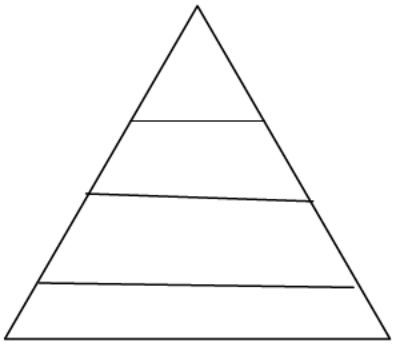
HSS EXAM – 2025

Botany - Answer Key

HSE II Total marks – 30

Category	Question No:	Answer key / Value points	Split score	Total score
Part I		Answer any 3 questions from 1 - 5 Each carries 1 mark		
	1.	c /Nitrogen and water soluble sugars	1	1
	2.	Microinjection	1	1
	3.	Ammensalism	1	1
	4.	Recombinant protein	1	1
	5.	Groundnut	1	1
Part II		Answer any 9 questions from 6 - 16. Each carries 2 mark		
	6.	a. Tapetum give nourishment to developing pollengrains b. Multinucleated cells	1+1	2
	7.	DNA enters the bacterium through the pores in cell wall • The bacterial cell is treated with divalent cation such as calcium • Incubate Recombinant DNA and bacterial cell on ice • Place this bacterial cell at 42° C which provides a heat shock • Put them back on ice Now bacteria can take up the Recombinant DNA	½ x 4	2
	8.	a. Rate of total biomass production by plants through photosynthesis. b. Factors influencing primary productivity :- Sunlight, temperature, moisture, plants in that area, photosynthetic capacity, availability of nutrients etc.	1+1	2
	9.	Apomictic seeds are used in hybrid seed industry / Apomixis helps in the production of hybrid seeds with a combination of desirable characters / In apomictic hybrid seeds, there is no segregation of characters /Farmers do not have to buy hybrid seeds every year because apomixis preserve good characters over generations for crop plants.	1+1	2
	10.	a. Number of individuals present per unit area at a given time. indicated by the letter N. b. In number of individuals of a population/ In % cover / biomass / If 200 parthenium plant and one huge banyan tree in an area, then the role of banyan tree in that community is greater than parthenium / Relative population density/ The number of fish caught or trap is	1 ½ x 2	2

		used to measure total population density of fish in the lake / Counting the colonies in a bacterial culture/ Indirect method – In tiger reserves tiger census is done on pug marks (foot prints)and fecal matter (any2 point)		
	11.	ADA deficiency – Gene therapy Human ά lactalbumin – Rosie ELISA - AIDS ά -1 Antitrypsin - Emphysema	½	2
	12.	**Pollination** – Bees pollinating flowers **Seed dispersal** -Birds eating fruits and dispersing seeds **Fig tree & wasp** .Female wasp , while searching for suitable place for egg laying, it pollinate the inflorescence of fig tree. In return, fig gives some developing seeds as food. **Mediterranean orchid, Ophrys & bees. sexual deceit** for pollination. One petal of its flower resembles female bees in size , colour &markings. So male bee **pseudocopulate** with the flower & dusted with pollen. When this bee pseudocopulate with another flower, it transfers pollen to it. If the female bee's colour pattern change slightly during evolution, pollination success will be reduced, unless orchid flower co-evolves to maintain the resemblance of its petals to the female bee. (any 2)	1+1	2
	13.	a. Somatic hybridization b. Somaclones	1+1	2
	14.	Co-existance by resource partitioning - Two species choose different times for feeding or different patterns of foraging. eg., Mc Arthur showed that 5 closely related species of warblers living on the same tree co-exist due to behavioural differences in their foraging activities. No species is eliminated	2	2
	15.	a. Grazing food chain – Plants. Detritus food chain – Detritus b. Grazing food chain	½ x 2 1	2
	16.	Disarmed pathogen vectors :- **Ti plasmid** of *Agrobacterium tumifaciens* & Retrovirus *Agrobacterium Tumifaciens* :- can deliver T-DNA to transform normal plant cells into a tumour. These tumour cells produce chemicals required by pathogen. Tumour inducing plasmid **(Ti plasmid**) of Agrobacterium tumifaciens is modified into a cloning vector. Retrovirus :- transform normal cells into cancerous in animal cells. Disarmed retrovirus are used as vector.	1+1	
Part III		Answer any 3 questions from 17 - 20. Each carries 3 scores		

	17.	a. Colourless/ Nector less / Odourless /Unisexual flowers/ Pollen grains are protected by mucilagenous covering./ Sticky and unwettable stigma/ Female flowers have long coiled stalk / Female flowers remain submerged/ Male flowers are released on to the surface of water and carried by water currents to the surface of stigma/ Long, ribbon like pollen grain (any 4 points) b. (i) Vallisneria (ii)seagrasses	½ x 4 ½ x 2	3
	18.	• **PCR** - based on amplification of DNA / Used to detect HIV in suspected AIDS patients/ Used to detect mutations in genes in suspected cancer patients/ Used to identify many genetic disorders • **ELISA** - based on antigen antibody reaction /pathogen can be detected by the presence of antigen or by detecting antibodies synthesized against the pathogen • **Radioactive probe** – A single stranded DNA /RNA, tagged with radioactive molecule (probe) is allowed to hybridize to its complementary DNA in a clone of cells , then detection using autoradiography.Clone having mutated gene will not appear on photographic film, because probe will not have complimentarity with the mutated gene • **rDNA technology** (explain any 3 tool)	1+1+1	3
	19.	a. (i) Stirred tank bioreactors . (ii) Sparged stirred-tank bioreactor b. Stirred tank bioreactors - Oxygen moves through a delivery system Sparged stirred-tank bioreactor -surface area of the culture medium is increased by bubbling the sterile air into the system	1+1 ½ x 2	3
	20.	a. Snake Frog Grasshopper Grass  b. In aquatic ecosystem, pyramid of biomass is inverted because biomass of phytoplankton is less as compared	1+1+1	3

		with that of small herbivorous fish, that feed on these producers. c. Ecological pyramid does not accommodate food web/ Do not take into account same species belonging to two or more trophic levels./ Assumes simple food chain, which never exist in nature / Saprophytes are not included.(any 1 point)		