

THE MAHARAJA SAYAJIRAO UNIVERSITY OF BARODA

(Accredited with "A+" Grade by NAAC)



DEPARTMENT OF
ENVIRONMENTAL STUDIES
FACULTY OF SCIENCE



2023
ADMISSIONS
OPEN

B.Sc. (Environmental Science)

Eligibility: H.S.C. (Science) Examination

M.Sc. (Environmental Science)

Eligibility: Graduates of all branches of science and technology

Dates of Entrance Exam

B.Sc. (Environmental Science)- 24/06/2023 (1:00 pm -2:30 pm)

M.Sc. (Environmental Science)- 28/06/2023 (2:30 pm -4:00 pm)



About Department

- Multidisciplinary curriculum
- Good Infrastructure and Instrument Facilities
- Broad Range of Research

Activities

- Expert Lectures
- Seminar Presentation
- Dissertation in last semester
- Field Exposures

Scope of Employment

- Industries
- Government Boards
- Consultancies
- Research Institutes
- Higher Studies



For any query, mail us at:
head-env@msubaroda.ac.in

For more details and registration,
visit university website:
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- Acetone on reaction with methylmagnesium bromide followed by hydrolysis produces _____.
 - n*-Butyl alcohol
 - iso*-Butyl alcohol
 - tert*-Butyl alcohol
 - sec*-Butyl alcohol
- A on reaction with aq. NaOH produces B which on oxidation with KMnO₄ produces Acetic acid. A and B are _____.
 - Ethyl bromide and ethanol
 - Ethyl alcohol and Acetyl chloride
 - Acetyl chloride and Ethyl bromide
 - Ethanol and Acetaldehyde
- _____ gives Cannizzaro reaction.
 - Benzaldehyde
 - Acetaldehyde
 - Acetone
 - Ethanol
- Cyclopentanone on reaction with zinc amalgam in acidic condition produces _____.
 - Cyclopentene
 - Cyclopentane
 - Cyclopentyl alcohol
 - Cyclopentyl bromide
- Styrene on reaction with NaOH and Br₂ produces _____.
 - 2-Phenyl-1-bromoethanol
 - 1-Phenyl-2-bromoethanol
 - 2-Phenyl-2-bromoethanol
 - 2-Phenylethanol
- _____ on reaction with nitrous acid at 0-5 C produces benzene diazonium chloride.
 - Phenol
 - Benzene
 - Aniline
 - Chlorobenzene
- Benzamide on reaction with KOBr produces _____.
 - Aniline
 - Bromobenzene
 - Benzyl alcohol
 - Benzyl amine
- Benzene diazonium chloride on reaction with cuprous chloride produces _____.
 - phenyl cuprous halide
 - Benzyl chloride
 - Azo dye
 - Chlorobenzene
- DNA double helix is held by _____ interaction.
 - Ion-ion interaction
 - Ion-dipole interaction
 - Hydrogen bonding
 - Hydrophobic interaction
- Acetaldehyde on reductive amination reaction with methyl amine produces _____.
 - Ethyl amine
 - Ethyl methyl amine
 - Methyl amine
 - Diethyl amine
- The number of atoms per unit cell in a simple cubic, fcc and bcc are
 - 1, 2, 4
 - 1, 4, 2
 - 4, 2, 1
 - 2, 4, 1

12. In Frenkel defect,
- Some of the lattice sites are vacant
 - An ion occupies interstitial position
 - Some of the cations are replaced by foreign ions
 - None of the above
13. For tetragonal crystal system, which of the following is not true
- $a = b \neq c$
 - $\alpha = \beta = \gamma = (90^\circ)$
 - $a \neq b \neq c$
 - none of these
14. Potassium crystallises in a bcc structure. The co-ordination number of potassium in potassium metal is
- 2
 - 4
 - 6
 - 8
15. The Bragg's equation for diffraction of X-rays is
- $n \lambda = 2 d^2 \sin \theta$
 - $n \lambda = 2 d \sin \theta$
 - $n \lambda = 2 d \sin 2\theta$
 - $n \lambda = d \sin \theta$
16. The Henry's law gives the relationship between
- The pressure and solubility of a gas in a particular solvent
 - The temperature and solubility of a gas in a particular solvent
 - The composition of the mixture and solubility of a gas in a particular solvent
 - None of these
17. 45 g of glucose (molecular mass 180) is dissolved in 500 g of water. The molality of the solution is
- 0.25
 - 0.5
 - 0.75
 - 1.0
18. The liquid mixtures which distill with a change in composition are called
- Azeotropic mixtures
 - Equilibrium mixtures
 - Zeotropic mixtures
 - Nonequilibrium mixtures
19. The depression in freezing point for 1 M urea, 1 M glucose and 1 M NaCl are in the ratio
- 1:2:2
 - 1:2:1
 - 1:1:1
 - 1:1:2
20. Which of the following is not a colligative property?
- Relative lowering of vapour pressure
 - Surface tension
 - Elevation in boiling point
 - Depression in freezing point

21. The equivalent conductance of a solution of an electrolyte
- Increases with dilution
 - Decreases with dilution
 - Does not vary with dilution
 - None of these
22. The pyrometallurgical operations involve the use of
- High temperature
 - Electrolysis
 - Complexation
 - Hydrolysis
23. During smelting a substance is added which combines with impurities to form a fusible mass. The substance added is called
- Slag
 - Flux
 - Gangue
 - Ore
24. Which of the following compound is known as inorganic benzene?
- B_6H_6
 - C_5H_5B
 - $C_3N_3H_3$
 - $B_3N_3H_6$
25. Marsh gas contains
- CH_4
 - CO_2
 - C_2H_6
 - N_2
26. A real gas behaves like an ideal gas if its
- Pressure and temperature are both high
 - Pressure and temperature are both low
 - Pressure is high and temperature is low
 - Pressure is low and temperature is high
27. The wavelength of a photon and the de Broglie wavelength of an electron and Uranium atom are identical. Which one of them will have highest kinetic energy
- Photon
 - Electron
 - Uranium atom
 - Nothing can be predicted
28. A particle is confined inside a one – dimensional box of length L and left unperturbed for a long time. In the most general case, the wave function must be
- The ground state of energy
 - Periodic, where L equals an integer number of periods
 - A linear superposition of the energy Eigen functions.
 - Any one of the energy Eigen functions.
29. The characteristic impedance of a co – axial cable is independent of
- Core diameter
 - Outer diameter
 - Length of the cable
 - Dielectric medium between the core and the outer mesh.

30. In the basic band structure theory of crystalline solids, which of the following leads to energy gaps in the allowed electronic energy values?
- a) Bragg reflection
 - b) Electron spin
 - c) Electron – Phonon interaction
 - d) Electron – Electron interaction
31. To operate a n – p – n transistor in active region, the emitter – base and collector – base junction respectively, should be
- a) Forward biased and reverse biased
 - b) Forward biased and forward biased
 - c) Reversed biased and forward biased
 - d) Reverse biased and reverse biased
32. Maxwell – Boltzmann statistics cannot be applied to
- a) Atoms
 - b) Molecules
 - c) Photons
 - d) Lattice
33. The difference between fermions and bosons is that bosons do not obey
- a) Aufbau principle
 - b) Pauli exclusion principle
 - c) Hund’s rule of maximum multiplicity
 - d) Heisenberg’s uncertainty principle
34. The buoyancy depends on
- a) Mass of liquid displaced
 - b) Viscosity of the liquid
 - c) Pressure of the liquid displaced
 - d) Depth of immersion
35. The process of diffusion of one liquid into the other through a semipermeable membrane is called
- a) Viscosity
 - b) Cohesion diffusivity
 - c) Osmosis
 - d) Surface tension
36. An ideal flow of any fluid must satisfy
- a) Bernoulli’s theorem
 - b) Pascal law
 - c) Continuity equation
 - d) Boundary layer theory
37. You feel lighter in the water than on land because
- a) Gravity is not as strong in the water
 - b) The buoyant force of the water counters some of your weight
 - c) Your mass is less in the water than on the land
 - d) You are trying to stay afloat
38. A balloon lifting in air follows the following principle
- a) Law of gravitation
 - b) Archimedes principle
 - c) Principle of buoyancy
 - d) All of above

39. Radioactive disintegration of tritium gives
- | | |
|------------------------|------------------|
| a) α – particle | c) neutrons |
| b) β – particle | d) None of above |
40. The safety – rods present to shut down the reactor are made up of
- | | |
|------------|------------|
| a) Copper | c) Carbon |
| b) Calcium | d) Cadmium |
41. At high temperatures, which material is best choice to be used as coolant in a nuclear reactor?
- | | |
|----------------|---------------------|
| a) Water | c) Molten Potassium |
| b) Heavy water | d) Molten Carbon |
42. What would be the effect of a nuclear holocaust?
- | | |
|-------------------|-------------------|
| a) Nuclear summer | c) Nuclear autumn |
| b) Nuclear spring | d) Nuclear winter |
43. If Laplace equation satisfies, then which of the following statement will be true?
- | | |
|-----------------------------|--------------------------------|
| a) Potential will be zero | c) Resistance will be infinite |
| b) Current will be infinite | d) Voltage will be same |
44. Suppose the potential is a step function, the equation that gets satisfied is
- | | |
|---------------------|---------------------|
| a) Laplace equation | c) Maxwell equation |
| b) Poisson equation | d) Ampere equation |
45. When a thin transparent sheet is introduced along the path of one of the slits in Young's double slit experiment. Then the fringe width
- Decreases
 - Increases
 - Does not change
 - Does not change but intensity becomes half
46. Which of the following is due to inhomogeneous refractive index of earth's atmosphere?
- | | |
|----------------------------------|---|
| a) Red colour of the evening Sun | c) Oval shape of the evening Sun |
| b) Blue colour of the sky | d) Large apparent size of the evening Sun |
47. X – ray incident on a material
- | | |
|-----------------------------|------------------------------|
| a) Exerts a force on it. | c) Transfers momentum to it. |
| b) Transfers impulse to it. | d) All of the above. |
48. The internal energy of a system remains constant when it undergoes
- A cyclic process
 - An isothermal process
 - An adiabatic process
 - Any process in which the heat given out by the system is equal to the work done on the system.

49. The first law of thermodynamics is based on
- | | |
|--------------------------------------|------------------------------------|
| a) The law of conservation of energy | c) The law of conservation of work |
| b) The equivalence of heat and work | d) Both (a) & (b) |
50. The time period of a simple pendulum in a freely falling lift is
- | | |
|-------------|------------------|
| a) Zero | c) Finite |
| b) Infinite | d) None of these |
51. Which of the following best describes the dominant plant phase in angiosperms?
- | | |
|---------------------------|----------------------------|
| a) Sporophyte and diploid | c) Gametophyte and diploid |
| b) Sporophyte and haploid | d) Gametophyte and haploid |
52. Which of the following is NOT a part of the embryosac?
- | | |
|---------------|-----------------|
| a) Synergids | c) Central cell |
| b) Antipodals | d) Micropyle |
53. What is the ploidy level of the antipodals in the embryo sac?
- | | |
|-------|-------|
| a) N | c) 3N |
| b) 2N | d) 4N |
54. How many megaspores are involved in the development of the embryosac in most angiosperms?
- | | |
|--------|----------|
| a) One | c) Three |
| b) Two | d) Four |
55. In which of the following embryo type is the micropyle and the funiculus in one axis?
- | | |
|-----------------|-------------------|
| a) Anatropous | c) Campylotropous |
| b) Orthotropous | d) Hemianatropous |
56. The number of pollen sacs in a typical dithecous anther would be_____.
- | | |
|--------|----------|
| a) One | c) Three |
| b) Two | d) Four |
57. A flower with several carpels and only one ovary would be _____.
- | | |
|--------------------------------|--------------------------------|
| a) monocarpellary & syncarpous | c) polycarpellary & syncarpous |
| b) monocarpellary & apocarpous | d) polycarpellary & apocarpous |
58. Which of the following is a non-albuminous seed?
- | | |
|-----------|------------------|
| a) Maize | c) Pea |
| b) Castor | d) Both a and b. |
59. Which of the following is a true fruit?
- | | |
|-----------|---------------|
| a) Apple | c) Strawberry |
| b) Tomato | d) Pineapple |

60. Which of the following would NOT be true for facilitated transport across membranes?
- a) Requires specialized proteins
 - b) Is highly selective
 - c) Capable of uphill transport
 - d) Transport speed can saturate
61. What would be the pressure potential of a flaccid cell?
- a) 100 kPa
 - b) 0 kPa
 - c) -100 kPa
 - d) 10 kPa.
62. Which of the following statements about osmosis is NOT true
- a) Solute particles move from their high to low concentrations.
 - b) Solvent particles move from their high to low concentrations.
 - c) Net movement of solvents particles is in one direction only.
 - d) It occurs through a semi-permeable membrane only
63. The casparian strip would be found in which of the following plant organs?
- a) Root
 - b) Stem
 - c) Leaf
 - d) Both a and b
64. The movement of water would NOT be through the cell cytoplasm in which of the following pathways?
- a) Apoplastic
 - b) Symplastic
 - c) Transmembrane
 - d) Both b and c
65. Which of the following environmental conditions would best facilitate guttation in plants?
- a) High soil water and low humidity
 - b) High soil water and high humidity
 - c) Low soil water and low humidity
 - d) Low soil water and high humidity
66. Where is water converted from its liquid phase to gaseous phase within a plantleaf?
- a) Substomatal cavity
 - b) Intercellular space of spongy mesophyll
 - c) At the stomatal pore
 - d) Cell wall of spongy mesophyll cell
67. Which of the following property of water is mainly responsible for transpirational cooling in plants?
- a) High specific heat
 - b) High latent heat of vaporization
 - c) Universal solvent
 - d) High evaporation point
68. Which of the following is the major difference in transport through xylem and phloem?
- a) Transport of water
 - b) Uni and bidirectional transport
 - c) Transport of solutes
 - d) Anucleated condition of transport cells

78. Correct sequence of urine formation is:
- Filtration, reabsorption, secretion
 - Filtration, secretion, reabsorption
 - Reabsorption, secretion, filtration
 - Reabsorption, filtration secretion
79. Which of the following most accurately states the goal of systematics?
- All animals should be grouped based on DNA sequence data
 - All animals should be classified based on the relatedness at the early embryonic stage
 - Classification of animals should be based on morphological characters
 - Classification scheme should reflect phylogenetic relationship
80. Which one of the following is the CORRECT matching of the site of action on the given substrate, the enzyme acting upon it and the end product?
- Stomach: Fat — by Lipase — to micelles
 - Duodenum: Triglyceride — by Trypsin — to monoglycerides
 - Small intestine: Starch — by (α) Amylase — to Maltose
 - Small intestine: Protein — by Pepsin — to Amino acids
81. Serum is best defined as:
- Blood without corpuscles and fibrinogen
 - Lymph without corpuscles
 - Blood without fibrinogen
 - Lymph
82. Find the **INCORRECT** match.
- Father of experimental genetics- T.H.Morgan
 - Father of modern genetics- Mendel
 - Model organism of classical genetics- *Pisum sativum*
 - Model organism of experimental genetics- *Drosophila melanogaster*
83. An action potential in the nerve fibre is produced when positive and negative charges on the outside and the inside of the axon membrane are reversed because:
- All potassium ions leave the axon
 - All sodium ions enter the axon
 - More potassium ions enter the axon as compared to sodium ions leaving it
 - More sodium ions enter the axon as compared to potassium ions leaving it
84. Which one of the following condition results from excess Growth hormone in adults?
- Cushing's disease
 - Acromegaly
 - Hyperthyroidism
 - Diabetes mellitus

85. The cell which secretes male sex hormone testosterone are:
- a) Isthmus
 - b) Lieberkühns
 - c) Sertoli cells
 - d) Leydig cells
86. Pyramid of energy in any ecosystem:
- a) is always upright
 - b) may be upright or inverted
 - c) is always inverted
 - d) cannot be represented in pyramid form
87. Which of the following **is not** found in prokaryotes?
- a) Cell wall
 - b) Plasma membrane
 - c) DNA
 - d) Endoplasmic reticulum
88. Which of these scientists proposed the ‘Continental Drift Theory’?
- a) Alfred Wegener
 - b) Alfred Wallace
 - c) Charles Lyell
 - d) Ernst Mayr
89. If the promoter region of a gene has been rendered non-functional due to a mutation, it may lead to:
- a) Production of a mutant protein
 - b) Production of normal protein
 - c) Over-production of protein
 - d) No production of protein
90. Which of the following is an example of homologous characters?
- a) Wings of birds and forelimbs of salamander
 - b) Wings of butterflies and patagium of bats
 - c) Flippers of whales and fins of fishes
 - d) Wings of insects and wings of birds
91. Small geographic areas with high concentrations of endemic species and a large number of endangered and threatened species are known as
- a) Endemic sinks
 - b) Critical communities
 - c) Biodiversity hot spots
 - d) Endemic metapopulations
92. The author of the book “Origin of Species” is
- a) Carl Linnaeus
 - b) Charles Darwin
 - c) Lamarck
 - d) John Ray
93. Which of the following is a correct hierarchical sequence for classifying a living organism?
- a) Domain- Kingdom- Phylum- Class- Order- Family- Genus- Species
 - b) Kingdom- Domain- Phylum- Class- Order- Family- Genus- Species
 - c) Domain- Kingdom- Phylum- Order- Class- Family- Genus- Species
 - d) Kingdom- Domain- Phylum- Order- Class- Family- Genus- Species

94. The Lamarckian concept of evolution was chiefly based upon:
- a) Inheritance
 - b) Transformation
 - c) Variation
 - d) Speciation
95. Proteins to be secreted out from the cell are synthesized by
- a) Free ribosomes in the cytosol
 - b) Ribosomes on the nuclear membrane
 - c) Ribosomes on the Endoplasmic reticulum
 - d) Ribosomes on the cell membrane
96. "Ontogeny recapitulates phylogeny" this recapitulation law was stated by:
- a) Alfred Wallace
 - b) Ernst Haeckel
 - c) Charles Darwin
 - d) Ernst Mayr
97. Pairing of homologous chromosomes is seen during:
- a) Zygotene
 - b) Leptotene
 - c) Diplotene
 - d) Pachytene
98. Which of the following represents a start codon in protein translation?
- a) UAG
 - b) AUG
 - c) AUU
 - d) UAA
99. In which phase of the cell cycle does DNA replication occur?
- a) G₁ phase
 - b) S phase
 - c) G₂ phase
 - d) M phase
100. 'Niche' of an animal in an ecosystem means:
- a) An animal's habit
 - b) An animal's habitat
 - c) An animal's position in the food chain
 - d) An animal's profession in the ecosystem

Rough Work