ‘**slanting style**’, ‘**gnarled or Hankan style**’, ‘**cascade (semi- or full) or kengai style**’, ‘**multiple trunk style**’, ‘**group planting (Ikadi-Buke, etc.)**’, ‘**plane or miniature bonsai**’, and ‘**clasped to stone style or rock bonsai**’. Under **upright style**, lower third of the trunk is bare so that the beauty of the trunk, bark and root (which are thick) is clearly seen. In straight or formal upright and curved or curved or informal upright the branches alternate side by side whereas in the windswept style the windward branches are pruned or bent toward the leeward side and the tip of the trunk may leap slightly away from its base if overall direction of the trunk is upright. In case of formal upright and in windswept the trunk is straight, in case of informal upright the trunk is zigzag whereas in all the cases the trunk is tapering which looks quite conical in formal upright because branches grow alternatively to three sides in horizontal manner. Three branches constitute the second third portion of the trunk; however, the top third is also composed of three or more small branches but with dense foliage in the booth, *viz.*, formal and informal upright styles. Conifers and *imli* suit this style in the oval or rectangular pot. **Cascade windswept** bonsai may also be made by growing the trunk and/or branches in a curved horizontal fashion, however, if it is half-way to upright and windswept it becomes slanting windswept as slanting style is nothing but here all the three types i.e. upright (straight or formal, informal or curved and windswept) are slightly slanted to one side. If all the slanted plants are further curved downward in cascade fashion, the straight slanting at 90° the curved slanting in an arching fashion then outward from the base of the pot and the windswept in a real cascade, these become partial cascade, curved cascade and full cascade in style, respectively. All these three categories of upright bonsai are when planted in groups of three or more, these become **group** or **forest style** whereas normally when the shrubs are trained to upright fashion with branches coming out of the ground, the central one being longer and the laterals gradually shorter in all the three basic types it becomes **clump style**. In ‘**multiple trunk style**’ (**Ikadi-Buki style**) a tree is often trained horizontally and several branches are allowed to grow vertically at intervals. In ‘**broom style**’, the trunk is allowed to branch out on the top only where branches grow upward to form an inverted fan-shaped broom. ‘**Plane or miniature bonsais**’ have 8-25 cm height but the trunk thickness is unusually more and the size of the leaves, flowers and fruits should also be small to match the size of the trunk. **Kyokkuk style** has a deep zigzag trunk growth under curved style and the **gnarled (Hankan) style** falls

under windswept category where trunks are deeply zigzag in windswept fashion with formation of a few loops in the trunk. Growing of bonsais over the rocks or on stone with roots establishing in the hollows or clinging to the crevices is known as **clashed to stone style**. The plants grown this way present the look of age and tenacity. On the basis of all these styles it may be concluded that there are only three major categories of bonsai (straight, curved and windswept) which may provide all the styles with slight modifications in their making. These all the styles have a choice for shape of the containers because all the containers do not suit every style. Selection of the pot is dependent on the size, shape, age, leaves and the character of the trunk of the bonsai plant. Formal upright and slanting styles suit best in rectangular and thick-walled pot, cascade styles in deep and thick-walled round or square containers, group and clump plantings in thin-walled shallow pots of round or oval shape and the rock plantings look better in rectangular or oval pots with thin walls and shallow depth. Normally the length of the container should be two-thirds the height of the tree.

The term **edging** may be used to describe the act of trimming the edges of lawns or the use of bricks or river borne similar size stones or rocks (non-living edges) or plants (living edges) to edge paths, beds and borders. It is employed in both type of gardens i.e. formal and informal, to divide beds and borders from roads, walks or paths. The live edging plants should grow very low so that it may give orderly appearance in a form of lining to please the eye. The plants used for edging should have handsome and evergreen foliage, and if possible, with long-lasting beautiful flowers, and should be amenable to neat trimming. The plants suitable for edging are *Alternanthera*, *Aspidistra*, *Caladium*, *Coleus*, *Echeveria*, *Eupatorium*, *Iresine*, *Justicia gendarussa*, *Kochia*, *Ophiopogon intermedius variegata*, *Phalaris arundinacea*, *Pilea muscosa*, *Santolina chamaecyparissus*, as evergreen foliage and *Alyssum*, *Brachycome*, *Cineraria maritima*, *Gazania splendens*, *Gerbera*, *Lobelia erinus compactus*, *Saponaria*, *Torenia*, *Zephyranthes*, etc. as flowering ones.

#### 1.2.3.8 Borders (Annual, Herbaceous and Shrubbery or Mix)

**Border** is the term with a rather wide and loose application in gardens. In general, it can be referred to any bed which is prepared for some special purpose e.g. the vine border which is usually completely enclosed by concrete or brick walls, the **annual border** which are normally grown through seeds for flowering in the first season, the **herbaceous border** set apart mainly for growing of herbaceous perennials, the **shrub border** devoted exclusively to the growing of shrubs, and the **mixed border** which may include shrubs, herbaceous perennials and annuals, all together.

In **herbaceous border**, the plants are arranged in irregular groups (not in straight lines) of a kind for harmonious or contrasting colour effect, either all flowering at one time or successively in such a way that those flowering later should grow up and screen the already flowered ones. Generally, the taller ones are planted in the back when the border is to be viewed from one side only otherwise in the centre when to be viewed from both the sides, the intermediates in the centre of either side and the smaller ones in the front for getting pleasing effect. Some taller plants may be brought forward to give an irregular contour. For succession of blooming, in between the two rows, one row of other herbaceous plants should be planted throughout the border in a harmonious way so that the beauty is enjoyed for longer period. An irregular and outwardly informal herbaceous border looks

more spectacular. But for good effect, the ordinary herbaceous border should be quite wide *i.e.* 1.5 metres when to be viewed from one side and 2.7 metres for viewing from both the sides. Herbaceous borders may include all the herbaceous plants including herbaceous perennials (flowering and non-flowering), all the bulbous plants as well as annuals. In the front and sides of the border grass verge may be maintained while in the back a hedge in case of one-sided border may be planted for effective viewing, however, for both-side borders only the grass verge is enough all around. The taller plants for the purpose are *Aster grandiflorus*, *Artemisia lactiflora*, *Delphinium* (blue), *Rudbeckia laciniata*, *Althaea rosea*, *Delphinium* (blue), *Digitalis purpurea*, *Solidago Canadensis*, *Althaea pink*, *Delphinium*, *Helianthus multiflorus*, *Aster*, *Althaea* (red), *Delphinium*, *Dahlia variabilis*, etc., intermediate plants are *Hemerocallis aurantiaca*, *Tritonia*, *Centaurea*, *Aster*, *Hymenocallis littoralis*, *Crinum*, *Inula*, *Salvia*, *Clarkia*, *Zantedeschia*, *Agapanthus africanus*, *Geranium*, *Chrysanthemum*, *Gladiolus*, *Watsonia*, *Lilium*, *Kniphofia uvaria*, etc. and the small or dwarf ones are *Lupinus*, *Phlox*, *Papaver*, *Oenothera*, *Iris germanica*, *I. florentina*, *Gladiolus*, *Campanula*, *Meconopsis*, *Linum*, *Gypsophila*, *Lupinus*, *Limonium*, *Malvaviscus*, *Scabiosa*, *Kochia*, *Acanthus*, *Dianthus caryophyllus*, *Gerbera*, *Anthurium*, etc. In **annual borders**, only annual (seasonal) flowers are to be planted and in the **mix borders**, annuals, biennials, and herbaceous perennials, all are planted in mixed form.

The term **shrubbery** is applied to any piece of ground devoted to cultivation of shrubs. It is a mass of many shrubs in the form of a border in the garden. Shrub borders create the outdoor living room, screen the views and serve as a backdrop for annual and perennial flowers. The gradation of planting is just the same as for herbaceous border. These can be planted either for colour display at one particular time or for successional display over a long period or throughout the year. A list of shrubs with their flowering time and span, flower colour, its nature of being deciduous or evergreen, final height, form and spread, its ornamental qualities *vis-a-vis* any seasonal changes in its appearance such as leaf colour when emerging and the hanging of fruits or berries after the flowering is over, and the particular point at the site of planting should be prepared for making a shrub garden or shrubbery. Certain bulbs may also be planted under or in the vicinity of the shrubs for extra pleasure. Flowering span may also be extended by planting mixed shrubbery border with annuals and other herbaceous perennials including kalanchoe (flowering types), pelargoniums, bedding plants, bulbs including *Clivia*, *Haemanthus*, *Dahlia*, *Kniphofia*, *Cooperia*, *Zephyranthes*, *Zantedeschia*, *Fritillaria*, etc. The shrubs for planting in the shrubbery border are *Abelia chinensis*, *Adenium obesum*, *Allamanda cathartica*, *Bauhinia acuminata*, *B. galpinii*, *B. tomentosa*, *Bixa orellana*, *Bougainvillea*, *Brunfelsia americana*, *B. calycina*, *Caesalpinia pulcherrima*, *Calliandra haematocephala*, *Camellia japonica*, *Cassia alata*, *C. biflora*, *Clerodendron paniculatum*, *Cuphea hyssopifolia*, *Jatropha pandurifolia*, *Daeadalacanthus nervosus*, *Dombeya spectabilis*, *Duranta repens*, *Forsythia intermedia*, *Fuchsia* sp., *Galphimia gracilis*, *Gardenia jasminoides*, *Gustavia insignis*, *Hamelia patens*, *Hibiscus malvaviscus*, *H. rosa-sinensis*, *Holmskioldia sanguinea*, *Hydrangea macrophylla*, *Ixora arborea*, *I. bandhuca*, *I. chinensis*, *I. coccinea*, *Kopsia fruticosa*, *Lagerstroemia indica*, *Lantana camara*, *Malpighia coccigera*, *Malvaviscus arboreus*, *Murraya exotica*, *Mussaenda erythrophylla*, *M. frondosa*, *M. lutea*, *M. philippica*, *Nerium indicum*, *Nyctanthes arbortristis*, *Parkinsonia aculeata*, *Pentas lanceolata*, *Plumbago auriculata*, *Poinsettia pulcherrima*, *Oncoba spinosa*, *Rhododendron azalea*, *Sambucus nigra*, *Tabernaemontana divaricata*, *Tecoma gaudichaudi*, *Thevetia peruviana*, *Woodfordia floribunda*, etc.

### 1.2.3.9 Trees, Shrubs and Climbers

A **tree** may be defined as any woody plant growing more than five metres in height with distinct trunk or main stem, where branching occurs after a certain height, and mostly making canopy at the top. This expression is used in distinction to shrub or bush which has no distinct main trunk and which branches at the ground level. Trees give a sense of permanence and maturity to a garden, create a strong visual impact, can define or enclose space and emphasize a path, and link the garden with the adjoining outside landscape. Trees give height, structure and the living sculptural focal points to a design. These are grown for providing shade on roads or at a secluded place, for the beauty of their flowers, foliage, shape, bark, decorative fruits sometimes edible, and often for their timbers. Some unusual trees are *Adansonia digitata*, *Couroupita guianensis*, *Kigelia pinnata*, *Parmentiera cerifera*, *Ravenala madagascariensis*, etc. Other ornamental trees are: i) foliage trees such as *Abies spectabilis*, *Adenantha pavonia*, *Ailanthus excelsa*, *Albizia lebbek*, *Alstonia scholaris*, *Anthocephalus cadamba*, *Araucaria cookii*, *Artocarpus incisa*, *Azadirachta indica*, *Brassaia actinophylla*, *Caesalpinia coriaria*, *Casuarina equisetifolia*, *Cedrus deodara*, *Dalbergia sissoo*, *Dillenia indica*, *Diospyrus embryopteris*, *Ficus benghalensis*, *F. benjamina*, *F. elastica*, *F. infectoria*, *F. krishnae*, *F. lyrata*, *F. mysorensis*, *F. nitida*, *F. parcellii*, *F. religiosa*, *F. retusa*, *F. roxburghii*, *Grevillea robusta*, *Heterophragma adenophyllum*, *Inga dulcis*, *Madhuca latifolia*, *Mimusops elengi*, *Platanus orientalis*, *Podocarpus chinensis*, *Polyalthia longifolia*, *Pongamia glabra*, *Putranjiva roxburghii*, *Salix babylonica*, *S. pendula*, *Samanea saman*, *Schleichera trijuga*, *Sterculia alaata*, *Swietenia mahagoni*, *Terminalia arjuna*, *T. catappa*, *Thuja occidentalis*, etc., and ii) flowering trees such as *Acacia longifolia*, *A. pyracantha*, *A. dealbata*, *A. decurrens*, *A. baileyana*, *A. cultiformis*, *Aesculus assamica*, *Amherstia nobilis*, *Barringtonia racemosa*, *B. speciosa*, *Bauhinia purpurea*, *Bignonia megapotamica*, *Brownea grandiceps*, *Butea monosperma*, *Callistemon lanceolatus*, *Callicarpa lanata*, *Cassia fistula*, *C. grandis*, *C. javanica*, *C. marginata*, *C. nodosa*, *C. renigera*, *C. siamea*, *C. spectabilis*, *Chorisia speciosa*, *Cochlospermum gossypium*, *Colvillea racemosa*, *Crataeva religiosa*, *Dillenia indica*, *Erythrina indica*, *Holarrhena antidysenterica*, *Ixora parviflora*, *Jacaranda mimosaefolia*, *Koelreuteria paniculata*, *Lagerstroemia flos-reginae*, *Liriodendron tulipifera*, *Magnolia grandiflora*, *Markhamia platycalyx*, *Mesua ferrea*, *Michelia champaca*, *Milletia ovalifolia*, *Millingtonia hortensis*, *Mitragyna parvifolia*, *Pachira rosea*, *Peltophorum ferrugineum*, *Plumeria* spp., *Poinciana regia*, *Pterospermum acerifolium*, *Rhododendron arboreum*, *Salmalia malabaricum*, *Saraca indica*, *Spathodea campanulata*, *Tabebuia* spp., *Tecoma argentea*, *Thespesia populnea*, etc.

A **shrub** may be defined as any woody plant with no distinct main stem, generally branching from the ground level, and growing not more than five metres in height. Certain shrubs also make canopy as to those of trees, and have no branching at the base as *Lagerstroemia indica*, so the distinction between the two is purely artificial. In fact, shrubs are little bushy trees, less in height than a tree, and have branching stems. Though the shrubs provide height and soft frame-work in the garden, act as dividers and demarcate the garden area in the form of hedges, act as screen, work as a specimen plant, and serve as windbreaks but in a garden it is a most abused category of plants. Beautiful shrubs are *Abelia grandiflora*, *Acalypha hispida*, *Adenium obesum*, *Allamanda cathartica*, *Ardisia crispa*, *Bauhinia acuminata*, *B. galpinii*, *Bougainvillea*, *Brunfelsia americana*, *Buddleia*



spp., *Caesalpinia pulcherrima*, *Calliandra houstoni*, *Carisa carandus*, *Cassia* spp., *Cestrum* spp., *Clerodendron fragrans*, *Duranta plumieri*, *Galphimia gracilis*, *Gardenia jasminoides*, *Gmelina asiatica*, *Hamelia patens*, *Hibiscus* spp., *Holmskioldia sanguinea*, *Ixora* spp., *Lawsonia inermis*, *Malpighia coccigera*, *Murraya exotica*, *Mussaenda philippica*, *Nerium odorum*, *Nyctanthes arbortristis*, *Punica granatum*, *Tabernaemontana divaricata*, *Tecoma gaudichaudi*, *Thevetia nereifolia*, *Woodfordia floribunda*, etc.

A **climber** may be defined as any woody (perennial climbers) or herbaceous (annual climber) plant growing to any height from a few feet to a tall tree but without a strong trunk to support itself, hence, requires support for climbing. These may have special structures to climb over supports. These special organs may be tendrils, modified leaf-stalks, rootlets or hooks like thorns. There is slight difference among climbers, creepers, rambles and stragglers, trailers, and twiners. The beauty of any garden is greatly enhanced if climbers are commonly grown on arches, pergolas, trellises, arbours, pillars or similar structures. These are also used for screening and for providing privacy to the viewers. The bare walls of buildings or boundary walls can be decorated by a colourful climber or those which have foliar beauty. Climbers are also trained up a tree, over the net-houses, lath houses and conservatories. They are most suited for roof gardens where due to paucity of space vertical growth is desirable. Beautiful climbers for i) shady situations are money plant, *Asparagus*, *Hedera helix*, *Trachelospermum jasminoides*, *Clerodendron splendens*, *Jacquemontia pentantha*, *Thunbergia grandiflora*, etc., ii) with attractive foliage are *Monstera deliciosa*, *Ficus repens*, *Asparagus*, money plant, etc., iii) climbers with scented flowers are jasmines, honeysuckle, *Trachelospermum jasminoides*, etc., and iv) the annual climbers are *Calonyction aculeatum*, *Clitoria ternatea*, *Cobaea scandens*, *Ipomoea purpurea*, *Lathyrus odoratus*, *Maurandia barclaiana*, *Pharbitis x imperialis*, *Quamoclit cocinea*, *Q. lobata*, *Q. pennata*, *Thunbergia alata*, *T. fragrans*, *Tropaeolum aduncum*, *T. majus*, *T. peregrinum*, etc. Other important climbers are *Adenocalymma alicium*, *Allamanda cathartica* var. *grandiflora*, *Antigonon guatemalense*, *A. leptopus*, *Aristolochia elegans*, *A. grandiflora*, *Artabotrys odoratissimus*, *Banisteria laevifolia*, *Bauhinia diphylla*, *Beaumontia grandiflora*, *Bougainvillea* spp., *Campsis grandiflora*, *C. radicans*, *Cissus discolor*, *Clematis flammula*, *Clerodendron splendens*, *Clytostoma purpureum*, *Combretum densiflorum*, *Ficus repens*, *F. radicans*, *Francoa appendiculata*, *Gloriosa superba*, *Hiptage benghalensis*, *Jacquemontia pentantha*, *Jasminum auriculatum*, *Lonicera hildebrandiana*, *L. japonica*, *L. sempervirens*, *Passiflora caerulea*, *Pereskia bleo*, *Petrea volubilis*, *Porana paniculata*, *Pyrostegia ignea*, *Quisqualis indica*, *Rosa banksiae alba*, *R. banksiae lutea*, *Solanum jasminoides*, *Thunbergia grandiflora*, *T. mysorensis*, *Vernonia elaeagnifolia*, *Wisteria sinensis*, etc.

### 1.2.3.10 Carpet or Design Bedding, Flower Beds and Sunken Garden

**Carpet or design bedding** is referred to the use of groups of closely planted, low-growing and colourful bedding plants in various formal patterns or designs. Sometimes these are also termed as 'geometrical bedding' or 'fancy bedding'. This is most expensive form of all kinds of bedding, the formation of which requires highest degree of technical skill. Only those herbaceous ornamentals are planted here which stand pinching and shearing such as *Achyranthes*, *Aerva*, *Alternanthera*, *Coleus*, *Echeveria secunda* (syn. *Cotyledon secunda*), *Eupatorium*, *Iresine*, *Justicia gendarussa*, *Lobelia erinus compactus*, *Ophiopogon intermedius*

*variegata*, *Phalaris arundinacea*, *Pilea muscosa*, *Sedum rupestre*, *Sempervivum tectorum*, *Torenia asiatica*, *Vittadenia australis*, various seasonal flowers (*Alyssum*, *Cineraria maritima*, *Portulaca grandiflora*, etc.) and many others. The plants are multiplied mostly through cuttings indoors and through them somewhere in the garden at a suitable place the imitations of the portraits of revered personalities, the buildings, the animals, floral clocks, lettered expressions, various formal geometrical patterns and several others of similar originalities are prepared in combination with annual flowers. It is normally done at a slightly sloping place in front or near the garden building or in the lawn at a quite conspicuous place. It may also be created in the sunken areas. Here many colours are harmonized together to denote different organs of a feature. In Ramoji City Garden near Hyderabad, such things are beautifully displayed.

**Flower beds** are the beds of annuals or biennials or any other flowering ornamental grown as annual or biennial in the beds outside. Flower beds are most important, by and large, permanent features, especially in a formal garden and whenever the season is over these may be planted out immediately throughout the year. Nursery beds can be prepared elsewhere and in the mean time the beds may be readied for transplanting. Certain beds are meant for perennial plants like *Canna*, *Cooperia*, *Hippeastrum*, *Kniphofia*, *Solidago*, *Tagetes* (as annual as well as perennial), *Zephyranthes*, certain other ornamentals, grasses, reeds, ferns, etc. The beds may be of any shape such as circular, oval, kidney-shaped, square, rectangular, or any other abstract design as these are easy to maintain. **Bedding plants** are those annuals and biennials, or others grown like these, generally raised inside up to maturity and then planted or bedded out often in large blocks for instant or temporary display. **Island beds** should be a place of accent visible from all the sides. It should effectively be surrounded either by lawn or paving but in paved gardens raised island beds look more attractive. It should be geometrical, round, square or rectangular to suit formal gardens while loosely curved island beds are appropriate in the undulating ground and in informal gardens. The plants for such gardens are annuals, biennials, and normally non-woody perennials but should be sturdy (not requiring stakes), dwarf and compact in habit.

A well devised **sunken garden** brings another dimension to the garden and adds a feeling of space. Sunken gardens are usually square or rectangular in shape and are laid below the eye level in geometrical design with formal flower beds divided by a symmetrical framework of paths and walkways, preferably with a sculptural feature such as a fountain or sundial in the centre of such gardens. Being lower than rest of the garden, normally such gardens are created at a sheltered situation but with proper drainage facilities. Various herbs, certain curious looking and unusual plants *vis-à-vis* specialty flowers, roses and formal bedding are most suited to such gardens.

### 1.2.3.11 Bog and Water Garden

**Bog garden** is a low-lying area of permanently wet **marshy** ground, often beside water in the garden, grown with special ornamental plants. In an informal design, a bog garden makes an attractive and unconventional feature. Bog garden also provides a link between aquatic garden and other parts of garden. The bog or **marsh** garden shall be kept in a **swampy** state throughout the year through the natural collection of the surface drainage and if there is a pond, though it is not a necessary feature, in a garden its banks may provide opportunity for creating

such a garden in a natural way but such ponds should have the control system for water level. Therefore, it is always better to use a waterlogged land for making a water garden. A clay soil becomes moist merely by a trickle of water but in the light soils which is well drained, slight digging becomes necessary. While making a bog garden, about 60 cm of top soil is dug up and at the base about 15-20 cm of clay soil is introduced covered with about 10-15 cm layer of rubble or stones, over which half loam and half leaf mould, peat or well decayed compost should be spread to the level of the land. If natural flow of water is not available, a trickle of water just to keep the land swampy should be artificially introduced. In case it is a large bog garden, paths of bricks or stones should be created to make full access to every part of the bog garden. Planting should be done in clumps of 3-5 in various patches, each patch having different colours but in a harmonious way. Just to make it quite natural, the patches may also have differing plant height. The plants suitable for such gardens are *Acorus calamus*, *A. gramineus*, *Alisma lanceolatum*, *Arundinaria bamboo*, *Arundo donax* (reed), *Astilbe*, *Berginia ligulata*, *Butomus umbellatus*, *Calla palustris* (bog arum), *Caltha palustris*, *Colocasia esculenta*, *Cypripedium spectabile* (orchid), *Cyperus involucratus*, *C. longus*, *C. papyrus*, *Gentiana asclepiadea*, *Geum rivale*, *Hedychium*, *Hemerocallis*, *Hosta*, *Hottonia palustris*, *Iris aurea*, *I. chrysographes*, *I. clarkei*, *I. forrestii*, *fulva*, *I. ensata* (syn. *I. kaempferi*), *I. laevigata*, *I. monnieri*, *I. orientalis*, *I. pseudacorus*, *I. sibirica*, *I. versicolor*, *Juncus ensifolius*, *Ligularia*, *Leucojum aestivum*, *Lobelia paludosa*, *Lysichiton americanus*, *Mentha aquatica*, *Mimulus cardinalis*, *Myosotis scorpioides*, *Pandanus odoratissimus*, *P. utilis*, *Parnassia palustris*, *Polygonatum multiflorum*, *Polygonum amphibium*, *Pontederia lanceolata*, *Primula beesiana*, *P. bulleyana*, *P. florindae*, *P. japonica*, *P. rosea grandiflora*, *P. sikkimensis*, *P. vulgaris*, *Ranunculus aconitifolius*, *Sagittaria latifolia*, *S. sagittifolia*, *Saxifraga*, *Thalictrum*, *Trollius*, *Typha angustifolia*, *T. minima*, various ferns, *Veronica beccabunga*, *Zantedeschia aethiopica*, etc.

**Water garden** means gardening in actual water. For water garden a low-lying piece of land in the garden should be selected. At a sunny and open situation away from overhanging trees where a natural depression already exists should be chosen for creating the water garden as this will be less expensive and without disturbing the natural landscape the water garden will be created. Also the place should be not prone to flooding so that danger of leaching down fertilizer or pesticide residues from the beds is gone as these substances will have adverse effect on the life of the water pool. But it should be constructed in harmony with its surroundings. For harmonious effects, the water gardens may be built in association with rock garden or wild garden. In informal gardens, the shape is informal while formal in formal gardens and the size depends on the availability of the space and commensurate to other features.

Why we should have water gardens? It is the soul of the garden; gives transition in the garden; is a natural element providing cooling effect and maintains humidity in the surrounding; has reflective surface where inverted images appear *via-a-vis* multiplies the moon and stars in the night and during day time the sparkling sunshine and dancing raindrops are mirrored; harbours live-stock in its water which provides added enjoyment especially to children; a pool has an inherent tranquillity while the flowing water in the form of rippling streams, evenly stepped or cascading waterfall or watercourse channelled over stones and leading into the pool or the spurting fountain at an elevated place or in the centre brings life to a garden and offers the extra pleasure of restful murmuring

sound and mobility; and provides scope for growing many beautiful and uncommon plants which can nowhere be grown without a pool of water.

**Preformed and prefabricated pools** are of glass fibre, plastic, wood barrels, concrete and earthen tubs, and may be in a variety of shapes, viz., round, square, rectangular, kidney shaped, circular, etc. The ones available in the market are often contoured to provide ledges for growing marginal plants. Fibreglass pools are best with respect to life and toughness. For installing these, a suitable site is excavated 5 cm more than of the depth and dimension of such pools where these are firmly fixed. It is then filled with medium followed by planting of the aquatics. Polythene pools are also made which are easy to procure because of being cheaper and if cared well, this may also last for 8-10 years. Bath, cattle troughs and tanks all may be used for growing aquatics.

The shape and size of the formal pool depend to some extent upon the personal taste or on the size of the garden or house but the **formal pool** should be formal in shape, viz., circular, rectangular, square, or similar balance patterns. The formal pools are more appropriate on the roof or terraces or as a focal point at a suitable place, especially at the main axis of the paths. The edges of sunken pools should be strong and wide and made preferably of attractive paving which should link it with the garden. The raised pools may have quite wide edges to form a seat from where leisurely the views and water reflections may be enjoyed. To complement the style of the pool, a fountain or an ornamental spout commensurate to the pool and overall design of the garden can be sculptured in it. Usually the water garden is 1.0 metre deep, though width is dependent on the space available, the size of the house or garden and the personal taste and convenience. For making a pool of 6.0 x 4.5 metres (20 x 15 feet), the excavation will have to be carried out 1.0 metre deep, 8.10 metres (27 feet) in length and 6.60 metres (22 feet) in width, keeping the width of some 75 cm all around the pool for accommodating marsh plants, and some 15 cm for the walls all around the pool, *vis-à-vis* the wall of the same thickness inside again leaving a net width of 75 cm between the two walls for creating the pocket for marshy plants. Thus net size of the pool for deep water plants would be 6.0 x 4.5 metres excluding 75 cm width either side for marginal plants *i.e.* 75 + 75 cm and 15 cm for each of the four walls *i.e.* 15 x 4 cm. After the excavation is over of the pit of the size of 8.10 meters length x 6.60 metres width x 1.0 metre depth, the loose soil is taken out and the bottom is made thoroughly firm by pounding with a heavy beater as loose soil will shrink away and will cause concrete to crack. In the centre of the pond, a high quality plastic plug is installed fitted with high quality plastic drainage pipe which is drawn up to the main drainage channel so that while emptying the tank for cleaning there may not be any problem. The plug should be fitted in a way that after spreading of concrete and cement wash it should be slightly up.

- i) **For deep water:** *Aponogeton distachyos*, *Euryale ferox*, *Nelumbo lutea*, (*N. pentapetala*), *N. nucifera alba*, *N. speciosa* (*N. nucifera*), *Nuphar advena*, *N. advena variegatum*, *N. japonicum*, *N. luteam*, *N. microphyllum*, *Nymphoides indica*, *N. pleat*, *Nymphaea alba*, *N. caerulea*, *N. mexicana*, *N. pygmaea*, *N. tetragona*, *N. tuberosa*, *Orontium aquaticum*, *Victoria amazonica*, *V. regia*, etc.
- ii) **For bog or moisture-loving:** *Anemone rivularis*, *Arundo donax* 'Variegata', *Astilbe chinensis*, *A. simplicifolia*, *Cardamine lyrata*, *Eupatorium purpureum*, *Euphorbia palustris*, *Gunnera chilensis*, *Hemerocallis*, *Hosta*,

*Iris ensata, I. sibirica, Leucojum aestivum, Ligularia clivorum, Lobelia cardinalis, L. fulgens, Lythrum salicaria, Osmunda regalis, Parnassia palustris, Phalaris arundinacea, Polygonum bistorta, P. campanulatum, Primula alpicola, P. denticulate, P. florindae, P. helodoxa, P. japonica, P. rosea, P. secundiflora, P. sikkimensis, Salix alba, S. babylonica, S. daphnoides, Scirpus cernuus, Scrophularia auriculata 'Variegata', Senecio smithii, Taxidium distichum, Thalia dealbata, Trollius x cultorum, T. europaeus, T. ledebourii, Wachendorfia thrysiflora, etc.*

- iii) For shallow marginals (15 cm depth of water):** *Acorus gramineus, A. gramineus 'Variegatus', Alisma parviflora, Alocasia macrorrhiza, Calla palustris, Caltha leptosepala, Caltha palustris, Carex elata, C. pendula, C. riparia, Colocasia esculanta, Cotula coronopifolia, Crinum americanum, Cryptocoryne lutea, C. wendtii, Cyperus adenophorus (C. diffuses, C. elegans, C. laxus), C. alterifolius, C. involucratus, C. longus, C. papyrus, Hederocleys nymphoides, Houttoynia cordata, Hymenocallis lirisome, H. littoralis, Ipomoea aquatica, Iris laevigata, I. versicolor, Juncus ensifolius, Lobelia paludosa, Lysichiton americanus, Mentha aquatica, Mimulus spp., Myosotis scorpioides, Peltandra alba, Polygonum amphibium, Sagittaria latifolia, S. sagittifolia, Typha minima, Xanthosoma lindenii, X. violaceum, Zinnia aquatica, etc.*
- iv) For deep marginals (30 cm water depth):** *Acorus calamus, Alisma lanceolatum, Brasenia schreberi, Butomus umbellatus, Canna glauca, Canna glauca vars 'Endeavour', 'Erebus', 'Ra' and 'Taney', Cyperus papyrus, Hottonia palustris, Iris pseudacorus, Marsilea quadrifolia, Nelumbo lutea, N. nucifera 'Alba Grandiflora', 'Alba Striata', 'Rosa Plena', Phragmites australis, Pontederia cordata, P. lanceolata, Ranunculus lingua, Typha angustifolia, T. latifolia, Zantedeschia aethiopica, etc.* Koi carp, common goldfish (*Carassius auratus*), golden orfe fish (*Idus idus*), veiltail goldfish (*Leuciscus phoximus*), frogs, newts, Ramshorn snail (*Planorbis corneus*), freshwater winkle (*Paludina vivipara*), freshwater whelk (*Limnaea stagnalis*), etc. may provide added pleasure in a water garden.
- v) For submerged oxygenators:** *Bacopa amplexicaulis, B. manniera, Cabomba aquatica, C. aroliniana, Callitriche autumnalis, Ceratophyllum demersum, Ceratopteris deltooides, C. pteridoides, C. thalictroides, Hydrocleys parviflora, Myriophyllum aquaticum, Potamogeton crispus, Preslia cervina, Tillaea recurva, etc.*
- vi) For floating aquatics:** *Azolla caroliniana, A. filiculoides, Ceratopteris pteroides, Eichhornia azurea, E. crassipes, Hydrocharis morsus-ranae, Lemna trisulca, Limnanthemum lacunosum, Limnobium spongia, L. stoloniferum, Phyllanthus fluitans, Pistia stratiotes, Riccia fluitans, Salvinia auriculata, Stratiotes aloides, Trapa natans, Utricularia minor, U. vulgaris, Wolffia arrhiza, etc.*

**Aquarium** is a glass enclosure with controlled environment for growing small tropical plants along with ornamental fishes. It can be landscaped with artistically designed wood, reef stones, oyster shell, conch shell, river borne stones, lime-free coarse sand (some 8 cm in the front and 10-15 cm at the back), etc. In aquarium, like to that of a garden pool, a good water chemistry balance is maintained by correct light levels through fluorescent tubes, temperature, and

organic matter. Also there should be provision for decanting filter fitted with a small electric pump. From time to time or once in a day, fish feed in right quantity should be poured in the aquarium for good health of the fishes. Plants suitable for aquariums are *Alternanthera philoxeroides*, *Aponogeton crispus*, *A. madagascariensis*, *Baldellia ranunculoides*, *Cabomba caroliniana*, *Cryptocoryne ciliata*, *Echinodorus major*, *Hemigraphis alternata*, *Hygrophila difformis*, *H. polysperma*, *Ludwigia arcuata*, *Myriophyllum hippuroides*, *Potamogeton crispus*, *Salvinia natans*, *Utricularia exoleta*, *U. vulgaris*, *Vallisneria gigantea*, etc.

**Terrariums and bottle gardens** is a part of indoor gardening in bottle or in an enclosed container made of glass or plastic for growing small plants of ornamental value. The containers may themselves be decorative. Those plants which require more humid atmosphere for their growing thrive best in terrariums. Here only those ornamentals are displayed which are non-flowering but with contrasting leaf textures and colours, require more humid conditions for their growing, and are slow in growth or of short stature. However, glass bottles with constricted neck, and tinted ones are not suitable for this purpose. The container for the terrarium should be absolutely clean. A terrarium should have a drainage material such as clay pellets, gravel or pebbles and fresh wood charcoal over which a highly porous but moisture-retentive compost is spread for planting, and where extra peat is added to keep the soil well aerated. Only young plants with just emerging roots are planted in this medium and then bare areas are covered with pebbles or moss to check the compost from drying out, lightly watered and then lid is placed. After these are established, there is scarce need of watering or no watering. The plants suitable for terrariums or bottle gardens are *Acorus gramineus* 'Pusilus', *Adiantum raddianum*, *Asparagus densiflorus* 'Sprengeri', *Asplenium nidus*, *Begonia* 'Tiger Paws', *Callisia*, *Cissus discolor*, *Codiaeum*, *Cryptanthus acaulis*, *Dracaena sanderiana*, *Fittonia verschaffeltii*, *Hedera helix*, *Maranta leuconeura*, *Pepromia caperata*, *Pilea cadierei*, *Sansevieria trifasciata*, *Syngonium hoffmannii*, *Tradescantia cerinthoides* etc.

Sometimes water of the pool turns green because of unicellular algal growth, though not harmful and instead act as fish food, water looks dirty. While using compost, it should properly decomposed with no fibres or any other unrotted material. However, certain oxygenators such as *Anacharis*, *Lagarosiphon* and *Myriophyllum* should be introduced in the pools along with small water fleas provided no fish is there in the pond.  $\text{KMnO}_4$  @ 1 g per 2 gallons of tank water is used first by dissolving it before use. *Planorbis* and *Paludina* snails also feed on plant debris, fish excreta and algae. Certain weeds which grow in the pond should be taken out gently. Blanket weed (slimy green growth) which develops during hot and dry weather is controlled by 115 g of copper sulphate or 30 g of  $\text{KMnO}_4$  to each 25,000 gallons of pond water, and a second application within a week if still the weed is there. This quantity is not injurious to fish in the pond or the plants. The control of insect-pests and diseases are the same as to other plants but chemicals may affect the water chemistry which may prove toxic to the livestock and also to the plants. However, hand picking is the best way to control these.

### 1.2.3.12 Rockery or Rock Garden

It may be a garden in itself or a part of the garden but **rock gardens** in real sense are those gardens where mountainous, temperate and/or alpine ornamentals, similar to their natural habitats, are grown in very rocky places. In fact, in the

temperate areas we have natural rocky mountains growing with such plants which we want to imitate elsewhere in the plains of India just to find out the suitable plants which can provide the same elegance and beauty as to that of temperate regions. Though in temperate areas it is easy to establish and maintain but in the plains it's not an easy task because this idea itself has developed only for the temperate or alpine regions and the plants. Moreover, the weather in the temperate areas is quite congenial for growing of ornamentals as there summer is not so extreme so all those plants which can be grown during winter season in the plains can be grown on the hills during summer with perfection but summer in the plains is quite harsh where most of such plants die or require summer protection. However, with thorough studies, to some extent, such gardens may also be created in the plains. Few people describe 'rockery', as massing of rocks while 'rock garden' having a few rocks placed properly in a wide area but, in fact, there is no difference and the both are referred to one thing 'growing of ornamentals with the rocks formed in the form of mountains'. As on the mountains, in one recourse, there are rocks and natural waterfalls, so natural water trickling through the peaks in the form of streams and accumulating in the various depressions formed naturally due to rocks at various elevations and then overflowing when completely filled, and finally falling to the rivulets or a river or a water reservoir (natural lake) look highly scenic so such scenes may also be created by combining rock garden with the water garden, while making a garden. Throughout the year, such trickles continue with more water from summer to autumn due to snow melting and rains which cause such falls running continuously though with less water during winters due to water transforming into ice because of a very low temperature. This works as rock garden as well as water garden which gives utmost enchantment. Artificially also, such marriages (rocks combining with water) are possible through which continuous trickle may be established which will keep the miniature falls running.

The idea that rock plants grow best on rocks is not correct. Rocks and stones found in the temperate or alpine areas provide shelter and coolness to the roots and in the crevices conserve moisture, which in turn is utilized by the plants. That is why in these crevices, in natural way, the plants are found growing and if the growing medium accumulates naturally on the rocks, certain plants start growing over them also but if the depth of the soil or medium is not enough on the rocks such plants dry up during summer with the drying of the medium.

Rock gardens have various features such as **wall garden (dry wall)**, **paved garden**, **moraine garden**, **scree garden** and **alpine garden**. Dry wall and paved gardens are already described. **Moraine garden** means growing of ornamental plants in the beds massed with earth and rock debris (rocks, small stones and grits or sand produced by the grinding effect of the ice on the surrounding rock) carried by an advancing glacier and left at its front and side edges as it retreats. Its depth should be around 30 cm or more. In moraine garden the water is fed from below, may be in the form of running stream or it may consist of a pool so that there is continuous supply of moisture to the roots of the plants. In nature, this condition is found through melting snows from which water flows or seeps through the rocks. For proper drainage, the moraine should consist of equal parts of loam, leaf mould, sand, and stone chips, with about 1 cm layer of chips on the surface. **Scree garden** means growing of high altitude alpiners in the sloping beds formed by accumulation of weathered rock debris, often forming a heap at the base of a cliff, hill, or mountain slope as in case of moraine, but no water is

supplied beneath the surface. Only those alpines are grown which require excellent drainage. It is only necessary to make scree if we want to grow certain choice alpines which will not grow in ordinary rock garden soil. For making a scree garden, it may be constructed on a bit sloppy or flat place at the base of rock garden where there is no water supply below the surface; however, the ornamental plants survive only on the water coming from the melting snow. Usually the medium for growing such alpines consists of 10 parts of rock debris (stone clippings) to 1 part of garden loam, 1 part of peat (preferably sphagnum peat) and 1 part coarse sand in a 45-60 cm bed depth, prepared on slightly sloppy ground with a drainage outlet at the bottom. Natural moraines or screes have their characteristic vegetation which survives with a minimum amount of nourishment but usually with abundant supply of water from spring to autumn from melting snow and ice. **Alpine garden** is that which houses mountainous plants. **Alpine** is a plant which grows naturally on mountains. In gardens, the term is applied to any plant suitable for cultivation in rock gardens, thus alpines and rock plants become synonymous. Mountain plants are mostly dwarf and compact in nature and have very long roots which penetrate great distance in search of food and moisture. Mostly these thrive best where light is good and drainage is quick. These remain dormant for 8-9 months below the blanket of snow which protects them during the winter, and within 3-4 months these make crowded growth, flower and seed by pooling whole of their growth together. This environment is not easy to be provided in the man-made rock gardens. The plants suitable for the rockeries are cacti and other succulents such as *Agave*, *Aloe*, *Cereu*, *Euphorbia milii*, *E. splendens*, *Furcraea*, *Gasteria*, *Haworthia*, *Kalanchoe*, *Mammillaria*, *Opuntia*, *Sansevieria*, *Sedum*, *Sempervivum*, *Stapelia*, *Yucca*, etc., ferns such as *Drynaria*, *Nephrodium*, *Nephrolepis*, *Polypodium*, etc., flowering annuals such as *Alyssum*, *Antirrhinum*, *Bellis perennis*, *Brachycome iberidifolia*, *Browallia elata*, *Dianthus thinness*, *Hymenatherum tenuifolium*, *Iberis amara*, *Mesembryanthemum criniflorum*, *Phlox*, *Salvia splendens*, *Verbena hybrida*, *Viola tricolor hortensis*, *Zinnia linearis*, etc., herbaceous plants such as *Angelonia grandiflora*, *Asclepias curassavica*, *Aster amellus*, *A. novae-angliae*, *A. novi-belgii*, *Cathranthus roseus*, *Dracaena sanderiana*, *Fittonia argyroneura*, *Impatiens holstii*, *I. sultanii*, *Pedilanthus tithymaloides variegata*, *Pilea muscosa*, *Portulaca*, *Sansevieria culindrica*, *S. zeylanica*, *Setcreasea*, *Tradescantia zebrina*, *Verbena erinoides*, etc., bulbous such as *Haemanthus*, *Kniphofia*, *Narcissus*, *Nerine*, *Oxalis*, *Ranunculus*, *Zephyranthes*, etc., and shrubs such as *Adenium obesum*, *Asystasia coromandeliana*, *Brya ebenus*, *Calliandra inaequilatera*, *Callistemon lanceolatus*, *Cassia alata*, *C. biflora*, *C. laevigata*, *Catesbaea spinosa*, *Clerodendron macrosiphon*, *Crossandra*, *Cuphea*, *Duranta plumieri variegata*, *Jatropha podagrica*, *Juniperus chinensis*, *Lantana sellowiana*, *Muehlenbeckia platyclada*, *Nolina lonfolia*, *Ruellia*, *Russelia juncea*, *Sanchezia nobilis variegata*, *Thuja*, etc. The plants suitable for the hills are *Achillea tomentosa*, *Adonis vernalis*, *Allium azureum*, *A. beesianum*, *A. coeruleum*, *A. Cyaneus*, *A. narcissiflorum*, *Androsace lanuginosa*, *Anemone*, *Aquilegia glandulosa*, *Azalea*, *Bridiaea*, *Bulbocodium vernalis*, *Campanula*, *Chionodoxa*, *Colchicum autumnale*, *Corydalis cheilanthifolia*, *Cotoneaster*, *Cotyledon oppositifolia*, *Crocus*, *Cyclamen*, *Cytisus*, *Daphne*, *Dianthus alpinus*, *Draba*, *Eranthis hyemalis*, *Erodium*, *Erythronium*, *Euonymus*, *Fritillaria*, *Galanthus*, *Gentiana*, *Gypsophila repens*, *Hyacinthus azureus*, *Hypericum*, *Iris*, *Juniperus horizontalis*, *Leucojum aestivum*, *L. vernalis*, *Lilium longiflorum*, *L. tigrinum*, *Linaria alpina*, *Linum*, *Meconopsis*, *Muscari armeniacum*, *M. botryoides*, *Narcissus bulbocodium*, *N. cyclamineus*, *N. minimus*, *N. triandrus*, *Oxalis*



*adenophylla, Papaver alpinum, Penstemon, Penstemon, Phlox ovata, Potentilla, Primula, Puschkinia scilloides, Rhododendron, Saxifraga, Scilla bifolia, S. peruviana, S. praecox, S. sibirica, Sedum, Sempervivum, Selaginella, Thymus, Tulipa, Vaccinium, Viola, Vittadinia australis, etc.*

### 1.2.3.13 Bandstand, Gazebo, Gatehouse, Lath House and Thatched Huts, Conservatory and Greenhouse

Literally, the **Bandstand** is an outdoor platform for a band or small orchestra to perform on, especially in formal receptions and other ceremonies. In a garden, it is a circular or hexagonal structure open on all sides with a solid roof and is used as a shelter against rain and sun as is seen on the hill stations of our country, especially in English gardens. **Gazebo** is a small, usually open sided building, especially in the English gardens, situated at an elevated place and at a spot from where aerial view of the entire garden can be seen. A **Gatehouse** at the entrance of the garden is necessary so that the entry of unwanted persons may be checked. Moreover, this also gives an impression of the garden status. 'Mandapam', the counterpart of gatehouse is seen erected in certain famous gardens of South India, but in such structures use of cement is limited and instead wood, bricks or stones and metals such as brass and bronze are used. **Lath house** is normally a temporary field or garden house prepared through wooden laths, plaster, tiles or slates for use as open store house, for sheltering shade-loving or greenhouse potted plants, carrying out various garden activities such as potting, repotting, seed extraction, media preparation, preparation of the material, packing, etc. To have a secluded and peaceful resting place in the garden away from the heat, dust and hubbub of the world, special **thatched huts** in umbrella, hexagonal or in any other suitable shape are created. These huts are sheltered for privacy by camouflaging with beautiful ornamental climbers and shrubs, foliage plants and flowers. **Conservatory**, in real sense, is a glassed extension of the house, may be onto the side or in the back, for growing and displaying of ornamental plants to be viewed by the ladies of the conservative families, especially in Great Britain so that they may not be going out for recreation. Now it is referred to growing of ornamentals, especially ferns and bromeliads, and those ornamentals which prefer more humid conditions for their growing. In broader sense, it is a house for cultivation and staged display of cacti and other succulents; ferns and other foliage plants; herbaceous perennials including anthurium, carnation, euphorbias, geranium, gerbera, orchids, philodendron, etc.; certain shrubs such as aralia, dracaena, eranthemum, fuchsia, schefflera, etc.; certain bulbs such as fritillaria, hyacinths, muscari, oxalis, zantedeschia, etc.; and other potted plants; *vis-à-vis* a small cemented pool in the centre for generating humidity inside, for growing enchanting water plants in it and for reflecting whole scenery of the house on the water surface. Now such structures are normally round, hexagonal or square in shape, created through cement works on the ground, and through vertical poles or angle irons roofed with thatching or wiring, and all around the structure it is covered with chicken wire over which climbers are trained. It may be in the form of glasshouse also but then climbers are not trained over this. Also there should be provision of light inside the conservatory in case it is made of other materials except glasses.

**Greenhouse** is a glass or transparent plastic structure, often on a wooden or metal frame, for growing high value plants by providing required heat and light (intensity and duration) *vis-à-vis* protection from the elements. In temperate areas,

glasshouses are required only during winter months when temperature goes very low and plants tend to become dormant so to create an environment for growing plants in winter, such greenhouses are erected though summers are quite congenial for growing plants outdoors without any protection. But one should be careful as weight of the snow will damage the roofed area of the polyhouses, therefore such greenhouses will be of no use there, and then only alternative left for making greenhouses in temperate areas is through glasses and not the polythene. It may be either i) **conventional greenhouses**, viz., 'traditional span', 'Dutch light', 'three-quarter span', 'lean-to', and 'Mansard' or 'curvilinear', or ii) **specialist greenhouses**, viz., 'dome-shaped', 'polygonal', 'alpine house', 'conservation greenhouse', 'mini-greenhouse' or 'polytunnel'. All of these may have aluminium or timber framework, and glass walls or part-solid walls, except Dutch light greenhouses. Glasshouses, now days are quite expensive but polytunnels are much cheaper and have added benefits. Greenhouse culture leads to 10-15 times higher yield than that of outdoor cultivation, depending upon the greenhouse design, availability of environment control facilities, cropping systems, greenhouse management and crop type. A modern greenhouse has three major components – structure, covering and environment control system (temperature, light and humidity). Of various designs, gutter connected house covered with heavy-duty transparent plastic sheets having roof ventilation is most efficient for wide range of conditions. These types of greenhouses are cheaper, and most feasible, to automate the single consolidated space inside a gutter connected greenhouse than the multiple equivalent space in Quonset greenhouses. Management of materials and products into and out of the greenhouse requires less labour in a single large space than in numerous small spaces. The heating cost is less in multispan (gutter) greenhouses, because there is a less expanded area.

The height of the gutter above the ground is increasing over the years to accommodate the growing evolution of climatic control equipment and automation devices. The original gutter connected greenhouse typically has a 2.4 m gutter height, but today 4.3 m is becoming very common. Gutter may be constructed from galvanized sheet of aluminium. The distance between gutter rows depends on the greenhouse brand purchased. The distance ranges from 3.2-12.2 m. Greenhouse with spacing between gutters of 3.7, 5.2, 6.7 and 9.1 m can be covered by film plastic sheets 4.3, 7.3, 7.6 and 11 m wide. Greenhouses are now offered that have roll up side curtains and can be installed on two or all the four walls. Greenhouses with retractable roof are becoming very popular in USA and Canada. The purpose of side curtain plus roof-ventilator system or the retractable roof with or without roll-up curtains is to replace high energy consuming 'fan and pad cooling systems'. These passive cooling systems work well in hot or cold climates. The greenhouse frames should preferably be covered with double layering covering 0.1-0.18 mm thick UV stabilized plastic. Today, polythene film as well as rigid FRP, acrylic and polycarbonate panels are available with an antilog surfactant built into the film or panel. It is advisable to use an antilog product because in addition to water dropping, the condensation also reduces light intensity within the greenhouse.

Fresh flower crops are grown in either ground beds or raised benches in the greenhouses. Such beds are 1.1 or 1.2 m wide and 20 cm deep, but 30 cm is best for rose beds. Fresh flower beds are oriented along with the length of the greenhouse with 45 cm aisles between them. This arrangement of beds allows

for 67-70 per cent of floor space for growing. Soil is the natural medium for growing greenhouse crops, but the growth and yield are not higher for roses and gerbera. The **cocopeat** available in plenty in South India can be used to get manifold yield with better quality. This substrate provides better root spread with minimum resistance, sufficient porosity, maximum nutrient uptake, better drainage of excess water, *vis-à-vis* minimum pathogens and scarce algal growth, as the medium is quite independent of the soil. Cocopeat, a powdered coconut fibre, is decomposed for 3-4 months in a tank filled with water which takes out the excess salts from the dust, and weathers it to the extent it becomes effective for crop growing. Temperate as well as sub-tropical climates of North India face heavy chilly weather, requiring heating to sustain crop growth for flower regulation on special events like Christmas, New Year and Valentine Day. Greenhouses can be **heated** with the oil burners, hot water or steam and electric heaters. A central heating system can be more efficient than unit heaters. In this system, two or more large boilers are in single location from where heat is transferred in the form of hot water or steam pipe mains to growing areas. Their heat is exchanged from hot water in a pipe coil located in plant zone or through overhead pipe. **Cooling** in the greenhouse is very essential where outside temperature goes above 30°C. Cooling system generally consists of fan at one side and pad at the other where principle of evaporation cooling is facilitated by running water stream over pad and consequent withdrawal of air through it by fans on the opposite side. A reduction of maximum 10-15°C difference in temperature could be achieved depending upon the system and outside climate. Greenhouse should be airtight during the running of fan-pad system and care must be taken to periodically clean the pads from salts and algae. Other active way of cooling alternative is fog cooling. Control can be achieved through analog machines or by computers through aspirated chambers. Top and side ventilation also add in cooling along with maintaining relative humidity.

Certain plants are damaged due to very high **light intensity** during summer. **Shading** reduces light intensity and cools the microclimate inside the greenhouse. Shade paints (lime or Redusol or Vari clear), agro-shade nets or retractable thermal screens are generally used or operated manually or through automatic devices. Several plant species flower only when they are exposed to specific light duration, Yield and quality of flower crops could be increased with artificial lighting during night hours. Cyclic lighting is most effective. Short day conditions in greenhouses can be created with fully automatic, semi-automatic or manual 'black out' system using good quality black polythene sheets, especially for chrysanthemum. **Fertigation** varies from single broadcasting of fertilizers to use of soluble grade fertilizers over different operating systems. One of the most modern technologies is currently offered by Priva-Phillips Nutriflux or Van Vliet Midi Aqua Flexilene System. Both the systems have a nutrient recycling method translating plant demand of nutrients in relation to EC/pH of the media, temperature, RH, light intensity, crop growth, mineral deficiency, etc. **Water quality** is very important though often overlooked. Total salt content levels, alkalinity levels, the balance of Ca and Mg, and levels of individual ions such as boron and fluoride can all have serious bearing on crop success. The water source should be tested before a greenhouse is established. **Electrical conductivity** level should be 0.75-1.5 dS/m and a **pH** of 6-7. Automatic watering system through drips or over-head foggers are generally used depending upon the crop. A manual or semi-automatic **control system** is less capital intensive but requires a lot of attention and care. Now computerized control systems are available which can integrate temperature,

light intensity, RH, CO<sub>2</sub>, plant moisture, nutrient requirement, and plant protection measures. There are certain unheated structures in the gardens which are used to advance or extend the growing season such as **cloches** used *in situ* over plants in the garden itself, and **cold frames** also used for storing ‘resting plants’ and for hardening off plants propagated in the greenhouse.

---

### Check Your Progress Exercise 2

**Note :** a) Space is given below for answers.

b) Compare your answer with that given at the end of the unit.

1) What is difference between hedge and an edge ?

.....  
.....  
.....  
.....  
.....

2) Define bog and sunken gardens ?

.....  
.....  
.....  
.....  
.....

### 1.2.4 Garden Adornments

#### 1.2.4.1 Walks (Paths, Pavements, Steps, Stepping Stones), Drives and Roads

**Walks** are the paths or routes in the garden designed or set aside for the use of people on foot. **Paths** are the surfaced tracks those have been created for walking by the people on foot or for cycling and the approach passages to connect various elements of the garden. These help forming the framework of the garden and lead the eyes to a focal point. The width of paths may be 60 cm to 1.2 m, depending on the purpose for which these are made. However, the width of the path should be such where at least two persons can walk together. Its laying should be in agreement to the design of the garden. In small gardens, the straight paths being narrower at the end should be flanked by shrubberies or flower borders which will put an illusion of being this a large garden. In large gardens *vis-à-vis* in rock gardens, winding paths can be very attractive but in the gardens every curve should be planted with beautiful shrubs to hide the view beyond. In formal gardens the paths should be paved with stone slabs or cement tiles with regular shapes while in the asymmetrical designs there should be crazy paving with irregular paving stones or slabs. Always the paths should slightly be elevated so that during rains these may not be submerged and the rain water is drained off easily. Paving stones with cobbles, bricks with gravel, or concrete paving slabs are quite suitable for making a path. **Pavements** are the paved paths for the pedestrians in the

garden alongside the streets or roads. **Steps** are the raised surfaces for the foot, especially in a series going up or down or these are a flight of stairs, made of stones or similar material, for approaching the elevated or sunken spots in a garden. These provide interesting changes of levels and create very different effects, and on the sloping sites the steps become an essential part of the path. These may be straight or curved, wide or narrow, and shallow or steep. **Stepping stones** are the series of stones at a natural pace in a garden on which one is able to step, especially to cross mostly flowing shallow water (or sometimes even still water) where these project above the water so that while walking the foot wears may not be wet or in the lawn so that its line is not spoilt but these should be set in the grass in such a manner that these may not obstruct the mowing. **Drives** are the paved areas or private and otherwise **roads** those run in the garden between the houses or garages and the nearby streets or wide roads and have pleasant views on both the sides. These have considerable impact on the garden design. The drives may be made more attractive by growing or positioning suitable ornamentals nearby. Roads though cannot be separated from the drives are, in fact, the hard routes broad enough for driving the light and heavy vehicles in the garden.

#### 1.2.4.2 Garden Seats and Straddle Stones

**Seating** is a necessity in most gardens but in a family garden there should be separate provision for parents and children. Individual seats for oldies are better suited while for ladies and children benches are more suitable. Tree seats always attract the eyes from across the garden. A tree with large trunk is most suitable for encircling with the wooden or plastic seats of white colour but where the tree is having a quite raised brick or concrete platform, below it all around, the seats should be fixed in a circle. Such seats may be constructed even with irons or stones though in winter these become quite cool. Wide weathered sleepers in informal gardens will attract children for sitting from both the sides if their positions are elevated a bit and such seats will blend completely with the surroundings. With the support of two stately and shady trees if growing together, hammock and a swing seat can be fixed for children. Sun loungers of bold colours in pairs will be quite appropriate in a garden as these can be moved around the garden easily. Any seat which is to be provided in the garden should merge with the surroundings and it should be comfortable, durable and good looking. However, the wood seats should be made from the durable timbers and painted in white for good appearance. Some natural stones as **straddle stones** or concrete seats should also be there in the garden, especially near the water and rock gardens or with a clipped dwarf hedge for the surround or in the undulating flower beds where people can sit by having their both the legs hanging over these. Such seats may be anything made from an old garden roller or the locally available rocks and boulders.

#### 1.2.4.3 Ornamental Stone Basins or Tubs, Urns, Vases and/or Well

**Ornamental stone basin, bowls or tubs** are open bowl-shaped large container made of stones, marble stones, concrete, ceramic (a hard brittle heat resistant-material made by firing a mixture of clay and chemicals at high temperature) and terracotta (an unglazed reddish-brown hard-baked clay, often used to make pottery objects), timber woods, etc. through inside carvings in a uniform manner. Surfaces (inside and outside) are also properly smoothed, and outside surface is engraved in good looking designs. Ceramic and terracotta basins are cheaper,

quite attractive and easily available in various designs. Plastic bowls can also be purchased from the market in various designs and these will be cheaper and durable. **Water basins** being so small that apart from capturing the essence of a Japanese garden these can add elegance to any garden. **Tubs** are almost the same as to stone basins but generally these are low open container, often round, and are made of metals, plastics, stones, concrete, bricks, earthen sinks and **troughs** (ideal for creating miniature rock garden) used for feeding the animals, China clay sinks, wooden, etc. **Urns** are the ornamental vases, usually with foot or pedestal. These are also made of China clay, stones, marble stones, concrete, porcelain, ceramic and terracotta, fibreglass, glasses, etc. **Vases** are the open containers, usually tall and rounded and are used as ornaments as well as for displaying cut flowers. These are ceramic and terracotta, asbestos, China clay, porcelain, stones, marble stones, marbles, glasses, plastic, and wooden. Basins and tubs can be made permanently in position or may be portable type. If positioned on a pillar in harmony to each other, it gives special effect. Wide paved paths can also be decorated with ornamental tubs or vases on both the sides or only two on both the sides in the end for giving an illusion that path is quite long, however, the path will have to be narrowed down a little towards the end. The basins kept in front will shorten the path. However, their placing at the gate or close to entrance-staircase will also enhance the beauty. These all may be displayed as ornaments in their own right in the garden. It is not necessary to fill them with plants, they look beautiful even without plants. Metallic urns with outside carvings will enhance beauty if kept on the terrace, roof garden, courtyard, veranda, near the staircase, on the doorsteps, or indoors. Beautiful potted ornamentals grown in earthen pots may be kept in such containers to superimpose the beauty of plants as well as of the basins, tubs, urns or vases. In informal gardens, a well dug and well built with bricks and concrete ‘country well’ with raised platform having an earthen pitcher and stout rope will also leave a good impact in the garden apart from providing pure drinking water or irrigation water. Its creation in the back of the rock garden, slightly away from the water garden, near a shelter, in the back of the garden, in a sunken garden or at the outskirts of the tea garden in the Japanese garden will be quite enchanting and useful.

#### 1.2.4.4 Ornamental Rocks or Stones

As per a legend, ‘**rock** is root of the cloud’. In a garden, rocks and **stones** play a very important role. Rocks and stones constitute the essential feature of a Japanese garden. Rock gardens are named so only because of the extensive use of the rocks. In the water gardens also, these make a beautiful element, especially when the water is clear and shallow. In the streams or flowing water, their visibility creates a special amusement, especially for the children. River-borne stones look so beautiful that a tradition, since the time immemorial, has descended in the country where Hindus, Janis and Buddhists consider them sacred. Even otherwise, people bring them home and the living rooms are decorated with a few pieces of these stones. Stones, rocks and reef stones are also used in the aquarium. Even in the knot gardens, the coloured stones or gravels are used among the hedges. In the garden where fountain is, below this river-borne stones are spread for good effect. Paths are also decorated by various shape and size of river-borne stones. Weathered natural rocks of different shapes and sizes are available in the mountainous rivers which if introduced in the garden give a sculptured element. These are also used as straddle stones for sitting.

#### 1.2.4.5 Ornamental Pillars or Towers, Statues, and Bird Baths & Bird Houses

**Ornamental pillars or towers** are the vertical columns used for support or decoration in the garden and these provide permanent support for climbing plants without going for a trellis or a pergola. These are most suitable in a formal garden where these provide formal effect along the back of a border or to flank a path by erecting pillars in a single row to one side of the path. These pillars are made of bricks, concrete or reconstituted stone and are set firmly with concrete in the ground. Over such pillars climbers are trained with the help of plastic nets or plastic-covered large-mesh netting. The pillars planted with strong growing climbers such as *Passiflora* and *Wisteria* present a strong vertical element to a mixed or herbaceous border. Pillars may also be used as an accent at a position where the garden level changes or at the corner of a border. **Statue** is the three-dimensional image of a human being or an animal that is sculptured, modelled, cast, or carved out of stones, especially marbles, or bronze, or even of concrete. A formal geometrical hedge combined with an elegant statue alongside a large water garden complements the scenery. A statue erected near a building among the straight or columnar group planting of trees or shrubs such as *Cupressus*, *Roystonea*, *Thuja*, *Thujiopsis*, etc. provides good impact. A stream may also be tamed in a way that water may fall through the mouth of the statue which will also enhance the beauty. A marble stone statue at the background of a large evergreen climber inside the gate will act as a focal point in the garden. **Bird baths** are normally constructed at a quiet corner of the garden in informal designs but somewhere in the centre of the axis in the formal garden, especially as focal point or near the edges of the lawn but not in the centre or close to the border. Putting suitable food for the birds as well as water for drinking and bathing will ensure regular visits of the birds. The bird baths are made of stones or concrete in the shape of a vase but with large rectangular or circular bottom set in the ground with concrete, and the top being quite wide, shallow and circular accommodating water as well as food for the birds. The height of the bird bath should be more than 2.25 metres so that cats are not able to jump up on to it. **Dovecote, bird tables** and other **bird houses** are structures set into the walls or on tall poles, with the tree trunks, in the lawn somewhere near the edges or in the back of the border with many separate entrances and compartments, for housing domestic pigeons and for enticing various other birds in the garden. Though **bird cages** are also one of the elements in this direction but are not preferred because here birds are kept in captivity and do not have any freedom. However, these can become the charming ornamental features in their own right.

#### 1.2.4.6 Sundials

Literally, **sundial** means an instrument that shows the time of a day by the position of a sun-generated shadow cast by a fixed gnomon (arm) onto a graduated plate or surface. In a garden it can be used as a focal point, can be erected at the junction of the path or in the end of axis, may be positioned at a suitable corner or side of the lawn, as a centre-piece in a formal flower bed, in the pools to link the informality of the plants to the pool's formal margins, or as an elegant feature in a sunken garden but wherever it is positioned, for the long duration of the day no shadow of a building or a tree should fall over this otherwise its very purpose will be defeated. The sundial some 60-90 cm in height is made of stones, tiles, bricks, concrete or combination of these though mostly without cement coating

so that it may look quite elegant and so may sometimes be used even as a focal point in the garden. The top of the column of the sundial is normally kept square fixed with sundial and compass. The column of the sundial is securely fixed in the ground with concrete. For making sundial, the dial in India as is nowhere available; it can be prepared by carving the digits on the stone or cement and then should be screwed to the base on the top of the structure keeping in view the movement of the sun. Live sundials with the help of ornamental plants in the form of topiary by projecting the plant parts as the dials and compasses are made through appropriate pruning but this requires regular and skilled clippings.

### 1.2.4.7 Floral Clocks

**Floral clocks** are the huge clocks in the garden where dial is represented either with carpet bedding of annual flowering plants or with *Alternanthera*, *Iresine*, etc., or with *Pilea muscosa*, *Sedum*, etc., or with various coloured pebbles; and the huge metallic or plastic hands for showing hours, minutes and seconds. These clocks are generally operated through electricity but the machinery pertaining to this is concealed in an underground chamber with only hands projecting above **against the floral or pebble's dial**. Bedding may be done through green plants and the figures made by red plants or *vice-versa*.

### 1.2.4.8 Hills, Water, Watercourses, Waterfalls, Streams, Fountains, Culvert and Bridge Work, Islands, and Light

If the place where garden is to be created has a background of **hillocks** or **hills**, that will add another charming dimension to the design. Many a features in the gardens have been introduced based on hilly resources, as most of the garden styles developed in the hilly terrains. Also if there is a tall building, that may be taken as a background for making a hill-side view for imitating the nature. In case the hillocks are there in the background and the sun in the morning is rising from the peaks behind these and setting to the other side behind another hill peak, the sunrise and sunset give immense eternal pleasure as is the case in Cape Comorin or the one on the 'Tiger Peak' to be seen from Darjeeling (W.B.). **Water features** appeal to the senses of sight and sound and add magic to a landscape. The best location for the water features is the backyard of the most home landscapes but it should be proportionate to the design, the surroundings and the size of the house and garden. Since the landscaped view is to be created only in the given piece of land hence it is not certain whether that will have natural **watercourses**. Watercourse is a river or stream channel or an artificial channel through which water flows. **Waterfall** is a vertical stream of water that occurs where a river or stream falls over the edge of a steep place. Cascading waterfall is highly appealing to the senses. Only a few gardens have a natural stream or waterfall but it is possible to create such features the water from which may spill out in a pool or water reservoir. Watercourse or waterfall may artificially be created by change of levels and linking them. However, in an informal garden, the watercourse may be edged with stones and rocks as well as with moisture-loving plants. **Stream** is a narrow and shallow river. **Fountain** is an ornamental water feature, structured in a way that it has a jet or jets of water, often emerging from a statue and mostly creating a mist. It is often used in formal gardens as a focal point, for adding height to a design and for creating mobility and restless sound *vis-à-vis* scattering of light, especially effective if lit at night or in the moonlight garden such as Vrindavan Garden, Mysore. Bubbling fountains are



also created as a curiosity for children. Such fountains are structured underground and are covered with stones from where the water bubbles come out. The size and style of the fountain are related to the overall design of the garden and the pool or any other element where it has been created. Grotesquely carved or lion-headed **water spouts** are also quite effective in small gardens and conservatories where these provide pleasure of the running water like to that of a fountain in a large garden. Natural trickling streams may be tamed in a way that water may fall on the stones through spout fitted in a wall. In the plains where we lack natural watercourse, a pump may be fitted to a pool or water reservoir and connected through a pipe which is out through the mouth of the spout. Literally, the **culvert** is arched channel carrying water beneath a road or railway track but ordinarily it is used for a small bridge over a sunken area, over a small flowing watercourse or over a still water. In gardens, the culverts and **bridges** are constructed just to imitate nature, even if these are not utilitarian. As per necessity, these are created to reach an island, to cross the watercourses (flowing, and even still), for smooth shortcut walking over a quite depressed area instead of descending inside and then ascending to the other side which may be a cumbersome job, and for recreation. In the countryside gardens, these culverts and bridges are often constructed through bamboos and wooden structures & sleepers as these are cheaper and locally available *vis-à-vis* bring informality whereas in formal gardens normally these are made of bricks and concrete, or of steel as over the rivers on the mountainous terrains, and sometimes the suspended steel bridges are also used as in Rishikesh (Uttarakhand) over the Ganges. Culverts and bridges are one of the essential elements of Japanese gardens where these are normally bright red in colour. **Island** is a mass of land smaller than a continent, which is completely surrounded by water such as Andaman Islands, or Andaman & Nicobar Islands which accommodate some 500 different islands. A piece of land projecting substantially above the water level in a pond or a lake is also an island such as 'Dal Lake' in Srinagar (J & K) which also contains many islands inside and a few villages in the form of islands are inhabited where supply is restored through boats. A small floating island is located in 'Khajyar' near Dalhousie in H.P. where in a small lake a mass of greenery grown with grasses floats from one side to the other, and in 'Dal Lake' there are many floating islands artificially made for growing various vegetables and Japanese people took the idea of growing vegetables and ornamentals from this country to Japan. In certain gardens, sometimes the natural ponds or lakes are found having islands in them. In case there is no pond in a garden but the garden is large enough to accommodate a pool or pond, it may be created by making an island in the centre and in case the pond is large enough a series of islands may be created with planting of lawn and certain other ornamentals.

**Light** in a garden is the necessity as apart from providing safety to the people, it gives security for the grounds and enriches the night landscapes by the use of ornamental lighting (up-lighting and down-lighting) on the paths and steps for pedestrians and at the base of the specimen plants or artwork to create a mirror effect in the water body nearby, mirror lighting through light reflections on water, spotlighting provides intense beam of light to focalize an object, shadow lighting provides a distinct pattern of light and shadow on a wall or backdrop, silhouette lighting for projecting silhouette of a statue or a plant in the background, accent lighting (up-lights, down-lights or diffuse lights) are small lights for highlighting a small garden element, a plant or a work of art, cross lighting to project the same object or an area from different angles, moonlighting from different angles,

and security lighting against the property. When using light in wet areas or in water, a ground fault circuit interrupter (GFCI) is a safety device designed to protect people using electricity which should be used. The best example of this in the country is Vrindavan Garden in Mysore which gives enhanced landscape beauty only after the sunset.

#### 1.2.4.9 Plant Stands

**Plant stands** also add beauty to a garden when displayed with beautiful plants. These are made of woods and steel wires and rods in various shapes and styles. Multi-tier stair-type front-sloping (tapering from bottom to the top) wooden benches accommodate many potted plants on their platforms situated at different ranks one after the other in a way that every plant gets the optimum morning sunlight. Two such benches kept back to back or the back of the benches kept close to a wall will hide the unwanted part. These benches are painted in white or green. Circular benches are rather more appropriate in 4-5-tier system narrowing from the bottom to the top, as all around these are viewable. Such stands will look appropriate in the centre or side of the lawn, at the junctions of the paths and in the end of the axis, and making and its arrangement will make it a focal point. Pretty Victorian wire plant stand in 3-4-tier circular system, the lowest platform accommodating many potted plants *i.e.* 8-10, next upper some 4-6 potted plants, the third tier some 3-4 plants and the top having only one large potted plant growing straight will bring utmost delight in the garden and will also act as a focal point. Vertically these are cylindrical in shape, the first tier some 1.0-1.6 m, the next some 0.6-1.0 m, next to next some 30-60 cm and the top one some 30-40 cm in diameter in case of 4-tier stand and below 30 cm in case of 3-tier stand. The plant stands of mild steel rods are moulded in various artistic ways and fixed with varying size of rings for holding the flowering plants. These may be displayed in the lawn, at entrance of the house, on the terrace, in the courtyard and patio, in the roof garden or elsewhere. Plants stands fixed with the walls are most suitable for indoor plants.

#### 1.2.4.10 Stone or Japanese Lanterns

**Japanese votive lanterns** are one of the very popular features of Japanese gardens and are enjoyed as the attractive garden ornaments even in the western gardens. These are used during prayers and evening tea ceremonies by the Japanese *vis-à-vis* for showing the paths as well as a scene in the garden. However, in the winding paths the lanterns are positioned at intervals for guiding the guests or viewers during nights. *Kasuga*-style lanterns with their pagoda-shaped tops present a bold focal point. These are named so after a Kasuga shrine in Nara, Japan. Japanese lanterns have a strong base, earth ring, pedestal or legs; a pillar, trunk or shaft; a firebox support, above which lies the firebox, then the roof or umbrella above and finally the cap, all in a well chiselled way but it's not necessary to have all the six parts. It may be as high as 45 cm (*oki-gata*), 80-85 cm (*yukimi-gata*), 1 m (*ikedomi-gata*), 1.5 m (*tachi-gata*), and 2 m (*to-gata*). These lanterns are usually carved artistically in white stones or marble stones to look more beautiful. These also have a place near the streams or pools.

---

### Check Your Progress Exercise 3

Note : a) Space is given below for answers.

b) Compare your answer with that given at the end of the unit.

1) Define garden paths, garden roads and garden drives.

.....  
.....  
.....  
.....  
.....

2) What are tubs, urns and vases ?

.....  
.....  
.....  
.....  
.....

---

### 1.3 LET US SUM UP

In this unit, we have studied various terms being used in landscape gardening, importance of landscaping, various elements of aesthetics, various landscape features and various garden adornments. If one is sincere in considering all these points while laying out a garden, there is no reason as to why the garden will not be a place where one may not get beautiful environment, picturesque beauty throughout the year, eternal pleasure, solace, tranquillity and achievement.

---

### 1.4 KEY WORDS

Landscape, landscaping, landscape gardening, landscape design, landscape designer, landscape architect, hardscape, landscape elements, garden features, and garden adornments.

---

### 1.5 FURTHER REFERENCES

- 1) Bailey, L.H. (1960). The Standard Cyclopedia of Horticulture (Vol. II). The Macmillan Co., New York.
- 2) Bhattacharjee, S.K. (2006). Advances in Ornamental Horticulture (Vol. 5). Pointer Pub., Jaipur.
- 3) Biondo, Ronald J. and Schroeder, Charles B. (2006). Introduction to Landscaping: Design, Construction and Maintenance (3<sup>rd</sup> Ed.), International Book Distributing Co., Lucknow.
- 4) Brickell, Christopher (Ed-in-Chief) (1992). The Royal Horticultural Society Encyclopedia of Gardening, Dorling Kindersley, London.

- 5) Coutts, J., Edwards, A., Osborn, A. and Preston, G.H. (1954). Ward, Lock & Co., Ltd., London.
- 6) Futehally, Laeeq (1978). Gardens, N.B.T., India.
- 7) Hackett, Brian (1979). Planting Design, McGraw-Hill Book Co., New York.
- 8) Hellyer, Arthur (1983). The Collingridge Illustrated Encyclopedia of Gardening, Collingridge Books, England.
- 9) McHoy, Peter and Evelegh, Tessa (1999). The Practical Encyclopedia of Garden Planning Design & Decoration, Lorenz Books, London.
- 10) Nambisan, K.M.P. 1992. Design Elements of Landscape Gardening. Oxford & IBH Pub. Co. Pvt. Ltd., New Delhi-110 001.
- 11) Randhawa, G.S. and Mukhopadhyay, A. (1986). Floriculture in India, Allied Pub. Pvt. Ltd., New Delhi-110 002.
- 12) Rice, Laura Williams and Rice (Jr.), Robert P. (1980). Practical Horticulture. Prentice-Hall, New Jersey.
- 13) Sehgal, G.S. (1997). A Handbook on Gardening Activities for Secondary School Teachers, SCERT, New Delhi-110 024.
- 14) Simonds, John Ormsbee (1961). Landscape Architecture, McGraw Book Co., Inc., New York.

---

## 1.6 ANSWERS TO CHECK YOUR PROGRESS EXERCISES

---

### Check Your Progress Exercise 1

- 1) Various **elements** for landscape designs are: The First Approach, Axis, Divisional Lines, Space, Unity & Harmony, Scale, Balance & Proportion, Time & Light, Texture, Tone & Colour, Mobility, Mass Effect, and Focal Point.
- 2) **Scale** is the proportion of one object to another while **balance** implies equilibrium among the objects, *viz.*, line, form, texture, colour, size, etc. in the garden.

### Check Your Progress Exercise 2

- 1) **Hedge** is a continuous line of shrubs, especially of one species, planted for making a boundary or a division in the garden, while an **edge** is to demarcate beds and borders from roads or paths with some low growing herbaceous evergreen plants or seasonal flowers and bulbs (living edges), or bricks and river borne stones (rocks) as non-living edges.
- 2) Generally the **bog garden** is a low lying ground in a garden where surface drainage will automatically collect and which remains in moist or swampy state through the whole year and where those ornamentals that prefer moist or swamps for their growing are cultivated normally in natural form. A mere trickle of water will make the ground moist if the subsoil is sticky clay but in case where it is light and well drained, it requires certain amount of

excavation. **Sunken garden** is geometrical in design, normally having a sculptural feature in the form of fountain or sundial in the centre surrounded by formal beds containing roses, herbs and certain specialty flower or otherwise flower beds divided by a symmetrical framework of pathways, comparatively at lower level than rest of the garden, enclosed by walls and surrounded by raised grass or paved paths, and is viewed from the above. A well devised sunken garden adds a feeling of space and brings another dimension to the design.

### Check Your Progress Exercise 3

- 1) A **garden path** is a surfaced track made for walking or cycling. The paths should be laid out in artistic manner after a great thought so that there is ready access to every part of the garden. In the rock garden the width of paths should be roughly 30 cm while of the main drive it may be even more than 4.5 metres. Normally the width of the path in a garden should not be less than 60 cm; the most convenient would be 90-120 cm. **Garden road** is a surfaced route broad enough for the vehicles (trucks, tractors, buses, trolleys, etc.) to be driven. **Garden drive** is a road or paved area that links house to the garage or street.
- 2) Garden tubs, urns and vases are garden ornaments which complement the visual energy of the garden. **Tub** is a low open round or oval wooden, earthen, China clay, cemented (white or mosaic) or stone-made (especially marble stones) ornamental container used as garden ornament. **Urns** are ornamental vases with pedestal which are either earthen or made of China clay, white cement, or marble stone, and these are also used as garden ornaments. **Vases** are also ornamental garden containers made of such things as tubs and urns and are usually tall, rounded and open.