

Printing Pages : 2

Paper Code: B040601T

A (SVSU:2024-25/R)

Enrollment No.

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B.Sc. Botany/Chemistry/Zoology/Environmental Science

VI Semester / III Year Examination

Subject Code- B040601T

Subject Name- Cytogenetics, Plant Breeding and Nanotechnology

[Time : 03:00 Hours]

[Max. Marks : 75]

Note : 1. Attempt all the questions as per given instructions.

2. Fill the correct answer of MCQs in the OMR sheet provided

1. Multiple Choice Questions (MCQs) [01×15=15]

- I** The longest phase of meiosis I is—
 (a) Telophase (b) Prophase I
 (c) Metaphase I (d) Anaphase I
- II** New cells need to be produced for:
 (a) Replacement (b) Growth
 (c) Repair (d) All of these
- III** Who proposed the chromosomal theory of inheritance?
 (a) Sutton (b) Boveri
 (c) (a) and (b) (d) Correns
- IV** A Botanist, who proposed the cell theory was:
 (a) Schleiden (b) Schwann
 (c) Robert Hooke (d) Robert Brown
- V** Mutations are
 (a) Always useful (b) Always harmful
 (c) Mostly useful (d) Rarely useful
- VI** Biostatistics is also called as?
 (a) Statistics in biology (b) Bio numerology
 (c) Biometry (d) All of above
- VII** Father of plant tissue culture is—
 (a) Mendel (b) Aristotle
 (c) Haberlandt (d) Theophrastus
- VIII** Haploid plants can be obtained from
 (a) Leaf culture (b) Root culture
 (c) Bud culture (d) Anther culture
- IX** What is the full form of SEM?
 (a) Scanning Electron Microscope
 (b) (b) Scanning electrode microscope
 (c) Scanning electrical microscope
 (d) All of the above

- X** Who is the interactor of Artificial Intelligence?
 (a) Geoffrey (b) Andrew Ng
 (c) John McCarthy (d) Jurgen Schmidhuber
- XI** 'Shodhganga' is repository of :
 (a) E-Resources (b) E-thesis (c) E-Journals (d) E-books
- XII** Wind speed is measured with the help of :
 (a) Barometer (b) Thermometer
 (c) Anemometer (d) All of above
- XIII** A person who collects data on atmospheric condition is called:
 (a) Chemist (b) Astronauts
 (c) Biologist (d) Meteorologist
- XIV** Lignin is not present in which part of the plant cell?
 (a) Primary cell wall (b) Secondary cell wall
 (c) Middle lamella (d) Cell membrane
- XV** Chromosomes are made up of
 (a) DNA, Proteins (b) RNA, Proteins
 (c) DNA, Histones (d) DNA, RNA

2. Answer in long (any three) [10×3=30]

- I** What do you mean by nanotechnology? Write down the properties of nanomaterials and explain top-bottom approach.
- II** What do you mean by chromosomal aberrations. Discuss the structure changes in chromosomes.
- III** Give a detailed note on pure line selection and mass selection.
- IV** What is Heterosis? Explain the genetic basis of heterosis and its applications in plant breeding.

3. Answer in short (any five) [6×5=30]

- I** Write the notes on Lamp brush chromosome and Golgi apparatus.
- II** Explain standard deviation and its merits as a measure of dispersion.
- III** Difference between Mitosis and Meiosis cell division.
- IV** Draw a well labelled diagram of Chloroplast.
- V** Describe the qualitative and quantitative inheritance.
- VI** Explain any of the hybridization methods of crop improvement and its significance.
- VII** What is incomplete dominance? Explain with suitable example.

Printing Pages : 2

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B

(SVSU:2024-25/R)

Enrollment No.

Program Name: B.Sc. Botany/Zoology/Chemistry

VI Semester / III Year Examination

Subject Code: B040602T

Subject Name: Ecology and Environment

[Time: 03:00Hours]

[Max. Marks: 75]

Note: 1. Attempt all the questions as per given instructions.

1. Multiple Choice Questions (MCQs): [01×15=15]

- I Which of the following is a non-renewable resource?
(a) Solar energy (b) Wind energy (c) Coal (d) Freshwater
- II Which resource is considered a biotic resource?
(a) Minerals (b) Petroleum (c) Forests (d) Rocks
- III Which report highlighted the concept of sustainability?
(a) Kyoto Protocol (b) Brundtland Report
(c) Montreal Protocol (d) Stockholm Declaration
- IV The term "ecology" was first coined by:
(a) Charles Darwin (b) Ernst Haeckel
(c) Robert Hooke (d) Alexander von Humboldt
- V Which of the following is a common method used for soil reclamation?
(a) Deforestation (b) Overgrazing
(c) Afforestation (d) Excessive use of fertilizers
- VI Which of the following is a biotic component of an ecosystem?
(a) Soil (b) Water (c) Bacteria (d) Rocks
- VII Which process contributes to soil formation?
(a) Weathering of rocks (b) Burning of fossil fuels
(c) Deforestation (d) Volcanic eruptions
- VIII Which material is commonly used in eco-friendly packaging?
(a) Styrofoam (b) Plastic
(c) Biodegradable paper (d) Non-recyclable glass
- IX The ability of soil to hold water is known as:
(a) Soil fertility (b) Soil permeability (c) Soil porosity (d) Soil texture
- X The term "biodiversity" was first coined by:
(a) E.O. Wilson (b) Charles Darwin
(c) Rachel Carson (d) Aldo Leopold
- XI Which factor affects phytogeographical distribution the most?
(a) Wind speed (b) Soil fertility
(c) Human population (d) Ocean currents

- XII** Which of the following gases is the main component of biogas?
(a) Carbon dioxide (b) Methane (c) Oxygen (d) Nitrogen
- XIII** Which phytogeographical region of India has the highest plant diversity?
(a) Thar Desert (b) Western Ghats
(c) Indo-Gangetic Plains (d) Deccan Plateau
- XIV** Which pollutant is responsible for acid rain?
(a) Carbon monoxide (b) Sulfur dioxide (c) Methane (d) Ozone
- XV** Which international agreement established the concept of carbon credits?
(a) Montreal Protocol (b) Paris Agreement
(c) Kyoto Protocol (d) Basel Convention

2. Answer in long (any three) [10×3=30]

- I** Explain the major causes and consequences of soil degradation. Discuss which factors contribute to soil degradation.
- II** Give an essay on the process of ecological succession and differentiate between primary and secondary succession.
- III** Discuss the role of contour farming, mulching, and strip cropping in soil conservation and sustainable agriculture.
- IV** Critically analyze the objectives, implementation, and impact of the Yamuna Action Plan in controlling pollution in the Yamuna River.

3. Answer in short (any five) [6×5=30]

- I** What is the major environmental impact of using non-renewable resources?
- II** Why is energy flow in an ecosystem unidirectional?
- III** What is the impact of soil erosion on a watershed?
- IV** What criteria are used to identify a region as a biodiversity hotspot?
- V** Which biogeographic region includes the Himalayas?
- VI** Define Landfilling and its advantages and disadvantages.
- VII** Write a note on importance of GPS in ecological studies.

**Program Name: B.Sc. Botany/ Chemistry/Genetics and Genomics/
Mathematics/ Physics/Zoology/ Environmental Science**

IV Semester / 2nd Year Examination

Subject Code: B020401T

Subject Name: QUANTUM MECHANICS AND ANALYTICAL TECHNIQUES

[Time : 03:00 Hours]

[Max. Marks : 75]

Note: 1. Attempt all the questions as per given instructions.

1. Multiple Choice Questions (MCQs)

[01×15=15]

I Pfund series are produced in the spectrum of hydrogen atom ?

- (a) When electrons jump down to 2nd- orbit
(b) When electrons jump down to 3rd- orbit
(c) When electrons jump down to 4th- orbit
(d) When electrons jump down to 5th- orbit

II Electron enters the subshell in which $(n+l)$ value is minimum. This is given by

- (a) Hund's rule (b) Aufbau principle
(c) Heisenberg uncertainty principle (d) Pauli's exclusion principle

III According to de Broglie's equation, the momentum of a particle in motion is proportional to wavelength.

- (a) inversely (b) directly (c) is not (d) none

IV The Balmer series in the spectrum of hydrogen atom falls in

- (a) Ultraviolet region
(b) Visible region
(c) Infrared region
(d) None

V The radial part of the wave function depends on the quantum numbers

- (a) n and l (b) l and m (c) l and s (d) n, l and m

VI In bathochromic shift the absorption maxima shifts towards

- (a) longer wavelength (b) shorter wavelength
(c) does not shift (d) none

VII The base value of heteroanular diene according to Woodward Fieser rule is

- (a) 217 nm (b) 214 nm (c) 253 nm (d) 245 nm

VIII Which of the following molecule will be IR active?

- (a) H_2 (b) O_2 (c) HCl (d) CO_2 (symmetrical)

IX Which technique is commonly used to study the interaction of matter with electromagnetic radiation?

- (a) Spectroscopy
(b) Chromatography
(c) Electrochemistry
(d) None

- X NMR is the study of absorption of ----- radiations.
 (a) Microwave (b) Radiofrequency (c) Infra-red (d) UV-rays
- XI Which of the following compound has most deshielded protons?
 (a) CH_4 (b) CH_3F (c) CH_3Cl (d) CH_3Br
- XII How much percentage of ^{12}C is present in nature?
 (a) 98.8 (b) 1.1 (c) 0 (d) 5
- XIII The ratio of peaks/splitting observed in quartet in NMR
 (a) 1:1:1:1 (b) 1:2:2:1 (c) 1:3:3:1 (d) 1:2:3
- XIV Total number of fundamental vibrations in CH_4 molecule are
 (a) 6 (b) 7 (c) 8 (d) 9
- XV The stretching frequency of molecule will be highest for
 (a) Triple bond (b) Double bond (c) Single bond (d) All are equal
2. Answer in long (any three) [10×3=30]
- I Define spectroscopy. Explain the concept of stretching and bending vibrations in IR spectroscopy by giving suitable representations.
- II What is chromatography? Classify the different types and explain their principles.
- III Explain the various electronic transitions of molecule in UV-Visible spectroscopy. Comment on the allowed and forbidden transitions present.
- IV Write a detailed note on following: (a) Black body radiation
 (b) Photoelectric effect (c) Compton effect
- V What are the absorption and intensity shifts in UV – spectroscopy? Explain each shift with suitable examples.
3. Answer in short (any five) [6×5=30]
- I What is Pascal's law of triangle and how it is used to determine the relative intensities of multiplets?
- II Differentiate between finger print region and functional group region. Justify the significance of the fingerprint region in IR spectroscopy.
- III What is Mc Lafferty rearrangement in mass spectrometry? Explain with suitable example.
- IV State and derive Hamiltonian equation. What is the significance of Hamiltonian operator?
- V Why is tetramethylsilane (TMS) used as an internal standard in NMR spectroscopy?
- VI Highlight the factor that affects the vibrational frequency.
- VII Define electromagnetic radiations and electromagnetic spectrum.
- VIII Outline the key points responsible for the shift in UV-Visible spectroscopy?
- IX What are the selection rules for a molecule to be IR active?
- X Explain the anisotropic effects in alkene, alkynes and benzene ring.

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Program Name: B.Sc. Botany/Zoology/Chemistry/ Genetics and Genomics/Environmental Science

IV Semester /II Year Examination

Subject Code: B040401T

Economic Botany, Ethnomedecine and Phytochemistry

[Time : 03:00 Hours]

[Max. Marks : 75]

Note : 1. Attempt all the questions as per given instructions.

1. Multiple Choice Questions (MCQs)

[01×15=15]

- I Which plant is known as "Queen of Herbs" in Ayurveda?
(a) Neem (b) Ashwagandha (c) Tulsi (d) Aloe Vera
- II The active compound in *Curcuma longa* responsible for its medicinal properties is:
(a) Quinine (b) Curcumin (c) Reserpine (d) Berberine
- III *Andrographis paniculata* is commonly known as:
(a) Kalmegh (b) Giloy (c) Brahmi (d) Shatavari
- IV Ethnomedicine is primarily studied under:
(a) Pharmacology (b) Ethnobotany
(c) Biochemistry (d) Microbiology
- V Ayurveda classifies medicinal plants into how many categories?
(a) Four (b) Six (c) Eight (d) Ten
- VI The first country to cultivate rice was:
(a) India (b) China (c) Brazil (d) Australia
- VII India is part of which biodiversity hotspot?
(a) Mediterranean (b) Indo-Burma (c) Australian (d) Neotropical
- VIII Which of the following is not an essential step in herbal capsule preparation?
(a) Drying (b) Powdering (c) Genetic modification (d) Encapsulation
- IX Domestication of plants started during the:
(a) Industrial Revolution (b) Neolithic Period
(c) Renaissance Period (d) 19th Century
- X The study of medicinal plants is a part of:
(a) Pharmacology (b) Pharmacognosy
(c) Agronomy (d) Microbiology
- XI Which medicinal plant is commonly used in herbal baths for relaxation?
(a) *Zingiber officinale* (b) *Ocimum sanctum*
(c) *Curcuma longa* (d) *Eclipta alba*

- XII** Ethnomedicine is primarily studied under:
 (a) Pharmacology (b) Ethnobotany
 (c) Biochemistry (d) Microbiology
- XIII** Which medicinal plant is commonly used in capsules for liver disorders?
 (a) *Andrographis paniculata* (b) *Mentha piperita*
 (c) *Coriandrum sativum* (d) *Curcuma longa*
- XIV** AAYUSH stands for:
 (a) Ayurveda, Yoga, Unani, Siddha, Homeopathy
 (b) Ayurveda, Allopathy, Yoga, Siddha, Homeopathy
 (c) Ayurveda, Acupuncture, Yoga, Siddha, Homeopathy
 (d) Ayurveda, Aromatherapy, Yoga, Siddha, Homeopathy
- XV** *Cocos nucifera* is the botanical name of:
 (a) Neem (b) Coconut (c) Palm (d) Jatropha

2. Answer in long (any three) [10×3=30]

- I** Explain the diversity centers of crop plant, and give the names of crop plants originated from there.
- II** Write a detailed account on timber-producing trees and provide their botanical names, local names, family names and plant part used.
- III** Write a detailed account on medicinal plants and provide their botanical names, local names, family names. Classify them according to their plant part used.
- IV** What do you mean by greenhouse? How can we cultivate the *Gerbera* in greenhouse?

3. Answer in short (any five) [6×5=30]

- I** How did Nikolai Vavilov contribute to the understanding of crop plant diversity?
- II** Write a note on importance of herbaria and museums in ethnobotanical studies.
- III** Define hydromedical and its significance in alternative medicine.
- IV** Write the local name, botanical name and family names of some important spices plants.
- V** Discuss the economic importance of fibre plants in India.
- VI** Write short note on the botanical and family names and plant part used of commonly important cereals.
- VII** How does ethnobotany aid in the conservation of traditional plant knowledge?