



4th Semester End Term Examination: 2021-22.

Subject : Chemistry II
Course : B.Sc. Biotechnology
Full Marks : 60
Roll No:
Time : 3 Hours.

Instructions to the Candidates:

- Read the question paper very carefully.
- Start writing from 2nd page onwards; **Don't Write On The 1st Page Backside.**
- Question Paper is divided into Three Parts -A, B & C.
- Part-A is containing 10 multiple choice & 5 Very Short questions.
- Part- B containing SIX questions out of which FOUR questions are to be answered.
- Part C containing FOUR questions out of which TWO questions are to be answered.
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PART - A

Multiple Choice Questions

[10x1=10]

1. The oxidation number of Cr in Na $[\text{Cr}(\text{NH}_3)_2\text{F}_4]$ complex is _____.
a) II
b) III
c) IV
d) V
2. In $\text{Ni}(\text{CO})_4$ the nickel atoms is _____ hybridized.
a) Sp^2
b) Sp^3
c) Dsp^2
d) Sp^3d
3. In the formation of N_2^+ from N_2 molecule the electron is removed from _____.
a) π -orbital
b) π^* -orbital
c) σ -orbital
d) σ^* - orbital
4. Which type of isomerism is shown by the complex compounds?
 $[\text{Co}(\text{NH}_3)_5\text{Br}]\text{SO}_4$ and $[\text{Co}(\text{NH}_3)_5\text{SO}_4]\text{Br}$
a) Ionic
b) Linkage
c) Co-ordination
d) Optical
5. The shape of ammonia molecule is _____.
a) Trigonal pyramidal
b) Linear
c) Trigonalbipyramidal
d) Tetrahedral

6. Which compound will not have hydrogen bond?

- a) CH₃COOH
- b) CH₄
- c) H₂O
- d) HF

7. Which molecule shows bond order of two?

- a) H₂
- b) O₂
- c) N₂
- d) He₂

8. Paramagnetic behavior of the molecule can be explained by the following theory _____.

- a) Valence bond theory
- b) Molecular orbital theory
- c) VSEPR Theory
- d) None of the above

9. According to VBT when covalent bonds are formed between the atoms, then their valence shell contain _____.

- a) Paired electrons
- b) Unpaired electrons of same spin
- c) Unpaired electrons of opposite spin
- d) Unpaired electrons as well as paired electrons

10. Which of the molecular orbital has least amount of energy?

- a) σ 2pz
- b) π^* 2py
- c) σ^* 2pz
- d) σ^* 2s

Very short question

1. Write any two limitation of VBT theory.
2. How stability is depend on bond order.
3. What do you understand by dipole-dipole interactions?
4. Write the electronic configuration of Cu and Fe.
5. Why H₂O is liquid and H₂S is gas under normal condition?

PART - B

Answer any FOUR out of SIX

- 1) Explain why the geometry of NH₃ and CH₄ are different from one another?
- 2) Explain the catalytic properties of 3d transition series.
- 3) Explain the geometry of PCl₅ and BeF₂.
- 4) Describe the important features of Crystal field theory.
- 5) Draw the M.O. energy level diagram for O₂⁺, and O₂ molecule. Which is more stable and why?

6) Write the formulae of the following compounds:

- a. Triaminetriaquochromium(III) chloride
- b. Potassium trisoxalatoferrate(III)
- c. Tetracarbonylnickel(0)
- d. Hexaamminecobalt(III) chloride
- e. Pentaamminechlorocobalt(III) chloride

PART - C

Answer any TWO out of FOUR

[2x10=20]

1. Write explanatory note on Crystal field stabilization energy and its significance.

Calculate CFSE for d₃, d₄, d₅ and d₆ metal ions in octahedral and tetrahedral fields.

2. Explain the geometry and magnetic behavior of the following compounds on the basis of VBT : [Ni(CO)₄], [Co F₆]³⁻, [Cu(CI)₄]²⁻.

3. Define hybridization. Explain sp and sp³d hybridization with example.

4. What do you understand by hydrogen bond? Into how many types does it fall?

Explain its nature and its effect upon the properties of a molecule.

[5x2=10]

[4x5=20]



ARKAJAIN
University
Jharkhand

4th Semester End Term Examination: 2021-22.

Subject : Microbial Metabolism

Roll No:

Course : B.Sc.Biotechnology

Full Marks : 60

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PART - A

Multiple Choice Questions

[10x1=10]

- 1) Which of the following is an organism that obtains its energy from the transfer of electrons originating from chemical compounds and its carbon from an inorganic source?
a) Chemoautotroph
b) Chemo heterotroph
c) Photo heterotroph
d) Photoautotroph
- 2) Which of the following molecules is reduced?
a) NAD⁺
b) FAD
c) O₂
d) NADPH
- 3) Enzymes work by which of the following?
a) Increasing the activation energy
b) Reducing the activation energy
c) Making exergonic reactions endergonic
d) Making endergonic reactions exergonic.
- 4) To which of the following does a competitive inhibitor most structurally resemble?
a) The active site
b) The allosteric site
c) The substrate
d) A coenzyme

- 5) Which of the following are organic molecules that help enzymes work correctly?
 a) Cofactors
 b) Coenzymes
 c) Holoenzymes
 d) Apoenzymes
- 6) During which of the following is ATP not made by substrate-level Phosphorylation?
 a) Embden-Meyerhof pathway
 b) Transition reaction
 c) Krebs cycle
 d) Entner-Doudoroff pathway
- 7) Which of the following products is made during Embden-Meyerhof glycolysis?
 a) NAD⁺
 b) Pyruvate
 c) CO₂
 d) Two-carbon acetyl
- 8) During the catabolism of glucose, which of the following is produced only in the Krebs cycle?
 a) ATP
 b) NADH
 c) NADPH
 d) FADH₂
- 9) Which of the following is not a name for the cycle resulting in the conversion of a two-carbon acetyl to one ATP, two CO₂, one FADH₂, and three NADH molecules?
 a) Krebs cycle
 b) Tricarboxylic acid cycle
 c) Calvin cycle
 d) Citric acid cycle
- 10) Which is the location of electron transports systems in prokaryotes?
 a) The outer mitochondrial membrane
 b) The cytoplasm
 c) The inner mitochondrial membrane
 d) The cytoplasmic membrane

Very short question

[5x2=10]

- a) Allosteric Enzyme
 b) Substrate level phosphorylation
 c) Generation time
 d) Nitrogen fixation
 e) Assimilatory nitrate reduction

PART - B

Answer any FOUR out of SIX

[4x5=20]

1. Write about ABC and group translocation in bacteria?
2. Define homolactic and heterolactic fermentation?
3. Write about the significance of pentose phosphate pathway.
4. Differentiate between feedback inhibition and feedback repression?
5. Classify microbes on the basis of nutrition?
6. Write notes on protein catabolism

PART - C

Answer any TWO out of FOUR

[2x10=20]

1. Explain the growth curve in bacteria?
2. Discuss electron transport chain in facultative anaerobes in steps.
3. Differentiate between primary and secondary metabolites
4. Discuss continuous mode of fermentation with graph. What are its advantages and disadvantages?



4th Semester End Term Examination: 2021-22.

Subject : **Molecular Biology** **Roll No:**

Course : **B.Sc.Biotechnology**

Full Marks : **60** **Time** : **3 Hours.**

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Multiple Choice Questions

PART - A

[10x1=10]

1. Which of the following combination is a correct observation for the transformation experiment performed by Griffith?
a) Type IIIS (living) + mouse = dead
b) Type IIIS (heat killed) + mouse = dead
c) Type IIR (living) + mouse = dead
d) Type IIIS (heat killed) + type IIR (living) + mouse = living
2. DNA methylation occur at N-6 position of
a) Adenine
b) Guanine
c) Thymine
d) Cytosine
3. Transcription of mRNA is done by
a) RNA polymerase I
b) RNA polymerase II
c) RNA polymerase III
d) None of these
4. Lagging-strand DNA replication is done by
a) DNA polymerase β
b) DNA polymerase α
c) DNA polymerase γ
d) DNA polymerase δ

5. Which of the following transcription termination technique has RNA dependent ATPase activity?
- Intercalating agents
 - Rho dependent
 - Rho independent
 - Rifampicin
6. The enzyme DNA glycosylase is used in
- Base excision repair
 - Photo reactivation repair
 - Nucleotide excision repair
 - Mismatch repair
7. TATA box is present at
- 10 position of promoter
 - 35 position of promoter
 - +10 position of promoter
 - At any upstream site
8. If the Mut H cuts the DNA at the 5' side of the mismatch then which nuclease is activated?
- Exonuclease VII
 - Exonuclease VIII
 - Exonuclease I
 - Exonuclease IX
9. 5-bromouracil is the analog of which base?
- Thymine
 - Guanine
 - Cytosine
 - Uracil
10. The nitrogenous base is covalently linked to the _____ carbon of the pentose sugar.
- C1
 - C2
 - C3
 - C4

Very short question

- Genetic code
- Promoter
- Telomerase
- Operon
- Tran

[5x2=10]

PART - B

Answer any FOUR out of SIX

- Write short notes on
 - RNA Polymerase II promoter
 - Photoreactivation repair system
- Write difference between A, B and Z form DNA.
- Describe any one DNA repair mechanism.
- Describe Rho dependent prokaryotic transcription termination.
- Write the characteristics of Genetic code.
- Describe any one post transcriptional modification.

[4x5=20]

PART - C

Answer any TWO out of FOUR

[2x10=20]

- Describe different enzymes involved in the DNA replication in prokaryote.
- Describe post translational modification in eukaryote.
- Describe different mechanisms of DNA repair.
- Describe transcription in eukaryote.



ARKAJAIN
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4th Semester End Term Examination: 2021-22.

Subject : Industrial Fermentation

Roll No:

Course : B.Sc.Biotechnology

Full Marks : 60

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PART - A

Multiple Choice Questions

[10x1=10]

- 1) Which one of the following is called as 'brewer's yeast'?
a) Saccharomyces budwigi
b) Saccharomyces cerevisiae
c) Saccharomyces boulardii
d) Saccharomyces pastorianus
- 2) Which microbial polysaccharide is used for the manufacture of special fibres and fabrics?
a) Xanthan
b) Pollulan
c) Dextran
d) Alginate
- 3) Which of the following is absent in fermentation media?
a) Carbon
b) Nitrogen
c) Agar
d) Water
- 4) Which of the following is not a carbon source?
a) Blackstrap molasses
b) Corn molasses
c) Beet molasses
d) yeast extract
- 5) The type of fermentation observed in yeasts is
a) Acrylic fermentation
b) Lactic acid fermentation
c) Pyruvic fermentation
d) Alcoholic fermentation

- 6) Which of the following process of converting sugar into alcohol
 a) Oxidation
 b) Pasteurisation
 c) Bleaching
 d) Fermentation
- 7) Which of the following is not a type of sterilization?
 a) Batch
 b) Continuous
 c) Filter
 d) Submerged
- 8) What do you mean by sterilization?
 a) Purification of products
 b) Recovery of products
 c) Elimination of contamination
 d) Formulation of media
- 9) What is the basic function of the fermenter?
 a) To sterilize the medium
 b) To recover the product
 c) To purify the product
 d) To provide optimum growth conditions to organisms and obtain the desired product
- 10) While constructing the fermenter, which of the following is not required?
 a) High-speed Agitation and Aeration system
 b) Temperature control system
 c) Sample facilities
 d) pH control system

Very short question

- a) Primary metabolite
 b) Secondary metabolite
 c) Enzyme in industrial processing
 d) Upstream processing
 e) Downstream processing

[5x2=10]

PART - B

Answer any FOUR out of SIX

1. What do you mean by microbial polysaccharides?
2. State the microorganisms used for lactic acid fermentation?
3. Explain the major microorganisms used in industrial microbiology?
4. State the application of xanthan microbial polysaccharides?
5. What are the stages in downstream processing?
6. Write the advantages in using bacteria and fungi in the fermentation process?

[4x5=20]

PART - C

Answer any TWO out of FOUR

1. Explain the microorganisms and Fermentation medium process used for propionic acid?
2. Explain the industrial metabolites of microorganisms?
3. Brief the production of lactic acid.
4. How is ethanol produced commercially?

[2x10=20]



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Subject : Immunology **Roll No:**
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PART - A

Multiple Choice Questions

[10x1=10]

1. The antigenic binding site on an antibody is called
 - a) Epitope
 - b) Paratope
 - c) Endotope
 - d) Antitope
2. Which of the following is not the characteristic of a good antigen?
 - a) Large in size
 - b) Foreignness
 - c) Highly complex
 - d) Reproduce only by binary fission
3. Which of the following substances will not stimulate an immune response unless they are bound to a larger molecule?
 - a) Antigen
 - b) Virus
 - c) Hapten
 - d) Miligen
4. Which one of the following is a primary lymphoid organ?
 - a) Lymph nodes
 - b) Spleen
 - c) Tonsil
 - d) Thymus
5. Clonal deletion of an immature B cell is typically caused by
 - a) A failure of the B cell to recognize antigen
 - b) Somatic hypermutation
 - c) Recognition of a cell surface self-antigen
 - d) Receptor editing

6. Congenital birth defect in humans in which the thymus fails to develop is called
- | | |
|-----------------------------|------------------------|
| a) DiGeorge's syndrome | b) Hashimoto's disease |
| c) Erythroblastosis fetalis | d) None of above |
7. The antibodies which contain J- chain are
- | | |
|--------------|--------------|
| a) IgE & IgM | b) IgA & IgM |
| c) IgG & IgE | d) IgM & IgD |
8. HIV associated immune deficiency is a result of
- | | |
|--|---|
| a) The destruction of the CD8 memory cell pool of the brain during primary infection | b) Autoantibodies directed to medullary stromal cells |
| c) Hypogammaglobulinemia | d) Early destruction of the CCR5+CD4+ T cells |
9. To prevent the pathogens the first line of defense mechanism is called
- | | |
|----------------------|--------------------|
| a) Adaptive immunity | b) Innate immunity |
| c) Resistance | d) None of these |
10. Name the class of MHC which is recognized by CD4 TH cell.
- | | |
|---------------------------------|------------|
| a) MHC cannot recognize T cells | b) MHC III |
| c) MHC I | d) MHC II |

Very short question

[5x2=10]

- Idiotypes
- AIDS
- Acquired immunity
- IgA
- Vaccine

PART - B

Answer any FOUR out of SIX

[4x5=20]

- Write short notes on
 - T cell receptor
- What is adjuvant? Write different types of adjuvant with example.
- Describe thymic selection.
- What is antigen? Write the properties of antigen.
- Describe B-Cell Receptor.
- Write the pathogen defense strategies.

PART - C

Answer any TWO out of FOUR

[2x10=20]

- What is antibody? Describe the structure of antibody.
- What is a Secondary lymphoid organ? Summarized their function in immune system.
- Describe the B-Cell maturation and differentiation.
- Describe the V-D-J rearrangements in heavy chain synthesis.