CSSR & SRRM Degree & PG College

Autonomous

Re-accredited with NAAC 'A' Grade with CGPA 3.22 in Cycle – II

Kamalapuram YSR (Dist)

Department of Botany

Board of Studies

Meeting – I (2024-2025)

Dated: 10-08-20234

CONTENTS

ESTD : 1992

CSSR & SRRM DEGREE & PG COLLEGE

AUTONOMOUS

Re-Accredited by NAAC with A Grade

Permanently Affiliated to Yogi Vemana University

Recognized Under 2(f) & 12(B) of UGC Act 1956

13/521, Reddy Colony, Kamalapuram-516 289, Kadapa Dist. A.P.

ISO 9001:2015

Dated:25-07-2024

PROCEEDINGS OF THE PRINCIPAL

Present: Dr.G. Vinod Kumar M.Sc., Ph.D., Principal

The Board of Studies for Department of Botany has been constituted by the Principal of CSSR & SRRM Degree & PG College (A), Kamalapuram as per UGC autonomous 2023 regulations of BoS for the period of three years i.e., 2024-2025 to 2026-2027 with the following members.

Sl. No.	Category	Name	Designation	Position in BoS
1	In charge of the Department	SMD.Haneef	Head	Chairperson
2	Two experts from Outside the Parent University nominated by Academic Council	Dr.BV.Ramana Naidu KSN Government Degree College, Ananthapuram Ph:9347573296 Email id: venakataramananaidubotta@gmail.com	Lecturer	Subject Expert
3		Dr. J. Vasundhara Department of Botany Government Degree College Banaganpalle Ph:9293196382 Email id: vasu3k@gmail.com	Lecturer	Subject Expert
4	One Expert Nominated by Vice Chancellor	Dr.P. Chandra Obul Reddy Department of Botany Yogi Vemana University Kadapa Ph:9908592005 Email id: pcoreddy@gmail.com	Professor	Subject Expert University Nominee
5	One representative from Industry/ Corporate allied areas nominated by the Principal	Rama Subba Reddy.C Shakthi Engineering Equipment Hyderabad Ph:07947105250	Industrialist	Member
6	Alumni nominated by the Principal	G. Sonallika	Alumni	Member

G.vinod 25/7/24

PRINCIPAL

CSSR & SRRM Degree & PG College

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13/521, Reddy Colony, Kamalapuram-516 289, Kadapa Dist. A.P.

ISO 9001:2015

Date:08/08/2024

To
The Members of BoS
Department of Botany

Dear Sir/Madam,

Sub: CSSR & SRRM Degree & PG College (A), Kamalapuram, -Conducting **Board of Studies -I for the academic Year 2024-2025** in the department -request-reg.

***

I am very much delighted to invite you to Board of Studies Meeting-I for the Academic Year 2024-2025 in the department we humbly request all the members of Board of Studies to attended the meeting as per the early discussion which is to be held on **10/08/2024** to discuss the following syllabus, blue print and model question paper. We request your acceptance and presence in the meeting.

With best regards,

CHAIRMAN
Chairperson
BOARD OF STUDIES

Department of Botany
CSSR & SRRM Degree & PG College
Autonomous
Kamalapuram, YSR

Copy To

Dr.B.V Ramana Naidu (Subject Expert)
Dr.J Vasundhara (Subject Expert)
Dr P Chandra Obul Reddy (University Nominee)

Board of Studies
Department of Botany
Minutes of Meeting

The Board of Studies meeting in Botany held on 10/08/24 in the Department of Botany, CSSR & SRRM Degree & PG College (A), Kamalapuram to discuss the following agenda.

Agenda:

1. To discuss and approve semester-I syllabus and the corresponding credits for all courses with CBCS framework.
2. To prepare COs, POs & PSOs
3. To approve the procedure relevant to internal, external and Practical examinations.
4. To discuss the pattern of question paper model.
5. To suggest panel of names for appointment of paper setters and examiners.
6. Departmental activities/events
7. Any other matter relating to CBCS system of 1st year UG courses.

Minutes of Meeting:

The Board of Studies members discussed and resolved the following points in the meeting held on -------

1. All the committee members discussed and resolved to follow the syllabus for I semester and their corresponding credits framed and implemented by APSCHE as it has no objectionable topics.
2. The members of the BoS approved the COs, POs and PSOs prepared by the department.
3. The board unanimously agreed and approved the procedure and scheme of internal, external and practical examinations.
4. The members approved the question paper pattern and the model question papers.
5. The board verified and approved the proposed panels of question paper setters and examiners.
6. The board suggested the department to organize developmental activities like seminars/workshops/FDPs for both faculty and students.
7. The board also suggested the department to conduct activities for development of various skills among the students.

Signatures of the members present:

1. S. Mallu
2. Vishnal attended
3. [illegible]
4. P [illegible]
5. Absent
6. Absent

Chairman

G. Vinod
Principal

Course Structure for First Year B.Sc (Botany) Honours

Year	Semester	Course	Paper Code	Title of the Course	No. of Hrs./Week	No. of Credits	IA	EA	TOTAL
I	I	1	BOT 101	Introduction to Classical Biology	5	4	30	70	100
		2	BOT 102	Introduction to Applied Biology	5	4	30	70	100

1. S. Hald
2. Virtual attended
3. ~~Absent~~
4. Please do my
5. Absent
6. Absent

SYLLABUS

I -Semester

Course: 1 **INTRODUCTION TO CLASSICAL BIOLOGY**

Hours/Week: 5 **Credits: 4**

Learning objectives

The student will be able to learn the diversity and classification of living organisms and understand their chemical, cytological, evolutionary and genetic principles.

Learning Outcomes

- Learn the principles of classification and preservation of biodiversity
- Understand the plant anatomical, physiological and reproductive processes.
- Knowledge on animal classification, physiology, embryonic development and their economic importance.
- Outline the cell components, cell processes like cell division, heredity and molecular processes.
- Comprehend the chemical principles in shaping and driving the macro molecules and life processes.

Unit 1: Introduction to systematics, taxonomy and ecology.

1.1. Systematics – Definition and concept, Taxonomy – Definition and hierarchy.

1.2. Nomenclature – ICBN and ICZN, Binomial and trinomial nomenclature.

1.3. Ecology – Concept of ecosystem, Biodiversity and conservation.

1.4. Pollution and climate change.

Unit 2: Essentials of Botany.

2.1 The classification of plant kingdom.

2.2 Plant physiological processes (Photosynthesis, Respiration, Transpiration, phytohormones).

2.3 Structure of flower – Micro and macro sporogenesis, pollination, fertilization and structure of mono and dicot embryos.

2.4 Mushroom cultivation, floriculture and landscaping.

Unit 3: Essentials of Zoology

3.1. The classification of Kingdom Animalia and Chordata.

3.2 Animal Physiology – Basics of Organ Systems & their functions, Hormones and Disorders

3.3 Developmental Biology – Basic process of development (Gametogenesis, Fertilization, Cleavage and Organogenesis)

3.4 Economic Zoology – Sericulture, Apiculture, Aquaculture

Unit 4: Cell biology, Genetics and Evolution

4.1. Cell theory, Ultrastructure of prokaryotic and eukaryotic cell, cell cycle.

4.2. Chromosomes and heredity – Structure of chromosomes, concept of gene.

4.3. Central Dogma of Molecular Biology.

4.4. Origin of life

1. S. Hall
2. Virtual attended
3. [signature]
4. Present [signature]
5. Absent
6. [illegible]

Unit 5: Essentials of chemistry

5.1 Definition and scope of chemistry, applications of chemistry in daily life.

5.2 Branches of chemistry

5.3 Chemical bonds – ionic, covalent, noncovalent – Vander Waals, hydrophobic, hydrogen bonds.

5.4 Green chemistry

References:

1. Sharma O.P., 1993. Plant taxonomy. 2nd Edition. McGraw Hill publishers.
2. Pandey B.P., 2001. The textbook of botany Angiosperms. 4th edition. S. Chand publishers, New Delhi, India.
3. Jordan E.L., Verma P.S., 2018. Chordate Zoology. S. Chand publishers, New Delhi, India.
4. Rastogi, S.C., 2019. Essentials of animal physiology. 4th Edition. New Age International Publishers.
5. Verma P.S., Agarwal V.K., 2006. Cell biology, genetics, Molecular Biology, Evolution and Ecology. S. Chand publishers, New Delhi, India.
6. Satyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
7. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
8. Karen Timberlake, William Timberlake, 2019. Basic chemistry. 5th Edition. Pearson publishers.
9. Subrata Sen Gupta, 2014. Organic chemistry. 1st Edition. Oxford publishers.

ACTIVITIES:

1. Make a display chart of life cycle of nonflowering plants.
2. Make a display chart of life cycle of flowering plants.
3. Study of stomata
4. Activity to prove that chlorophyll is essential for photosynthesis
5. Study of pollen grains.
6. Observation of pollen germination.
7. Ikebana.
8. Differentiate between edible and poisonous mushrooms.
9. Visit a nearby mushroom cultivation unit and know the economics of mushroom cultivation.
10. Draw the Ultrastructure of Prokaryotic and Eukaryotic Cell
11. Visit to Zoology Lab and observe different types of preservation of specimens
12. Hands-on experience of various equipment – Microscopes, Centrifuge, pH Meter, Electronic Weighing Balance, Laminar Air Flow
13. Visit to Zoo / Sericulture / Apiculture / Aquaculture unit
14. List out different hormonal, genetic and physiological disorders from the society

1. S. Hallit
2. Virtual attended
3. [illegible]
4. [illegible]
5. Absent –
6. Absent –

I -Semester

Course: 2 **INTRODUCTION TO APPLIED BIOLOGY**

Hours/Week: 5 **Credits: 4**

Learning objectives

The student will be able to learn the foundations and principles of microbiology, immunology, biochemistry, biotechnology, analytical tools, quantitative methods, and bio informatics.

Learning Outcomes

1. Learn the history, ultra structure, diversity and importance of microorganisms.
2. Understand the structure and functions of macro molecules.
3. Knowledge on biotechnology principles and its applications in food and medicine.
4. Outline the techniques, tools and their uses in diagnosis and therapy.
5. Demonstrate the bio informatics and statistical tools in comprehending the complex biological data.

Unit 1: Essentials of Microbiology and Immunology

1.1. History and Major Milestones of Microbiology; Contributions of Edward Jenner, Louis Pasteur, Robert Koch and Joseph Lister.
1.2. Groups of Microorganisms – Structure and characteristics of Bacteria, Fungi, Archaea and Virus.
1.3. Applications of microorganisms in – Food, Agriculture, Environment, and Industry.
1.4. Immune system – Immunity, types of immunity, cells and organs of immune system.

Unit 2: Essentials of Biochemistry

2.1. Biomolecules I – Carbohydrates, Lipids.
2.2. Biomolecules II – Amino acids & Proteins.
2.3. Biomolecules III – Nucleic acids -DNA and RNA.
2.4. Basics of Metabolism – Anabolism and catabolism.

Unit 3: Essentials of Biotechnology

3.1. History, scope, and significance of biotechnology. Applications of biotechnology in Plant, Animal, Industrial and Pharmaceutical sciences.
3.2. Environmental Biotechnology – Bioremediation and Biofuels, Biofertilizers and Biopesticides.
3.3. Genetic engineering – Gene manipulation using restriction enzymes and cloning
3.4. vectors; Physical, chemical, and biological methods of gene transfer.
3.5. Transgenic plants – Stress tolerant plants (biotic stress – BT cotton, abiotic stress – salt tolerance). Transgenic animals – Animal and disease models.

Unit 4: Analytical Tools and techniques in biology – Applications

4.1. Applications in forensics – PCR and DNA fingerprinting
4.2. Immunological techniques – Immunoblotting and ELISA.
4.3. Monoclonal antibodies – Applications in diagnosis and therapy.
4.4. Eugenics and Gene therapy

Unit 5: Biostatistics and Bioinformatics

5.1. Data collection and sampling. Measures of central tendency – Mean, Median, Mode.
5.2. Measures of dispersion – range, standard deviation and variance. Probability and tests of significance.
5.3. Introduction, Genomics, Proteomics, types of Biological data, biological databases- NCBI, EBI, Gen Bank; Protein 3D structures, Sequence alignment
5.4. Accessing Nucleic Acid and Protein databases, NCBI Genome Workbench

1. S. Hall
2. Virtual attended
3. [illegible]
4. P [illegible]
5. Absent
6. Absent

REFERENCES

1. Gerard J., Tortora, Berdell R. Funke, Christine L. Case., 2016. Microbiology: An Introduction. 11th Edition. Pearson publications, London, England.
2. Micale, J. Pelczar Jr., E.C.S. Chan., Noel R. Kraig., 2002. Pelczar Microbiology. 5th Edition. McGraw Education, New York, USA.
3. Sathyanarayana U., Chakrapani, U., 2013. Biochemistry. 4th Edition. Elsevier publishers.
4. Jain J.L., Sunjay Jain, Nitin Jain, 2000. Fundamentals of Biochemistry. S. Chand publishers, New Delhi, India.
5. R.C. Dubey, 2014. Advanced Biotechnology. S. Chand Publishers, New Delhi, India.
6. Colin Ratledge, Bjorn, Kristiansen, 2008. Basic Biotechnology. 3rd Edition. Cambridge Publishers.
7. U. Sathyanarayana, 2005. Biotechnology. 1st Edition. Books and Allied Publishers pvt. ltd., Kolkata.
8. Upadhyay, Upadhyay and Nath. 2016. Biophysical Chemistry, Principles and Techniques. Himalaya Publishing House.
9. Arthur M. Lesk. Introduction to Bio informatics. 5th Edition. Oxford publishers.
10. AP Kulkarni, 2020. Basics of Bio statistics. 2nd Edition. CBS publishers.

ACTIVITIES

1. Identification of given organism as harmful or beneficial.
2. Observation of microorganisms from house dust under microscope.
3. Finding microorganism from pond water.
4. Visit to a microbiology industry or biotech company.
5. Visit to a waste water treatment plant.
6. Retrieving a DNA or protein sequence of a gene'
7. Performing a BLAST analysis for DNA and protein.
8. Problems on bio statistics.
9. Field trip and awareness programs on environmental pollution by different types of wastes and hazardous materials.
10. Demonstration on basic biotechnology lab equipment.
11. Preparation of 3D models of genetic engineering techniques.
12. Preparation of 3D models of transgenic plants and animals.

[**NOTE**: In the colleges where there is availability of faculty for microbiology and biotechnology, those chapters need to be handled by microbiology and biotechnology faculty. In other colleges, the above topics shall be dealt by Botany and Zoology faculty]

1. S. Halit
2. Virtual attended
3. [signature]
4. [signature]
5. Absent
6. Absent

INTERNAL & EXTERNAL ASSESMENT (30 & 70 MARKS)

Question Paper Taxonomy										
Level of Bloom's Taxonomy	Types of Questions and Marks Assigned									
	MCQs		FIB		VAQ		MC		T/F	
	CIA	SEE	CIA	SEE	CIA	SEE	CIA	SEE	CIA	SEE
Remembering	3 m	10 m								
Understanding	3 m	10 m								
Applying	4 m	10 m								
analyzing					5 m	10 m				
Evaluating							5 m	10 m	5 m	10 m
Creating			5 m	10 m						

MCQs: Multiple Choice Questions 1 mark per question.
FIB: Fill in the blanks. 1 mark for question.
VSQ: Very short answer questions. 1 mark per question.
MC: Matching. 5 marks for matching of 5 items.
T/F: True or False. 1 mark per question.

Note:

m: marks; CIA: Continuous Internal Assessment; SEE: Semester End Examinations.

1. S. Hall
2. Virtual attended
3. [illegible]
4. [illegible]
5. Absent
6. Absent

CSSR & SRRM DEGREE & PG COLLEGE
(AUTONOMOUS)
SEMESTER-I
END SEMESTER EXAMINATION

Name of the Student:
Group: B. Sc (Botany) Hons.
Paper Code:
Hall Ticket No: _____

Academic Year: 2024-2025
Course: Introduction to Classical Biology
Date:
Signature of the Student:

Duration: 03:00 Hr.

Max. Marks: 70

Signature of the Invigilator:

I.CHOOSE THE CORRECT ANSWER **(30 X 1= 30 M)**

1. System of classification based on a number of characters is referred as ( )

a) Phylogenetic system b) Artificial system
c) Natural system d) All of the above

2. The National Botanical Research Institute is located at ( )

a) Dehradun b) Delhi c) Gangtok d) Lucknow

3. Binomials with identical genus name and specific epithet are called ( )

a)Homonym b)Tautonym c)Basionym d)Synonym

4. Which of the following requires maximum energy? ( )

a)Secondary consumer b).Decomposer c) Primary consumer d).Primary producer

5. Which of the following gas is more in percentage in the air? ( )

a) Oxygen gas b) Nitrogen gas c) Water vapour d) Carbon dioxide gas

6. Vascular bundles are not found in ( )

a. Gymnosperms b. Pteridophytes c. Angiosperms d. Bryophytes

7. Photosynthesis occurs in ( )

a) Chloroplast b) Golgi body c) Endoplasmic reticulum d) Nucleus

8. An important product of the Krebs cycle is ( )

a) Water b) Methane c) ATP d) None of the above

9. Which is a genetically modified crop? ( )

a) Bt-cotton b) Bt-brinjal c) Golden rice d) All

1. S. Hall
2. Virtual attended
3. [illegible]
4. P. [illegible]
5. Absent
6. Absent

10. Flowers with both androecium and gynoecium are called ( )

a) Bisexual flowers b) Anther c) Stamens d) Unisexual flower

11. Which class has the largest number of animals? ( )

a) Fishes b) Reptiles c) Insects d) Mammals

12 Salamander belongs to the class ( )

a) Pisces b) Aves c) Reptiles d) Amphibian

13. Phylum Porifera is classified based on ( )

a) Branching b) Symmetry c) Spicules d) Reproduction

14. The canal system in sponges develops due to ( )

a) Porous walls b) Gastrovascular system c) Reproduction d) Folding of inner walls

15. Select the correct pair ( )

a) Arthropoda- silver fish b) Pisces- jelly fish c) Echinodermata- cuttle fish d) Mollusca- star fish

16. Which group does not contain polyp ( )

a) Anthozoa b) Hydrozoa c) Scyphozoa d) Calcarea

17. Cnidaria is characterized by ( )

a) Tissue level of organization b) Nematoblasts c) Coelenteron d) All

18. Notochord occurs throughout life and all through the length of the body in ( )

a) Cephalochordata b) Hemichordata c) Urochordata d) Vertebrata

19. Periplaneta belongs to which phylum? ( )

a) Mollusca b) Arthropoda c) Annelida d) Echinodermata

20. The term cell was given by ( )

a)Robert Hooke b) Tatum C) Schwann d) De Bary

21. The prokaryotic cells are characterized by: ( )

a) A distinct nuclear membrane b) Absence of chromatin material
c) Distinct chromosome d) Absence of nuclear membrane

22. Cell wall is found around the ( )

a) Prokaryotic cells b) Algal cells c) Plant cells d) All the above

1. S. Hadlı
2. Virtual attended
3. [illegible]
4. P [illegible]
5. Absent
6. Absent

23. Unicellular microscopic organisms were first studied by ( )
a) Robert Hooke b) Priestley c) Pasteur d) Leeuwenhoek

24. A ribosome consists of: ( )

a) Four subunits b) Six subunits c)Two subunits d) Three subunits

25. Which of the following is the poorest conductor of heat in comparison to other options? ( )

a) Silver b) Copper c) Lead d) Mercury

26. What is the correct chemical formula of Graphite? ( )

a) C b) C2 c) C4 d) C6

27. Which of the following is not a metalloid? ( )

a) Boron b) Silicon c) Germanium d) Titanium

28. Which of these states of matter has the maximum density? ( )

a) Solids b) Liquids c) Gases d) None of the above

29. Which of the following compound of sodium is generally prepared by Solvay process? ( )

a) Sodium Carbonate b) Sodium Hydroxide
c) Sodium Chloride d) All of the above

30. Which of these is NOT an allotropic form of carbon? ( )

a) Diamond b) Graphite c) Fullerene d) None of the above

II.FILL IN THE BLANKS (10 X 1= 10M)

31. Binomial Nomenclature Is Given By_____ Carolus Linnaeus
32. Five Kingdom Classification Was Proposed By_____ R.H. Wittekar
33. Air pollution occurs when a large amount of harmful _____Gases
34. _____ are male part of a flower? Stemens
35. Glycolysis is also known as _____EMP Pathway
36. _____ of the following is a functional unit of a body? Cell
37. _____ is known as the powerhouse of a cell? Mitochondria
38. _____ cell doesn't contain a cell wall? Animal
39. _____ cells Sarcoplasmic reticulum is found? muscle cell
40. The suicide bag of a cell is_____Golgi Complex

III.VERY SHORT ANSWERS (10X 1= 10 M)

41. Name the highest categories of classification?

A.

1. S. Hall
2. Virtual attended
3. ~~Absent~~
4. Present Sir/Mam
5. Absent
6. Absent

42. ICBN Stands For

A.

43. What is male and female sex organs in Bryophytes are called as?

A.

44. What are the two maincatogerios of animals in the kingdom

A.

45. Give one Example vertebrates and Non vertebrates

A.

46. What are prokaryotes?

A

47. What is the difference between rough and smooth endoplasmic reticulum?

A

48. What is the plasma membrane made of?

A.

49. Write the equation of thePhotosynthesis

A.

50. What is cell biology?

A.

IV.MATCH THE FOLLOWINGS **(10 X 1=10 M)**

51. Mango tree	( )	(i) Insectivorous plant
52. Mushroom	( )	(ii) Heterotroph
53. Pitcher plant	( )	(iii) Autotroph
54. Cuscuta	( )	(iv) Saprophyte
55. Elephant	( )	(v) Parasitic
56. Sepals	( )	(vi) The male reproductive par
57. Stamen	( )	(vii) Protect the flower bud
58. Pistil	( )	(viii) Contains ovules
59. Ovary	( )	(ix) Supports the anther
60. Filament	( )	(x) he female reproductive part

1. S. H—d/f
2. Virtual attended
3. [redacted]
4. P. [redacted]
5. Abs—
6. Abs—

V.STATE WHETHER TRUE/FALSE **(5 X 1= 5 M)**

61. Green plants generally contain chlorophyll. ( )
62. Angiosperms are plants that produce flowers. ( )
63. Stomata are mostly found on the bark of trees. ( )
64. A plant that lives for several years is called an annual plant. ( )
65. Seaweeds can photosynthesis like plants. ( )
66. Gregor Mendel is known as the father of genetics. ( )
67. Genetic information is transferred from Protein to RNA to DNA. ( )
68. Gregor Mendel is known as the father of genetics. ( )
69. Humans have 25 pairs of chromosomes. ( )
70. All living organisms use DNA as their genetic material. ( )

1. [illegible]
2. Virtual attendant
3. [illegible]
4. [illegible]
5. Absent
6. Absent

CSSR & SRRM DEGREE & PG COLLEGE
(AUTONOMOUS)
SEMESTER-I
END SEMESTER EXAMINATION

Name of the Student:
Group: B. Sc (Botany) Hons.
Paper Code:
Hall Ticket No: _____
Duration: 03:00 Hr.

Academic Year: 2024-2025
Course: Introduction to Applied Biology
Date:
Signature of the Student:
Max. Marks: 70
Signature of the Invigilator:

I. CHOOSE THE CORRECT ANSWER **[30 X 1=30 M]**

1. **What is Microbiology?** ( )
   a) Study of molecules that are visible to human eyes
   b) Study of animals and their family
   c) Study of organisms that are not visible to naked eyes
   d) Study of microscope

2. **Who is known as the father of Microbiology?** ( )
   a) Edwin John Butler
   b) Ferdinand Cohn
   c) Robert Koch
   d) Antony van Leeuwenhoek

3. **Which microorganism(s) among the following perform photosynthesis by utilizing light?** ( )
   a) Cyanobacteria, Fungi and Viruses
   b) Viruses
   c) Cyanobacteria
   d) Fungi

4. **Which part of the compound microscope helps in gathering and focusing light rays on the specimen to be viewed?** ( )
   a) Condenser lens
   b) Magnifying lens
   c) Objective lens
   d) Eyepiece lens

5. **Which of the following are produced by microorganisms?** ( )
   a) Alcoholic beverages
   b) Fermented dairy products
   c) Breads
   d) All of the mentioned

6. **The Atoms of solid Ar are held together by** ( )
   a) Van der Waals forces
   b) Hydrogen bonds
   c) Ionic bonds
   d) Hydrophobic forces

7. **Which of the following has the weakest bond?** ( )
   a) Ice
   b) Diamond
   c) KCl
   d) Neon

8. **Which of the following is the weakest bond?** ( )
   a) Ionic bonds
   b) Metallic bonds
   c) Covalent bonds
   d) Van der Waals forces

9. **Which of the following has both covalent and ionic bonds?** ( )
   a) NaOH
   b) KCl
   c) CH_4
   d) SO_2

10. **In a crystal, covalent molecules are held together by** ( )
   a) Dipole-dipole attraction
   b) Hydrogen bonds
   c) Van der Waals attraction
   d) Electrostatic attraction

11. **Which of the following is considered the first biotechnological process used by humans?** ( )
   a) Genetic engineering
   b) Fermentation
   c) Cloning
   d) Tissue culture

12. **Who is known as the father of modern biotechnology?** ( )
   a) Louis Pasteur
   b) Robert Koch
   c) Károly Ereky
   d) Alexander Fleming

13. **Which of the following is an application of biotechnology in the pharmaceutical industry** ( )
   a) Production of biofuels
   b) Development of monoclonal antibodies
   c) Creation of transgenic plants
   d) Bioremediation

14. **What is the primary goal of using biotechnology in agriculture?** ( )
   a) To increase crop yield and resistance to pests
   b) To develop new industrial enzymes
   c) To produce therapeutic proteins
   d) To create new vaccines

15. **Which of the following is an example of bioremediation?** ( )
   a) Using bacteria to clean oil spills
   b) Producing ethanol from corn
   c) Developing genetically modified crops
   d) Creating monoclonal antibodies

15. **Which of the following is an example of bioremediation?** ( )
   a) Using bacteria to clean oil spills
   b) Producing ethanol from corn
   c) Developing genetically modified crops
   d) Creating monoclonal antibodies

16. **Biofertilizers are primarily used to:** ( )
   a. Increase soil fertility
   b. Control pests
   c. Produce biofuels
   d. Clean up environmental pollutants

17. **What is the primary purpose of PCR in forensic science?** ( )
   a. To amplify DNA sequences
   b. To sequence DNA
   c. To cut DNA into fragments
   d. To visualize DNA

18. **Which of the following is a key application of DNA fingerprinting?** ( )
   a. Diagnosing genetic diseases
   b. Identifying individuals in criminal investigations
   c. Cloning organisms
   d. Producing genetically modified crops

19. **What is the main advantage of ELISA over other immunoassays?** ( )
   a. It is less expensive
   b. It is highly sensitive and specific
   c. It requires less sample preparation
   d. It can detect nucleic acids

20. **What is the purpose of the secondary antibody?** ( )
   a. To bind to the target protein directly
   b. To provide a visual signal by binding to the primary antibody
   c. To separate proteins by size
   d. To amplify the DNA sequence

21. **Which of the following is a common use of monoclonal antibodies in medicine?** ( )
   a. Treating bacterial infections
   b. Diagnosing diseases like cancer
   c. Enhancing athletic performance
   d. Cloning animals

22. **How are monoclonal antibodies typically produced?** ( )
   a. By cloning genes in bacteria
   b. By fusing B cells with myeloma cells
   c. By extracting them from human blood
   d. By synthesizing them chemically

23. **What is the main ethical concern associated with eugenics?** ( )
   a. It can lead to genetic diversity
   b. It can be used to enhance athletic performance
   c. It can result in discrimination and inequality
   d. It can cure genetic diseases

24. **Which measure of central tendency is most affected by extreme values?** ( )
   a. Mean
   b. Median
   c. Mode
   d. Range

25. **If a dataset has an odd number of observations, which measure of central tendency will always be one of the data points?** ( )
   a. Mean
   b. Median
   c. Mode
   d. Standard Deviation

26. **Which measure of dispersion is calculated as the square root of the variance?** ( )
   a. Range
   b. Standard Deviation
   c. Mean Deviation
   d. Interquartile Range

27. **In hypothesis testing, what is the probability of rejecting the null hypothesis when it is actually true?** ( )
   a. Type I Error
   b. Type II Error
   c. Power
   d. Confidence Level

28. **Which database is known for storing nucleotide sequences?** ( )
   a. NCBI
   b. EBI
   c. GenBank
   d. PDB

29. **Proteomics is the study of:** ( )
   a. Genes
   b. Proteins
   c. Metabolites
   d. RNA

30. **Which tool can be used to visualize and analyze genomic data?** ( )
   a. BLAST
   b. NCBI Genome Workbench
   c. FASTA
   d. Crustal.W

II.FILL IN THE BLANKS [10X 1= 10 M]

31) The combination of two or more cells is called _____
32) Metabolism is a_____
33) Bacteria have 80S ribosome's each composed of a _____ large subunit and a _____ small subunit.
34) French chemist Louis Pasteur developed _____.
35) _____Bacteria in Milk that changes Milk to Curd.

36) Bioremediation is the process of using _____ (microorganisms) to remove pollutants from the environment.

37) Biofuels are renewable energy sources produced from _____ (biomass).

38)_____(Eugenics) is a controversial field that involves improving the genetic quality of the human population through selective breeding.

39)_____(Gene therapy) involves the introduction, removal, or alteration of genetic material within a person's cells to treat or prevent disease.

40)_____ is the study of genomes, the complete set of genetic material within an organism.

III.VERY SHORT ANSWERS [10 X 1= 10 M]

41) What are the cell wall structural components of fungi?
A)
42) What does a viral DNA becomes after being associated with the bacterial chromosome?
A)
43) Which of the following inhibits DNA replication?
A)
44) How many types of lipids?
A)
45) What is glucose?
A)
46) What is Bioremediation?
A)
47) Explain Gene Transfer?
A)
48) What is DNA Fingerprinting?
A)
49) What is Gene Therapy?
A)

50)Explain about Mean, Mode and Median?
A)

IV.MATCH THE FOLLOWINGS [10 X 1= 10 M]

51).Proteins	( )	a) Formation of DNA segments
52). Protein 3D structure	( )	b) Triglycerides
53).Lipids	( )	c) Peptides
54) Thymus	( )	d) B-Cells
55) Bone Marrow	( )	e) T-Cells
56) Transgenic Plant	( )	f) Enzyme Linked ImmunosorbentAssay
57) Vector	( )	g) P(A) = f/N
58) PCR	( )	h) Bt Cotton
59) ELISA	( )	i) Clover Leaf
60) Probability	( )	j) DNA molecule

V. STATE WHETHER TRUE/FALSE [10 X 1= 10 M]

61) DNA is a polynucleotide ( )
62) RNA is a double strand ( )
63) DNA is a double strand ( )
64) Exposure to air is necessary for microbial growth ( )
65) Five types of antibodies are present in our immune system. ( )
66) Biotechnology has been used for over10,000 years, through agriculture ( )
67) The term "biotechnology" was first widely applied to molecular and cellular technologies in the 1960s ( )
68) Gene therapy aims to correct or replace faulty genes to treat genetic disorders. ( )
69) Mode is the middle number in an ordered dataset. ( )
70) Protein 3D structure is in Clover leaf shape ( )

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