

# उत्तर प्रदेश राजर्षि टण्डन मुक्त विश्वविद्यालय, प्रयागराज ।

विज्ञान (स्नातक) कार्यक्रम अधिन्यास 2024–25

कोर्स कोड : Course Code: CSSBCH-01	कोर्स शीर्षक:- (Course Title) <b>Introduction to Biochemistry</b>	अधिकतम अंक : 30 Maximum Marks : 30
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**खण्ड – 'अ' – (Section - A)**  
दीर्घ उत्तरीय प्रश्न (Long Answer Questions)

**नोट :** किन्हीं तीन प्रश्नों के उत्तर 800 से 1000 शब्दों में लिखें।  
**Note:** Attempt any three questions. Each question should be answered in 800 to 1000 Words.

अधिकतम अंक: 18  
Maximum Marks: 18

1. Give detailed account of amino acid classification.
2. Enumerate biologically important monosaccharide and discuss their structural features and functions.
3. Describe biochemical roles of vitamin B complex.
4. Give an account of  $\alpha$  - helical conformation of proteins including protein architecture.
5. Discuss the structure and function of hemoglobin.
6. Describe the structure of genes and the manner its expression is regulated in prokaryotes.
7. Discuss various levels of structural organization of protein.
8. Classify lipids and describe role of phospholipids.
9. Classify carbohydrates and describe structural features of starch.
10. Define Biomolecules. Enlist these biomolecules. Describe the structure and function of proteins.
11. What do you know about nucleic acids? Describe Watson-Crick model of double stranded DNA.
12. Define an amino acid. Draw structure of aromatic amino acids. Describe the role of aromatic amino acids in proteins.

**खण्ड – ब (Section - B)**  
**लघु उत्तरीय प्रश्न (Short Answer Questions)**

अधिकतम अंक: 12  
Maximum Marks: 12

**नोट :** किन्हीं चार प्रश्नों के उत्तर 200 से 300 शब्दों में लिखें।  
**Note:** Write any four questions. Answer should be given in 200 to 300 Words.

1. Describe essential features of secondary structure of proteins.
2. Differentiate between saturated and unsaturated fatty acids giving suitable diagrams.
3. Describe structural features of clover leaf model of t-RNA
4. Discuss the role of lactate dehydrogenase in glucose metabolism.
5. Write about gluconeogenesis, how does it differ from glycogenolysis.
6. Describe practical advantage of antibiotic-resistance genes in plasmid.
7. Describe importance of vitamins in diet.
8. Define essential amino acids.
9. Classify vitamins. In what forms the Vitamins are used in the body? Describe with suitable examples.
10. Write about lipids and their functions in the body.

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विज्ञान (स्नातक) कार्यक्रम अधिन्यास 2024-25

कोर्स कोड : Course Code: CSSBCH-02	कोर्स शीर्षक:- (Course Title) <b>Intermediary Metabolism</b>	अधिकतम अंक : 30 Maximum Marks : 30
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खण्ड – 'अ' – (Section - A)  
दीर्घ उत्तरीय प्रश्न (Long Answer Questions)

**नोट :** किन्हीं तीन प्रश्नों के उत्तर 800 से 1000 शब्दों में लिखें।  
**Note:** Attempt any three questions. Each question should be answered in 800 to 1000 Words.

अधिकतम अंक: 18  
Maximum Marks: 18

1. Describe the formation of urea by Krebs Henselit cycle .
2. Discuss HMP Shunt.
3. Explain the reaction of the b oxidation.
4. Describe organization of electron carriers in electron transport system.
5. Describe various pigments involved in harvesting light energy during photosynthesis.
6. Discuss steps involved in B-oxidation of fatty acid.
7. Describe different processes regarding disposal of nitrogen in the body.
8. Discuss the advantage of lipids over carbohydrates or proteins. Explain the B-oxidation of fatty acids.
9. Describe the various components of respiratory claim in carbohydrate metabolism.
10. Describe oxidation of purvate through TCA cycle using suitable diagrams.
11. Discuss detailed sequence of reactions responsible for generation of reducing power in photosynthesis.
12. Differentiate between prokaryotic and eukaryotic protein synthesis also mention inhibitors of prokaryotic protein synthesis.

खण्ड – ब

**Section - B**

लघु उत्तरीय प्रश्न (Short Answer Questions)

अधिकतम अंक: 12  
Maximum Marks: 12

**नोट :** किन्हीं चार प्रश्नों के उत्तर 200 से 300 शब्दों में लिखें।  
**Note:** Write any four questions. Answer should be given in 200 to 300 Words.

1. Write in brief about pyruvate dehydrogenase complex.
2. What is oxidative phosphorylation?
3. Define free energy change in a reaction.
4. Differentiate between protein synthesis machinery in prokaryotes and eukaryotes.
5. Briefly describe mechanism of ATP synthesis.
6. Give an account of coenzymes.
7. Discuss 'iron' as trace element in biological system.
8. Describe biochemical function of bile.
9. Describe synthesis of ATP on ATP synthases.
10. Describe free energy change and its significance in bioenergetics.

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विज्ञान (स्नातक) कार्यक्रम अधिन्यास 2024–25

कोर्स कोड : Course Code: CSSBCH-03	कोर्स शीर्षक:— (Course Title) Bio Analytical Techniques	अधिकतम अंक : 30 Maximum Marks : 30
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## खण्ड – 'अ' – (Section - A) दीर्घ उत्तरीय प्रश्न (Long Answer Questions)

**नोट :** किन्हीं तीन प्रश्नों के उत्तर 800 से 1000 शब्दों में लिखें।  
**Note:** Attempt any three questions. Each question should be answered in 800 to 1000 Words.

अधिकतम अंक: 18  
Maximum Marks: 18

1. Describe buffers and discuss their uses in human body.
2. Discuss principle and procedure of paper chromatography.
3. Discuss principle of spectrophotometry and describe its uses in biochemistry.
4. Describe distribution coefficient in detail. How does distribution coefficient governs separation at solute in partition chromatography.
5. Define the terms transmittance and absorbance. Why in expression at the Beer-Lambert law, absorbance is preferred as a measure of the absorption rather than percent (%) transmittance?
6. Describe effect at electric field (current, voltage resistance) on electrophoresis in detail.
7. What do you know about molecular sieving? Discuss the principle and applications of this technique.
8. Differentiate colorimetry from spectrophotometry. Define molecular extinction coefficient and unite its applications.
9. What is centrifugation? Discuss the principles and applications of ultracentrifugation.
10. Describe the structure and function of different components of a compound microscope.
11. Explain the mechanism of antigen-antibody reaction. How different blood group are tested.
12. Discuss the principle and procedure of paper chromatography.

## खण्ड – ब

### Section - B

लघु उत्तरीय प्रश्न (Short Answer Questions)

अधिकतम अंक: 12  
Maximum Marks: 12

**नोट :** किन्हीं चार प्रश्नों के उत्तर 200 से 300 शब्दों में लिखें।

**Note:** Write any four questions. Answer should be given in 200 to 300 Words.

1. What do you understand by the term electrophoresis? Describe its applications in biochemistry.
2. Briefly describe gel chromatography.
3. Describe principle of HPLC. Discuss various type at HPLC with their specific type of application.
4. Discuss anion and cation ion exchanger with suitable example and its application in chromatographic separation.
5. How does intensity at colour at biomolecule helps in its qualitative and quantitative analysis?
6. Discuss effect of various factors *i.e.* shape, size and molecular weight on gel filtration.
7. How will you separate proteins with some charge on them?
8. Write about the principle and applications of agarose gel electrophoresis.
9. Discuss the principle and applications of SDS-PAGE
10. Describe the working of an electron.

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विज्ञान (स्नातक) कार्यक्रम अधिन्यास 2024-25

कोर्स कोड : Course Code: CSSBCH-04	कोर्स शीर्षक:- (Course Title) Nutritional Biochemistry	अधिकतम अंक : 30 Maximum Marks : 30
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## खण्ड - 'अ' - (Section - A) दीर्घ उत्तरीय प्रश्न (Long Answer Questions)

**नोट :** किन्हीं तीन प्रश्नों के उत्तर 800 से 1000 शब्दों में लिखें।

**Note:** Attempt any three questions. Each question should be answered in 800 to 1000 Words.

अधिकतम अंक: 18  
Maximum Marks: 18

1. Discuss in detail symptoms and disease due to the deficiency of fat soluble vitamins?
2. Describe trace elements and its utility in physiological and biochemical responses in living organisms.
3. What do you understand by Recommended Dietary Allowances? Describe various factors affecting RDA.
4. What are essential amino acids and essential fatty acids? Write about their names and structures. Describe their significance.
5. What are trace elements required for balanced diet. Explain the role of iodine and zinc in the body.
6. What are water soluble vitamins? Write about the deficiency diseases of water soluble vitamins. How will you cure these diseases?
7. Give functional classification of protein.
8. Write the sequence of glycolytic pathway.
9. What are fatty acids? Differentiate between saturated and unsaturated fatty acids.
10. What are 'Prostaglandins'. Give an account of function and therapeutic use of prostaglandins.
11. Discuss the role of cyclic AMP as second messenger and its significance.
12. Give an account of the way glucose is utilized to meet the energy requirement of the cell.

## खण्ड - ब

### Section - B

लघु उत्तरीय प्रश्न (Short Answer Questions)

अधिकतम अंक: 12  
Maximum Marks: 12

**नोट :** किन्हीं चार प्रश्नों के उत्तर 200 से 300 शब्दों में लिखें।

**Note:** Write any four questions. Answer should be given in 200 to 300 Words.

1. Poly unsaturated Fats?
2. Aminoacid deficiency?
3. BMR and BMI?
4. How will you measure fuel value of foods? Mention its significance.
5. Describe the role of magnesium and phosphorus in body.
6. Give the principle of bendict's test.
7. Describe the symptoms of diabetes mellitus.
8. Explain the principle of paper chromatography.
9. Describe the hormones used to regulate the glucose level in the blood.
10. Discuss the symptoms and control of malnutrition and Kwashiorkor syndrome.

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विज्ञान (स्नातक) कार्यक्रम अधिन्यास 2024-25

कोर्स कोड : Course Code: CSSBCH-06	कोर्स शीर्षक:- (Course Title) Immunology	अधिकतम अंक : 30 Maximum Marks : 30
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**खण्ड – 'अ' – (Section - A)**  
दीर्घ उत्तरीय प्रश्न (Long Answer Questions)

**नोट :** किन्हीं तीन प्रश्नों के उत्तर 800 से 1000 शब्दों में लिखें।  
**Note:** Attempt any three questions. Each question should be answered in 800 to 1000 Words.

अधिकतम अंक: 18  
Maximum Marks: 18

1. Describe the classification, types and functions of antibodies.
2. Explain the clonal selection theory.
3. Describe the principle, methodology and applications of the enzyme-linked immunosorbent assay.
4. Differentiate between antigen and hapten describes criteria of antigenicity.
5. Discuss the processes involved in generation of antibody diversity.
6. Give detailed account of acquired immune deficiency syndrome.
7. Describe the structure and functions of different types of immune globulins.
8. Give an account of monovalent antibodies and their importance.
9. Describe the different types of Lymphocytes and their role in protecting the human body.
10. Describe the structure and functions of antibody.
11. How do antigens elicit immune response? Describe in detail.
12. Differentiate between innate and adaptive immunity. Explain components of innate immunity.

**खण्ड – ब**

**Section - B**

लघु उत्तरीय प्रश्न (Short Answer Questions)

अधिकतम अंक: 12  
Maximum Marks: 12

**नोट :** किन्हीं चार प्रश्नों के उत्तर 200 से 300 शब्दों में लिखें।

**Note:** Write any four questions. Answer should be given in 200 to 300 Words.

1. Explain the Innate immunity.
2. Explain the Haptens
3. Explain the Acquired immunodeficiency.
4. Explain the Agglutination.
5. Discuss the primary and secondary immune response.
6. Give an account of viral vaccines.
7. Write notes on Radio-immunoassay (RIA).
8. Describe Cell Mediated Immune Response.
9. Write notes on the following  
a) Haptens    b) Lymph node    c) Vaccines    d) Secretory antibody
10. Explain the following:  
(a) Hypersensitivity    (b) Primary and secondary immune response  
(c) Ouchterlong double immune diffusion    (d) T- cell receptor diversity

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विज्ञान (स्नातक) कार्यक्रम अधिन्यास 2024–25

कोर्स कोड : Course Code: CSSBCH-07	कोर्स शीर्षक:- (Course Title) Enzymology	अधिकतम अंक : 30 Maximum Marks : 30
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## खण्ड – 'अ' – (Section - A) दीर्घ उत्तरीय प्रश्न (Long Answer Questions)

**नोट :** किन्हीं तीन प्रश्नों के उत्तर 800 से 1000 शब्दों में लिखें।  
**Note:** Attempt any three questions. Each question should be answered in 800 to 1000 Words.

अधिकतम अंक: 18  
Maximum Marks: 18

1. Describe enzymes as a biological catalyst. How do they perform catalysis. Mention their specific properties.
2. Discuss different themes of enzyme actions with suitable examples.
3. What is enzyme inhibition? Write about different types of enzyme inhibition.
4. What are the different plots which can be used to determine  $K_m$  and  $V_{max}$ . Enumerate their basic features.
5. Explain the mechanism of action of lysozyme.
6. Discuss the mechanism of action and regulation of pyruvate dehydrogenase.
7. Discuss enzyme classification citing examples.
8. Describe types of enzyme inhibition and differentiate between competitive and non-competitive using Lineweaver-Burk plot.
9. Discuss general mechanisms of enzyme regulation by giving suitable examples.
10. What are enzymes? Describe the general features of enzymes.
11. Give an account of the regulation of enzyme activity.
12. Discuss the mechanism of enzyme activity.

## खण्ड – ब (Section - B) लघु उत्तरीय प्रश्न (Short Answer Questions)

अधिकतम अंक: 12  
Maximum Marks: 12

**नोट :** किन्हीं चार प्रश्नों के उत्तर 200 से 300 शब्दों में लिखें।

**Note:** Write any four questions. Answer should be given in 200 to 300 Words.

1. What is a holozyme? Give one example.
2. Define activity and specific activity of an enzyme. Mention their units.
3. Discuss the following:  
a) Catalytic efficiency b)  $K_m$ .
4. Describe the significance of Lineweaver-Burk's double reciprocal plots.
5. Explain that enzymes are substrate specific.
6. Describe immobilized enzymes.
7. Write notes on Co-enzymes.
8. Discuss effect of substrate concentration on the activity of enzymes.
9. Explain the following.  
A. Enzyme classification. B. Isozymes. C. Allosteric enzymes D. Competitive inhibition.
10. Describe the following.  
(a) Significance of  $K_m$  and  $V_{max}$  (b) Lysozyme (c) Positive and negative cooperativity (d) Isozymes

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विज्ञान (स्नातक) कार्यक्रम अधिन्यास 2024–25

कोर्स कोड : Course Code: CSSBCH-08	कोर्स शीर्षक:- (Course Title) Plant Biochemistry	अधिकतम अंक : 30 Maximum Marks : 30
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## खण्ड – 'अ' – (Section - A) दीर्घ उत्तरीय प्रश्न (Long Answer Questions)

नोट : किन्हीं तीन प्रश्नों के उत्तर 800 से 1000 शब्दों में लिखें।

**Note:** Attempt any three questions. Each question should be answered in 800 to 1000 Words.

अधिकतम अंक: 18  
Maximum Marks: 18

1. Describe C 3 cycle.
2. Mention names of plant hormones and describe function of any two of them.
3. Describe structure and functions of plant cell wall.
4. Describe oxidative phosphorylation and mechanism of ATP synthesis.
5. Explain the process of nitrate reduction and assimilation in plants. Mention its regulation.
6. How does CO<sub>2</sub> fixation take place in C<sub>3</sub> plants? Discuss the regulation of CO<sub>2</sub> fixation.
7. Describe organization of electron carriers in electron transport chain.
8. Explain roles of photo system I and photo system II in photo synthesis
9. Define secondary metabolites and describe biosynthesis of alkaloids.
10. Describe in detail the sequence of events during light and dark reaction.
11. Discuss Oxidative Phosphorylation and ATP formation.
12. Describe structure and function of plant cell wall.

## खण्ड – ब

### Section - B

लघु उत्तरीय प्रश्न (Short Answer Questions)

अधिकतम अंक: 12  
Maximum Marks: 12

नोट : किन्हीं चार प्रश्नों के उत्तर 200 से 300 शब्दों में लिखें।

**Note:** Write any four questions. Answer should be given in 200 to 300 Words.

1. Describe Hill reactions.
2. Define nitrogen fixation.
3. Discuss causes of seed dormancy.
4. C<sub>4</sub> pathway of carbon reduction and its regulation.
5. Biosynthesis of lignine.
6. Heavy metals stress and their impact on palnt metabolism.
7. Discuss the importance of nif genes.
8. Point out the difference between starch and cellulose.
9. Describe endosymbiotic origin of Mitochondria and Chloroplast.
10. Write notes on the following  
(a) AT Pase (b) Photorespiration (c) Abiotic stress (d) Nitrogenous complex

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विज्ञान (स्नातक) कार्यक्रम अधिन्यास 2024-25

कोर्स कोड : Course Code: CSSBCH-11	कोर्स शीर्षक:- (Course Title) <b>Spectroscopy</b>	अधिकतम अंक : 30 Maximum Marks : 30
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## खण्ड – 'अ' – (Section - A) दीर्घ उत्तरीय प्रश्न (Long Answer Questions)

**नोट :** किन्हीं तीन प्रश्नों के उत्तर 800 से 1000 शब्दों में लिखें।  
**Note:** Attempt any three questions. Each question should be answered in 800 to 1000 Words.

अधिकतम अंक: 18  
Maximum Marks: 18

1. Explain the Electromagnetic Radiation and the Atomic Spectrum of Hydrogen?
2. Explain Molecular Symmetry through VSEPR theory and Point Groups of H<sub>2</sub>O and NH<sub>3</sub> Molecules?
3. Explain IR frequency and Spectrum of H<sub>2</sub>O and CO<sub>2</sub> Molecule?
4. Explain the Electromagnetic Radiation and the Atomic Spectrum of Hydrogen?
5. Explain Molecular Symmetry through VSEPR theory and Point Groups of H<sub>2</sub>O and NH<sub>3</sub> Molecules?
6. Explain IR frequency and Spectrum of H<sub>2</sub>O and CO<sub>2</sub> Molecule?
7. Explain the origin of different series of spectral lines observed in the atomic spectrum of hydrogen.
8. Discuss the basic components of an ESR spectrometer.
9. Discuss the principle of Infra-red spectetroscopy. How it helps in detection of Organic compounds?
10. Explain the Raman Spectroscopy and its application. What are the differences between I.R and Raman spectra?
11. Using suitable diagram, explain the differences between fluorescence and phosphorescence.
12. Describe the principles of NMR spectroscopy.

## खण्ड – ब

### Section - B

लघु उत्तरीय प्रश्न (Short Answer Questions)

अधिकतम अंक: 12  
Maximum Marks: 12

**नोट :** किन्हीं चार प्रश्नों के उत्तर 200 से 300 शब्दों में लिखें।  
**Note:** Write any four questions. Answer should be given in 200 to 300 Words.

1. Explain the Applications of IR and Raman Spectroscopy?
2. Explain Terms Used in Electronic Spectroscopy-Chromophore, Auxochrome, Hypsochromic Shift, Bathochromic Shift, Hyperchromic Shift and Hypochromic Shift?
3. Explain Charge - Transfer Spectra with examples?
4. Explain Jablonski Diagrams?
5. Explain the Applications of IR and Raman Spectroscopy?
6. Explain Charge - Transfer Spectra with examples?
7. Explain Jablonski Diagrams?
8. Write a note on chemical shift.
9. What is stretching and bending vibrations of molecule?
10. Define the terms chromophone and auxochrome, in UV spectroscopy.