

MAHARSHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END THEORY EXAMINATION

MODEL ANSWER PAPER

Semester: VI (NEW)

Academic Year: 2022-23

Course No: ELE HORT-367

Title: Landscaping

Credits: 3 (2+1)

Total Marks: 80

Day & Date: -2023

Time: 3 hrs

- Note:**
1. Solve ANY EIGHT questions from SECTION "A".
 2. All questions from SECTION "B" are compulsory.
 3. All questions carry equal marks.
 4. Draw neat diagrams wherever necessary.

Q.1	What is landscaping? How landscaping play important role in beautification.	8
Ans.	<p>The importance of landscape gardening can be divided into three categories: Environmental importance, Economic importance and Social importance</p> <p>1. Environmental Importance Environmental pollution has become a major issue in public health as it has reached alarming level in some of the largest cities in the world and also in metropolitan cities of India. Unplanned development of cities and industrial areas are more affected by pollution compared to planned one.</p> <p>a. Air pollution Trees and other vegetation - reducing air pollution both directly removing pollutants and reducing air temperatures - near parks. Plants help in reducing air pollution are <i>Aloe vera</i>, <i>Areca palm (Dyopsis lutescens)</i>, <i>Ficus spp.</i>, <i>Rubber plant (Ficus elastica)</i>, <i>Snake plant (Sansevieria triJasciata)</i>, <i>Weeping fig (Ficus benjamina)</i></p> <p>b. Heat effect Due to rapid urbanization and industrialisations, many environmental issues are associated with cities. The effect of vegetation on the atmospheric heat island is manifested not only indirectly in the form of a reduction of sensible heat flux from the cooler surface but also directly in the form of evaporative cooling.</p> <p>c. Ultraviolet radiation reduction Vegetation can protect people from harmful ultraviolet (UV) radiation, as tree leaves absorb about 95% of UV radiation. Exposure to UV radiation is associated with development of skin cancer and cataract of the eye. The people visiting the parks may therefore, have less exposure to UV radiation.</p> <p>d. Noise abatement The dense transportation systems, including roads, railways and air traffic characterize the modern urban environment are responsible for noise pollution. Landscaping by trees and other plants has been proposed as a natural material to reduce outdoor noise pollution. Plantation of trees like <i>Neem (Azadirachta indica)</i>, <i>coconut (Cocos nucifera)</i> and <i>tamarind (Tamarindus indica)</i> can reduce the noise level up to the extent of 610 dB (Decibel). The evergreen plants such as <i>eucalyptus (Eucalyptus globules)</i> and <i>wax myrtle (Morelia cerifera)</i> also helps in reducing noise</p>	3

pollution. Trees like willows (*Salix*) and weeping fig (*Ficus benjamina*) act as curtains against noise.

- e. **Water purification** Plants such as reed, iris, sweet flag (*Acorus calamus*) have an affinity for water and are able to recycle water through their root system. Such type of plants can be used to purify and filter water thereby help to remove heavy metals, harmful bacteria, radioactive isotopes and other chemicals.
- f. **Soil erosion** Detachment of soil particles from the soil surface is known as soil erosion. Soil erosion can be caused either by air or water damaging the top soil that are crucial for growth and development of plants. Landscape gardening can be one of the most effective tools to control soil erosion because vegetations maintain crucial interrelationship with soil properties and enhance biodiversity of steeply sloped areas that have highly erodible soils.
- g. **Stormwater runoff** Stormwater runoff can be reduced through planting or conserving existing forest areas and creating other green infrastructure such as green roofs by utilizing landscape gardening tools in a proper manner. Plant roots create conditions that promote infiltration of rainwater into the soil. Trees also help in slowing down and temporarily store runoff which promote infiltration and decrease chances of flooding and downstream erosion.

2. Economic Importance

A beautiful landscaping of an area can promote local economic growth by attracting tourists, residents as well as investors in that particular area. In rural areas, landscape supports a number of primary production activities such as farming, forestry and horticulture. The rural economy is strongly dependant on recreation and tourism industries.

Tourism revenues It can be increased through development of a beautiful landscape around the historic place, bank of river, etc. to improve its aesthetic beauty. This will attract tourists and film industry for enjoying and utilizing the natural beauty.

Heating and cooling costs Appropriate landscape gardening around buildings can considerably diminish both heat loss and cold air infiltration through walls and floors during the winter months resulting heating and cooling costs would be cheaper than other buildings.

3. Social Importance

People value different landscapes for different reasons. Some landscapes are appreciated for their highly aesthetic natural values. These include some iconic landscapes like Aksha beach, Nilgiri hills, Dal Lake, Tehri dam and Gangotri origin as well as areas of wild and relatively undeveloped coastline, mountains, high country, lakes and rivers. Other landscapes are appreciated for their unique or special character which has arisen from the interaction of natural and human influences over time. Such landscapes can become an integral part of the identity of local communities. They provide a strong sense of belonging to 'our place' for residents and regular visitors alike. Landscape gardening is also a key tool for improved health by providing site for exercise, stress reduction and relaxation. From the medical perspective, researchers have documented that people who interact with plants recover more quickly from everyday stress and mental fatigue. There has been an increased awareness in the restorative value of plants in hospitals, homes for

	the aged and senior citizens. In such places, many "healing gardens" are being constructed for clients, staff and visitors. Gardening is a universal language that brings the community together. Its conversations and activities bring neighbours together, melting differences between racial and ethnic groups. Gardening is an effective tool to unite neighbourhoods.	
Q.2	Which are different types of Japanese garden? Explain in detail features of Japanese garden.	8
Ans.	<p>Types of Japanese garden</p> <ol style="list-style-type: none"> Hill garden: This garden is the ideal type known as <i>Tsukiyama sansui</i> in Japanese language which means hills and water. The main features of the garden are hills, stream, ponds, etc. It comprises of well formed landscape of hills, exposed weathered stones, watercourse, lake, bridges, island, lantern, stepping stones and trees. Here, different stones are used that represent different symbols like natural, mood, idea, spiritual and melodic symbols. These are Statue stone, Low vertical stone, Flat stone, Recumbent stone and Arching stone. Tea garden: A garden attached to tea house is called tea garden. It is divided into three sections. The outer section is <i>Sotoroji</i>, the waiting place is <i>Machi ai</i> and inner section is <i>Uchiroji</i>. The inner garden is simple and natural with objects like stones, lanterns, rocks, water basin, etc. It is enclosed by rustic fence equipped with a gate made of bamboo. Pathway is made up of stepping stones. Flat garden: These are known as <i>Hira niwa</i>, mostly planned for confined places or for laying out in front of buildings of secondary importance. It comprises of simple raked sand or gravel, vertical or flat stones, bamboo, well, water basin, etc. Here the principle is to avoid strong vertical lines represented by tall pines. Passage garden: These are known as <i>Roji niwa</i> laid out in narrow passage between the two houses or approaches to buildings. As such areas are generally narrow, garden should be simple and not over crowded. Here the common features are few key rocks, slabs of stones and only couple of plants. Sand garden: This garden is devoid of plants. The main features are few vertical and prostrate stones with fine white gravel. This style looks pleasant and effective only when confined to a limited area. The garden is mostly comprised of hills and stones in group of two and three. <p>Japanese garden:</p> <ul style="list-style-type: none"> • Japanese garden designs were based on their idea of heaven. • Japanese garden follows same style for centuries are their admirable feature. • Except some seasonal changes these gardens hardly go through any other changes. • There are three main elements in garden viz, water, stone and plants. • Japanese gardens are of five types viz. hill, flat, passage, tea and sand. • Water is the life of garden and present in different forms such as pond, stream, waterfall, fountain, wells, island and water basin. • Japanese gardens have certain important features that make these gardens different with other styles of gardens. Some important features are as below. <p>Features of Japanese garden</p> <ol style="list-style-type: none"> Pond: These are of irregular shape generally fed by stream or water fall. Stream: These are arranged with natural stone bordering the bank. Waterfall: These are made more effective and dignified giving mountain scenery. 	4

	<p>iv. Fountain: These can be provided near foot of hill, on hill side or in forest.</p> <p>v. Wells: Rustic wells made up of wood and stone walls and completed with lever, rope, bucket, pulley, etc.</p> <p>vi. Island: These can be of four types; Elysian, Windswept, Master and Guest isle.</p> <p>vii. Bridges: The main criteria is that it should be pleasing to eye. It holds the concept of not just a quick crossing of water way. Most bridges are of arch shaped.</p> <p>viii. Water basin: These are fitted to rinse mouth and for washing hands.</p> <p>ix. Garden lanterns: Court of Buddhist temples are generally decorated with stone or bronze lanterns. Sometimes these are arranged singly or in combination with trees, shrubs or water.</p> <p>x. Stones: It represents different symbols like natural mood, idea, spiritual and melodic. Stones in Japanese garden are of five distinct shapes like statue, flat, low vertical, recumbent or ox and arching.</p> <p>xi. Garden pagoda: This ornament is purely decorative may be in form of stone tower or pagoda.</p> <p>Vegetation</p> <p>1. Evergreen: <i>Abies</i>, <i>pinus</i>, <i>Cryptomeria japonica</i>, <i>Podocarpus macrophylla</i>, <i>Juniperus chinensis</i>.</p> <p>2. Deciduous: <i>Acer sp.</i>, <i>Morus alba</i>, <i>Populus sp.</i>, <i>Salix babylonica</i>.</p> <p>3. Flowering plants: <i>Magnolia grandiflora</i>, <i>Prunus sp.</i></p> <p>4. Shrubs: <i>Aucuba japonica</i>, azaleas, <i>Gardenia Florida</i>, <i>Nandina domestica</i>, <i>Camellia</i>, <i>Lagerstroemia indica</i>, rhododendrons.</p> <p>5. Flowering plants: Chrysanthemum, aster, carnation, lilies, irises, lotuses, orchids.</p> <p>6. Vines: <i>Clematis</i>, <i>Lonicera japonica</i>, <i>Ipomoea hederacea</i>, <i>Ipomoea purpurea</i>, <i>Trachelospermum jasminoides</i>.</p> <p>7. Bamboos: <i>Bambusa nana</i>, <i>B. multiplex</i>, <i>B. blumeana</i>, etc.</p>	
Q.3	Explain in brief about principles of landscaping.	8
Ans.	<p>1. Simplicity: The plan must be simple. It should not contain too many themes or overcrowding of plants or other garden ornaments, as this creates confusion and hinders in getting the theme and also distract the viewers.</p> <p>2. Unity: It is the most important feature of a landscape planning. It increases aesthetic beauty of the garden. It can be expressed by harmonious placement of garden features in proper way. It can be created by repetition of single component or by blending different components in harmony in such a way that every feature expresses the total effect independently.</p> <p>3. Harmony: It is an overall effect of various features, style and colour schemes of the total scene. Harmony is arranging different things in garden in such a way that it creates relation between all and makes them all look one.</p> <p>4. Balance: Balance in a design is an essential part for unity, harmony and proportion of design. All the components must be balanced. Therefore, correct positioning of plants and features create well balanced design. In a design, balance in different planting materials like annuals, shrubs, trees should be maintained. Balance in size, shape, colour and form of building and different plants should be maintained. Too much green should be overcome by planting annuals, flowering shrubs and trees.</p> <p>5. Proportion: In this, every feature should be in relation with total space available for the garden. The space provided for lawn, paths, herbaceous borders, shrubbery,</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>

	<p>2. Informal style The garden elements are set up in an informal style. It makes the garden look very natural. No symmetry is maintained in the design. There is always an element of surprise at places to walk through the whole garden. Much more variety of elements is used. Each part of the garden looks amazingly different. Elements like umbrellas, seats, cascades, rockery, water pool, etc. are used.</p> <p>Key features: This style is natural and holistic, It is a contrast to the formal style. Aim is to capture natural scenery, Leveling of land is not required, Plan is asymmetric according to the land available for making the garden, Smooth curvaceous outlines are more applied, Non-geometrical beds and borders, Hedges, edges and borders are not trimmed, Trees are not used as specimen, Water bodies are more irregular in shape, Hillocks, waterfalls, lakes, island, cascades, rocks and rustic hutments may be provided to create countryside effect, Approximately grouped plants provide spontaneity and they are not trimmed, All the garden elements and adornments can successfully be used in this style without any restrictions.</p> <p>E.g. Chinese, English and Japanese gardens.</p>	2
	<p>3. Free style A new approach to gardening that allows developing a garden with what on hand. This style combines the good point of both formal and informal as well as naturalistic features are aesthetically mixed to create a picturesque effect. In free style formality and the flatness of all geometrical styles are included along with the freedom in applying the treatment while choosing the essentials of different styles. This style is suited to almost all the situations.</p> <p>Key features: Curved paths with both regular and irregular shapes, Non-geometrical beds and borders, Well defined borders with hedges and edges, Close to naturalistic garden design, More flowing shapes, Less regulated and controlled planting, Soft curved patterns, Mix of both symmetrical and asymmetrical designs.</p> <p>E.g. Rose Garden of Ludhiana (Punjab, India).</p>	2
	<p>4. Wild style William Robinson gave the concept of wild style of gardening. Aim is to make garden more beautiful and natural. The concept of a wild garden is against formalism. Such gardens are laid out for more agreeable communication with nature. Wide variety of trees, shrubs and creepers are used in a natural way. No formal rules are followed and plants are allowed to grow in their natural shapes.</p> <p>Key features : Grasses remain unmowed as in nature and bulbous plants are grown scattered in the grass to create a wild effect, Ornamental trees and shrubs are planted in forest flora and creepers are allowed to grow over the trees, Hardy flowers that thrive much better in rough places are planted, Fine-leaved plants, ferns, flowers, climbers, grasses and trailing shrubs relieve each other in wild style garden where they gives a natural picturesque scene, The passage to the garden is generally opened in woodland, Wild garden style is attempted where a vast area is available, Such garden combines a pleasing blend of beauty and utility with ecological and environmental needs.</p> <p>E.g. Highline Park (New York).</p>	2
Q.5	Discuss in brief landscaping of schools.	8
Ans.	<p>Landscaping of schools:</p> <p>A planned and properly landscaped school brings difference in appearance and beauty. Moreover, a good garden in the campus develops aesthetic sense to young generations. An architectural design for school should incorporate landscape design.</p>	4

Instead of taking up gardening of the campus in bits, it is necessary to have master plan of the whole area and to implement it in phases, according to the resource availability.

The general recommendation is to plant large trees in the school compounds. Large shady trees should be planted on the periphery of the campus to bring down the noise and cut down dust and wind storms. A thickly planted belt of *Eucalyptus grandis*, *Grevillea robusta*, *Polyalthia longifolia*, *Putranjiva roxburghii*, seedling mango and *Samanea saman* are ideal for peripheral planting. This also helps in keeping down heat and cold waves. The front side should be planted with medium sized flowering trees for beauty. It is difficult to give general recommendations as it will vary according to architectural design, situation and climate. The objection is to provide beauty and comfort depending on convenience. *Cassia fistula*, *Cassia nodosa*, *Cassia renigera*, *Tabebuia chrysantha*, *Delonix regia*, *Tecoma argentea*, *Ervthrina indica*, *Largestroemia flosregime* and *Bauhinia variegata* are suitable for planting in the front and in the front row of the border planting.

The roads and paths are to be formerly planted with medium to tall flowering plants. Where the electric wires limits the choice of avenue trees. small flowering trees such as *Cochlospermum gossypium*, *Callistemon lanceolatus*, *Bauhinia variegata* and *Tecoma argentea*, *Tretea religiosa*, *Cassia fistula* should be planted. Border planting of shrubbery on large grounds or at the back of the school campus serves useful purpose of filling the gaps between the trees and lawns. Shrub borders around parks or playground is very effective and can replace hedges as the maintenance is less. A school garden should be planned with plant materials which need minimum maintenance. Planting of lawn in playground looks attractive in educational institutes. A *Bougainvillea*, *Adenocalyma*, *Antigonon leptopus* or *Bignonia venusta* creepers trained on the wall of the building can change the whole look. Creepers which are climbing with their rootlets such as *Ficus repens*, *Carnpsis radicans* can also be trained on pillars.

It is desirable that the maintenance of the campus should be left to the students as this will be quite educative also. Students should be encouraged for their work. If the students take the charge of maintenance themselves they will identify themselves with the creation and the garden will be spared from destruction by the students. Different trees, shrubs, roses, flowering annuals, etc. may also be properly labeled so that students could learn their names. This knowledge will be helpful for the students to lay out their home gardens. Besides an ornamental garden, school, universities and colleges can also maintain a botanical garden where the plants are arranged family and genera wise in groups so that such gardens become educative. A corner can also be allotted for growing medicinal plants.

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Q.6	Define tree and describe in detail planting scheme of avenue trees for road side plantation.	8
Ans	Tree: A tree is a perennial plant with an elongated stem or trunk, supporting branches and	1

	leaves in most species.	
	Purpose of growing 1. Specimen 2. Shade 3. Ornamental trees 4. Avenue trees 5. Screening 6. Wind break 7. Functional purpose 8. For checking air pollution	2
	Avenue trees: In this, trees are planted along road side for their flower and foliage other than providing shade on both the sides of a road. Avenue trees are planted in four ways.	1
	a. One kind of flowering trees on both sides: <i>Cassia fistula</i> , <i>Lagerstroemia speciosa</i> , <i>Grevillea robusta</i> , <i>Bauhinia variegata</i> , etc.	1
	b. Two kinds of flowering trees blooming at one time on both sides: <i>Grevillea robusta</i> (yellow) - <i>Jacaranda acutifolia</i> (blue) - <i>Grevillea robusta</i> (yellow) <i>Cassia fistula</i> (yellow) — <i>Delonix regia</i> (red) - <i>Cassia fistula</i> (yellow) <i>Cassia fistula</i> (yellow) - <i>Cassia nodosa</i> (pink) - <i>Cassia fistula</i> (yellow).	1
	c. Two kinds of flowering trees blooming at different times on both the sides: <i>Bauhinia triandra</i> (purple in Nov.) — <i>Spathodea campanulata</i> (red in Apr.) — <i>Bauhinia triandra</i> (purple in Nov.) / <i>Cassia fistula</i> (yellow in May) - <i>Jacaranda acutifolia</i> (blue in Apr.) — <i>Cassia fistula</i> / <i>Grevillea robusta</i> (yellow in Apr.) — <i>Bauhinia variegata</i> (mauve in Mar.) — <i>Grevillea robusta</i> .	1
	d. Shady trees on both the sides: The trees that are planted under avenues are <i>Delonix regia</i> , <i>Butea monosperma</i> , <i>Cassia javanica</i> , <i>Cassia fistula</i> , <i>Cassia siamea</i> , <i>Alstonaria scholaris</i> , <i>Putranjiva roxburghii</i> , <i>Bauhinia purpurea</i> , <i>Peltophorum ferrugineum</i> , <i>Jacaranda mimosifolia</i> , <i>Grevillea robusta</i> , <i>Erythrina indica</i> , <i>Spathodia nilotica</i> , <i>Bauhinia variegata</i> , <i>Azadiracta indica</i> , <i>Terminalia ajuna</i> , etc	1
Q.7	What is lawn? Describe in details planting methods lawn.	8
Ans.	Importance of lawn: Lawn is a green carpet which binds together the different features of garden. Lawn is the basic feature of garden. As a recreational function, grass is the choice for playing sports such as football, golf, tennis, cricket etc. As a visual function lawn provides a place for taking rest after day's hard work or tiring job and when looked at garden it makes the man cool and comfortable. Lawn improves the appearance of the home, resort, public parks, etc. Lawn provides perfect setting for flower beds, border, shrubbery, a specimen tree or shrub, <i>Cynodon dactylon</i> (Burmuda grass or doob grass), <i>Axonopus affinis</i> (Carpet grass), <i>Agrotis canina</i> (velvet bent grass), <i>Zoysia tenuifolia</i> (korean velvet grass). are some of the important grasses used in making lawn. Different methods of planting of lawn such as – 1) Seed Sowing 2) Dibbling 3) Turfing 4) Turf plastering.	4

	<p>1) Seed sowing Prior to sowing, the rolled surface is scarified with a rake to a depth of 2.5 cm and the seeds at the rate of $\frac{1}{2}$ kg per 200 m² area is mixed with double quantity of fine soil and broadcasted carefully and mixed with the soil by hand. Apply water gently with water can having rose. The seeds will germinate within 3-5 weeks time.</p> <p>2) Dibbling This is the cheapest but slowest method of establishing lawn. Small roots of 4-6 cm length are dibbled about 15 cm apart into the prepared ground when it is wet. The roots spread and grow under ground. It takes usually 6 months to make fairly compact lawn.</p> <p>3) Turfing Turfing is the quickest method of lawn establishment. Turf is a small piece of compact grass mass along some soil. It is taken from the place where a compact mass doob grass (<i>Cyanodon. dactylon</i>) is grown. The turfs should be spreaded closely side by side on the prepared ground and slightly beaten down flat into position. The entire area to be turfed is then thoroughly rolled and watered.</p> <p>4) Turf plastering Fresh hariyali roots are cut into 2-4 cm long. Two parts of these roots and one part of each of well-decomposed F.Y.M. soil is rendered into paste by stirring it with required quantity of water. Spread the paste evenly on the prepared ground, which has previously been watered. Grass will start up growth in about fortnight.</p>	1 1 1 1
Q.8	Explain in details of Hedges and edges with suitable examples and state the garden features.	8
Ans.	<p>Garden is made more beautiful and attractive with the help natural or man-made features.</p> <ol style="list-style-type: none"> 1. Garden walls 2. Fencing 3. Garden steps 4. Garden drives and paths 5. Hedges and Edges 6. Arches and pergolas 7. Terraces and Terrace Gardening 8. Paved Garden 9. Dry wall 10. Lawn 11. Carpet bedding 12. Flower beds 13. Shrubbery 14. Borders 15. Rock garden 16. Water Garden 17. Marsh or Bog Garden 18. Roof Gardening 	4

	<p>19. Ornamental Tubs, Urns and Vases</p> <p>20. Bird baths</p> <p>21. Sun dials</p> <p>22. Floral clocks</p> <p>23. Japanese Lanterns</p> <p>24. Ornamental stones</p> <p>25. Fountains</p> <p>26. Statues</p> <p>27. Plant stands</p> <p>Hedges and Edges :</p> <p>Hedge play an important role in the structure and character of the garden as they provide protection, demarcate a sector, screen unwanted and ugly sites, acts as wind break and anti pollutant and finally beautify the spot. Trees, shrubs and climbers are used as hedge. Plants for Hedge : <i>Duranta plumeri</i> , <i>Duranta repens</i> " variegata " , <i>Lantana camera</i>, <i>Hibiscus rose – sinensis</i>, <i>Casuarina equisetifolia</i>, <i>Galphimia glauca</i>, <i>Meyenia erecta</i> , <i>Clerodendron inermi</i> etc.</p> <p>Edges separate the different elements of garden which give a finished look to the area and offer a decorative accents. Edges are soft dividers around tress, flower beds, pathways, drives, lawns. Edging can be done by living and non-living materials.</p> <p>Plants for Edge : <i>Ageratum spp.</i>, <i>Altenanthera spp.</i>, <i>Justicea spp.</i>, <i>Plumbago capensis</i>, <i>Phaladaris arandinaceae</i> (Ribbon grass).</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
Q.9	Write in brief landscaping of urban and rural area.	8
Ans.	<p>Landscaping of urban and rural areas</p> <p>In a tropical country like India the roadside avenues are important for beautification and utility. Trees provide cool shade which is so much needed in the long hot summer months. Trees also help to bring down air pollution, act as windbreak and cut down noise pollution. Parks are places of relaxation, entertainment and fresh air supplier in congested cities. In selecting trees for urban areas, the main criteria should be beauty and shade. The broad roads in the cities should be planted with double rows of trees, the outer rows should consist of shade trees, which provide shade to the footpath users and the inner row consisting of flowering trees adding beauty. The tree should not interfere with the telephone or electric lines or the underground sewers. For this reason, tall trees (<i>Eucalyptus</i>, <i>Araucaria</i>, <i>Millingtonia hortensis</i>) and trees with spreading habit (Banyan, <i>Cedrus deodara</i>, <i>Ficus benjamina</i>. etc.) are not suitable for city or town roads. The tropical flowering trees are generally deciduous in habit and flower in leafless condition, which may be at a time when shade is needed to the maximum. The solution is, wherever feasible, to have an outer row of small shade trees such as <i>Ficus infectoria</i>, <i>Putranjiva roxburghii</i>, Silver oak, <i>Mimusops elengi</i>. etc., and inner row of flowering trees. The trees either in both or in the rows a single row, should be planted in pure avenues, i.e., with one kind of tree only. The spacing should be 10 m between the trees and in the case of double rows the distance between the rows will vary between 3 and 10 m, depending upon the trees planted and the situation. The trees in the opposite rows should be planted in a</p>	4

staggering (alternating) fashion. The spacing for dwarf and non-spreading trees (e.g. *Tecoma argentea*, *Cochlospermum gossypium* etc.), can be decreased as required. Though it has been suggested to plant flowering trees in pure avenue for beauty, it is possible to combine two different flowering species in the same season with harmonizing flower colours. For eg, the scarlet gulmohar combines well with the yellow amaltas. Similarly, scarlet gulmohar with the blue *Jacaranda* but flowering season may not coincide always.

Landscaping of city parks

In most of the cities, parks of the several sizes from medium to very large are generally found at street intersections. These are meant for recreation environment and environmental conservation. Most of the cities in India have been developed without any systematic planning and hence there is a very little space for garden. Hence, the solution is to lay out a garden in the nearest vicinity of the countryside.

There are four main categories of parks which can be developed as city parks:

1. Large size parks: Area of 200-1000 hectares
2. Medium size parks: Area of 50 to 200 hectares
3. Small size parks: Area of 1 to 50 hectares
4. Pleasure grounds: Up to one hectares

The parks should have following considerations:

1. Large size parks:

- A long meadow, which is a park like open space; • An-undulated and rising hilly section with woody construction; • A number of sceneries and objects of beauty like hanging bridge, National Zoo park, etc. • A small lake and its surrounding with flowering trees, shrubs. • Several self contained sectors having special features *ie*. Botanical garden, Arboretum etc.

2. Medium size parks:

- It may be used for a single purpose *ie*. Water park, a miniature Zoo etc. • Big woody plantation along with shrubs, ever blooming flowering trees and perennial flowering plants should be arranged in natural ways.

3. Small size parks :

- Good flowering and shade trees should be planted in groups or singly in some corners or other suitable places which may serve as a place pleasant for taking rest in a natural beautiful environment.
- In the small city parks, the scenery created does not look as natural as those of large rural park because of the limited space.
- Senior citizen's park and children's park may also be included in this type.

Landscaping of rural areas

A countryman may not need a sophisticated garden but need as much privacy as a city dweller. A villager would like to grow more vegetables and fruits for its family consumption but one or two shade trees and some space reserved for children's playground is definitely needed. Tamarind, Bilipatra, Neem, Jamun, Ficus and Mango are such trees which serve both purposes. Some utility flowering trees such as *Michelia champaka*, *Plumeria acutifolia* and shrubs such as *Hibiscus rosa-sinensis*, *Tabernaemontana coronaria*, *Barleria*, *Crossandra*, *Jasmines*, *Oleander*, *Tecoma stans* and *Thevetia* yielding flowers for worshipping and hair decoration should be included for planting. The common flowering annuals such as balsam, gaillardia, gomphrena, marigold, sunflower, vinca and zinnia can be grown for beauty and flowers for various

	<p>purposes.</p> <p>Trees for rural areas</p> <p>Tree Plantation in the rural areas should be based on for economy and utility i.e. fuel, timber, fodder or fruit. Babul is a common tree in the village, as it is cheap source of fuel and wood Bark of this tree is also used for making tanning leather. <i>Dalbergia sissoo</i> and Sal (<i>Shorea robusta</i>) also are good source of timber and fuel. Some minor fruit trees should be planted along the country road which not only provide shade but also yield nutritious fruits for villagers. For eg: mango, jackfruit, date, <i>jamun</i>, <i>tamarind</i>, etc. The foliage of the following plants yields valuable fodder For eg: <i>Babul</i>, <i>Kachnar</i> (<i>Bauhinia</i>), <i>neem</i>, <i>mulberry</i> (<i>Morus alba</i>) and <i>ber</i> (<i>Zizyphus</i> species).</p>	
Q.10	Write short notes (Any Two)	08
Ans.	<p>1) Rock garden: Artificial feature. Breaks monotony of level ground. Real rock or alpine garden can't created at elevations < 2000-2500 m. Situated in open part of garden as it should get all sun possible or at least half of the day preferably forenoon. Shaded corner of garden is useful. Away from large trees & hedges. Undulated part – also used. Miniature rock garden situated near by wall or house. Hill south facing slope – ideal to sun loving plants. North slope – ideal to shade loving plants.</p> <p>Construction – Select local origin, porous & weathered rocks. Weathered lime – ideal. Stones - 60 cm. Stones – slightly slanting, gently leaning backward – water flows to plant roots. Create – pockets in between stones of 15 – 60 cm. Small ranges & peaks – interspaced with broad valleys – imitates nature. Broad path – 45-60 cm through rockery between gorges & valleys. Avoid dense planting. Beautiful look- Pendent plant hanging down or prostrate plant rambling along large stone.</p> <p>Planting time – rainy. Potted plant – around year.</p> <p>Management – Severe winter – delicate plants – provides net/plastic sheets. Weeding – periodically. Watering – sprinkling water over rocks.</p> <p>Replanting of rock plants – after every 4 - 5 years as soil become stale or sour. Application of compost with bone meal 25-50 g.</p> <p>Plants used – Cacti – <i>Opuntia</i>, <i>Cereus</i>, <i>Mamillaria</i>. Succulents – <i>Agave</i>, <i>Aloe</i>, <i>Euphorbia splendens</i>, <i>Yucca</i>. Ferns – <i>Drynaria</i>, <i>Nephrodium</i>, <i>Nephrolepis</i>, <i>Polypodium</i>. Shrubs – <i>Adenium obesum</i>, <i>Cassia alata</i>, <i>Cassia biflora</i>, <i>Crossandra</i>, <i>Cuphea spp.</i>, <i>Duranta</i>, <i>Lantana</i>, <i>Russelia juncea</i>. Herbeaceous & bulbous plants – <i>Angelonia grandiflora</i>, <i>Oxalis rubra</i>, <i>Portulaca</i>, <i>Rose miniature</i>. Flowering plants – <i>Alyssum</i>, <i>Antirrhinum</i>, <i>Candy tuft</i>, <i>Dianthus chinensis</i>, <i>Phlox</i>, <i>Salvia splendens</i>, <i>Verbena hybrida</i>, <i>Viola tricolour</i>, <i>Zinnia linearis</i>.</p> <p>2) Bonsai: Bonsai is an art of growing dwarfed, ornamentally shaped trees or shrubs in shallow containers or trays.</p> <p>Shallow potted plants receive certain cultural treatments, which tend them to grow in limited space and produce artistic appearance</p> <p>Criterion for selection of plants for bonsai-</p>	4

Hardiness, rigors of growing in a shallow container, withstand to operations of pruning of roots, branches and tough training, growth of plant should be in harmony with container, trunk of trees should be strong and thick enough at the ground level to give a good appearance, plant, which shows seasonal variations in growth and flowering pattern, are greatly favoured as they are creating mobility,

Styles of bonsai:

- | | |
|---|--|
| 1. Formal upright style (<i>Chokkan</i>) | 2. Informal upright style (<i>Moyogi</i>) |
| 3. Slanting trunk style (<i>Shakkan</i>) | 4. Cascade style (<i>Kengai</i>) |
| 5. Semi cascading style (<i>Han kengai</i>) | 6. Multiple trunk style (<i>Kabudachi</i>) |
| 7. Clump style | 8. Raft style (<i>Ikadabuki</i>) |
| 9. Broom style (<i>Hokidachi</i>) | 10. Bunjin style |
| 11. Windswept style (<i>Fukinagashi</i>) | 12. Twisted trunk style |
| 13. Split trunk style | 14. Driftwood style (<i>Sharimiki</i>) |
| 15. Exposed root style | 16. Rock grown style (<i>Ishisuki</i>) |

3) **CAD application:** It can be defined as design and drafting of a landscape garden with the aid of computer. It can also be defined as use of information technology in garden designing.

Computer Aided Design (CAD) for landscape gardening is comparatively new. The core of the CAD system is software, which makes use of graphics for product representation. Computer aided designing is an important industrial art, extensively used in industry and landscape architecture designing and for many more purposes. For landscape designs, it represents a practical solution for the imperative needs of helping to visualise the future. Now-a-days, CAD is used to create 2D or 3D computer models. CAD assists the designer by

1. Providing accurately generated and easily modifiable graphical representations (rectangle, polygon, polyline, etc.).
2. Performs complex designs in a short time.
3. Implementing finite elements.
4. Record and recall information with consistency and speed.
5. Whole design can be stored along with processing history of a certain model for future reuse and upgrade. Some of the CAD softwares used in landscaping are AutoCAD, ArchiCAD, Advance Concrete, Advance Design, Advanced Steel, BRL-CAD, BricsCAD, Tekla, Revit, LANDCADD, etc.

SECTION "B"

Q.11. Define the following terms-

1. **Terrarium** : A miniature garden is made in glass container or in bottle by growing small plants of

ornamental value in capsulated form.

2. **Bio-aesthetic planning** : is recognized as the aesthetic branch of horticulture which deals with planting of ornamental plants to create a picturesque effect. 1
3. **Xeriscaping** : refers to landscaping and gardening in a way that reduce or eliminate the need for supplemental irrigation. 1
4. **Bonsai** : is an art of growing dwarfed, ornamentally shaped trees or shrubs in shallow containers or trays. 1
5. **Landscape** : A landscape may be defined as any area, either big or small, on which it is possible or desirable to mould a view or a design. 1
6. **Cacti** : A succulent plant with a thick fleshy stem which typically bears spines, lacks leaves and has brilliantly coloured flowers. 1
7. **Annual** : are the group of plants which complete their life cycle in one season or in one year. 1
8. **Ferns** : are flowerless plant that has feathery or leafy fronds. 1

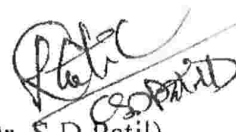
Q.12. Do as directed

1. A miniature garden is made in glass container or in bottle by growing small plants of ornamental value in capsulated form is called as **Ans. Terrarium/ Wardian** 1
2. Shrubs having height upto.....are categorized as dwarf shrub. **Ans. 1 m** 1
3. Who was the flag bearer of bio-aesthetic planning in India. **Ans. M.S.Randhava** 1
4. State the nature of climber to be used for screening purpose **Ans. Evergreen** 1
5. is the family of Bottle brush (*Callistemon lanceolatus*). **Ans. Myrtaceae** 1
6. Contrast colour scheme in shrubs is also called as..... **Ans. Complementary** 1
7. *Sansveria cylindrica* is commonly known as..... **Ans. Snake plant** 1
8. Royal palm is having which type of canopy? **Ans. Spreading** 1

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