Date: 01/09/2022

To
The Principal
Shri. Mohatadevi Shikshan Sanstha
Pragati Mahavidyalaya
Sawkheda, Tq. Sillod
Dist. Aurangabad

Subject: Application for Approval to Run Certificate Course in "***Biochemistry***"

Respected Sir,

I hope this letter finds you in good health and high spirits. I am writing to seek your approval for running a certificate course entitled "***Biochemistry***" in the Chemistry Department for the academic year 2022-23.

The proposed course will be of 32 hours duration and aims to provide our students with a comprehensive understanding of the principles and applications of biochemistry. This course will not only enhance their knowledge but also better prepare them for future academic and professional opportunities in the field of chemistry.

The course will cover fundamental aspects of biochemistry, including:

- Structure and function of biomolecules
- Enzyme kinetics and mechanisms
- Metabolic pathways
- Biochemical techniques and their applications

We believe that this course will greatly benefit our students by equipping them with essential skills and knowledge relevant to their field of study. The curriculum is designed to be rigorous yet accessible, ensuring that students can engage with and apply the concepts learned effectively.

We request your kind approval to initiate this course and to facilitate the necessary arrangements for its successful implementation. We are confident that this addition will contribute positively to the academic environment of our institution.

Thank you for considering this proposal. We look forward to your positive response.

Yours sincerely,

Head of Department
Department of Chemistry
Pragati Mahavidyalaya
Sawkheda, Tq. Sillod Dist. Aurangabad

Shri Mohatadevi Shikshan Sanstha, Aurangabad.
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Contact: 9822021784, 8888611717
Estd: 2016

Mrs. Kaveri Palkar, President | Mrs. Archana Mukhekar, Secretary | Dr. Varsha Phalke, Principal

Ref No.: PMS/2022-2023/03 Date : 06/09/2022

To
The Head of Department
Department of Chemistry
Pragati Mahavidyalaya
Sawkheda, Tq. Sillod
Dist. Aurangabad

Subject: Sanction for Running the Certificate Course in ***"Biochemistry"***

Dear HOD,

I am pleased to inform you that your application for running the certificate course entitled "***Biochemistry"*** has been approved. The course, as proposed, will be conducted over 32 hours and is scheduled for the academic year 2022-23.

The aim of this course is to enhance the students' understanding of biochemistry and to provide them with practical and theoretical knowledge that will be valuable in their academic and professional pursuits.

Please proceed with the necessary arrangements to ensure the successful implementation of this course. This includes organizing the course content, scheduling classes, and coordinating with the faculty involved.

We trust that this initiative will contribute significantly to the academic growth of our students and strengthen the Chemistry Department's offerings. Should you require any further assistance or resources for the smooth execution of the course, please do not hesitate to contact the administrative office.

Congratulations on this endeavor, and we wish you success in delivering a valuable educational experience to our students.

Yours sincerely,

PRINCIPAL
Pragati Mahavidyalaya
Sawkheda, Tq. Sillod, Dist. Aurangabad

Principal
Shri. Mohatadevi Shikshan Sanstha
Pragati Mahavidyalaya
Sawkheda, Tq. Sillod
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Seal

Ref No.: PMS/2022-2023/03 Date : 09 /09 /2022

Notice

Subject: Certificate Course in "***Biochemistry***" for the Academic Year 2022-23

Dear Students,

We are excited to announce the introduction of a new certificate course entitled "***Biochemistry***" for the academic year 2022-23. This course is designed to enhance your understanding of key biochemical concepts and applications, complementing your current studies in Chemistry.

Course Details:

- **Title:** ***Biochemistry***
- **Duration:** 32 hours
- **Objective:** To provide comprehensive knowledge of biochemistry including biomolecular structures, enzyme functions, metabolic pathways, and biochemical techniques.

Enrollment:

- Details regarding the enrollment process, schedule, and further information will be provided shortly.
- Please keep an eye on the department's notice board and your email for updates.

We encourage all interested students to participate in this course and take advantage of the learning opportunity it offers.

For any queries, feel free to contact the Chemistry Department office.

Thank you.

Head of Department of Chemistry

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Certificate Course in *Biochemistry*

Total Duration: 32 Hours

Course Objective: To provide a comprehensive understanding of biochemistry principles, including the structure and function of biomolecules, enzymology, metabolic pathways, and biochemical techniques.

Syllabus

Module 1: Introduction to Biochemistry (4 hours)

- Definition and scope of biochemistry
- Importance of biochemistry in various fields
- Overview of biomolecules: carbohydrates, proteins, lipids, nucleic acids

Module 2: Structure and Function of Biomolecules (8 hours)

- **Carbohydrates**: Structure, classification, and functions
- **Proteins**: Amino acids, peptide bonds, protein structure (primary, secondary, tertiary, quaternary), and functions
- **Lipids**: Types (saturated, unsaturated, phospholipids, sterols), structure, and functions
- **Nucleic Acids**: DNA and RNA structure, functions, and replication

Module 3: Enzyme Biochemistry (6 hours)

- Enzyme structure and classification
- Mechanism of enzyme action
- Enzyme kinetics (Michaelis-Menten kinetics)
- Enzyme inhibition (competitive, non-competitive, uncompetitive)
- Applications of enzymes in industry and medicine

Module 4: Metabolism (8 hours)

- **Introduction to Metabolism**: Catabolism vs. anabolism
- **Glycolysis**: Pathway, regulation, and energy yield
- **Krebs Cycle**: Pathway, regulation, and significance
- **Oxidative Phosphorylation**: Electron transport chain, ATP synthesis
- **Fatty Acid Metabolism**: Beta-oxidation, synthesis
- **Amino Acid Metabolism**: Deamination, urea cycle

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Module 5: Biochemical Techniques (4 hours)

- Spectrophotometry
- Chromatography (paper, thin-layer, and column)
- Electrophoresis (gel electrophoresis)
- PCR (Polymerase Chain Reaction) and its applications

Module 6: Practical Applications and Case Studies (2 hours)

- Case studies on metabolic disorders (e.g., diabetes, phenylketonuria)
- Applications of biochemical techniques in research and clinical diagnostics

Teaching Methodology:

- **Lectures:** Conceptual understanding and theoretical knowledge
- **Practical Sessions:** Hands-on experience with biochemical techniques
- **Case Studies:** Application of theoretical knowledge to real-world scenarios
- **Assignments and Quizzes:** Regular assessments to reinforce learning

Assessment:

- Participation and attendance
- Assignments and quizzes
- Practical sessions performance
- Final exam or project presentation

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Final Examination: Biochemistry

Total Marks: 30
Duration: 1 Hour

Multiple-Choice Questions

1. Which of the following is the primary function of carbohydrates?
a) Energy storage
b) Enzyme catalysis
c) Genetic information storage
d) Hormone regulation

2. The quaternary structure of a protein refers to:
a) The sequence of amino acids
b) The local folding into alpha-helices and beta-sheets
c) The overall three-dimensional shape of a single polypeptide
d) The arrangement of multiple polypeptide chains

3. Which of the following is NOT a component of nucleic acids?
a) Phosphate group
b) Deoxyribose
c) Ribose
d) Glycogen

4. The Michaelis-Menten equation describes:
a) The rate of enzyme-substrate interaction
b) The rate of DNA replication
c) The rate of protein synthesis
d) The rate of cell division

5. What is the primary function of enzymes in biochemical reactions?
a) To provide energy
b) To increase the rate of reaction
c) To provide structural support
d) To store genetic information

6. The Krebs cycle occurs in which part of the cell?
a) Cytoplasm
b) Mitochondria
c) Nucleus
d) Endoplasmic reticulum

7. Which vitamin is essential for the synthesis of coenzyme A?
a) Vitamin A
b) Vitamin B1
c) Vitamin B5
d) Vitamin C

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What does the term "beta-oxidation" refer to?
a) The breakdown of fatty acids
b) The synthesis of nucleotides
c) The formation of proteins
d) The conversion of glucose to pyruvate

9. Which of the following is a method used to separate proteins based on size?
a) Paper chromatography
b) Gel electrophoresis
c) Thin-layer chromatography
d) Spectrophotometry

10. In which metabolic pathway is ATP produced through oxidative phosphorylation?
a) Glycolysis
b) Krebs cycle
c) Electron transport chain
d) Fatty acid synthesis

11. Enzyme inhibition where the inhibitor binds to a site other than the active site is called:
a) Competitive inhibition
b) Non-competitive inhibition
c) Uncompetitive inhibition
d) Allosteric inhibition

12. Which of the following enzymes is responsible for the formation of peptide bonds?
a) Ligase
b) Protease
c) Polymerase
d) Synthase

13. Which of the following structures is NOT present in RNA?
a) Ribose
b) Uracil
c) Thymine
d) Phosphate group

14. What is the end product of glycolysis?
a) Glucose
b) Pyruvate
c) Acetyl-CoA
d) Oxaloacetate

15. What type of bond holds the two strands of DNA together?
a) Hydrogen bonds
b) Ionic bonds
c) Covalent bonds
d) Disulfide bonds

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16. In the urea cycle, ammonia is converted into:
a) Uric acid
b) Urea
c) Ammonium ion
d) Glutamine

17. Which biochemical technique is used to measure the concentration of a substance based on light absorption?
a) Chromatography
b) Spectrophotometry
c) Electrophoresis
d) PCR

18. The term "catabolism" refers to:
a) The building up of molecules
b) The breakdown of molecules
c) The transfer of electrons
d) The synthesis of nucleotides

19. Which of the following is a component of ATP?
a) Adenine
b) Cytosine
c) Guanine
d) Thymine

20. Which of the following processes occurs in the mitochondria?
a) Glycolysis
b) Krebs cycle
c) DNA replication
d) Protein synthesis

21. What is the role of the enzyme DNA polymerase?
a) To unwind the DNA double helix
b) To synthesize new DNA strands
c) To separate RNA from DNA
d) To break down proteins

22. In which process is NADH primarily used?
a) Glycolysis
b) Krebs cycle
c) Oxidative phosphorylation
d) Fatty acid synthesis

23. What is the main function of ribosomes in a cell?
a) DNA replication
b) Protein synthesis
c) Lipid metabolism
d) Cellular respiration

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24. Which of the following is a key feature of an allosteric enzyme?
a) It can bind to multiple substrates
b) It is regulated by binding to a site other than the active site
c) It exhibits a linear rate of reaction
d) It only catalyzes reactions in the presence of a cofactor

25. Which type of RNA carries genetic information from DNA to the ribosome?
a) tRNA
b) rRNA
c) mRNA
d) miRNA

26. What is the role of ATP synthase?
a) To break down ATP
b) To transport molecules across membranes
c) To synthesize ATP from ADP and inorganic phosphate
d) To facilitate the exchange of gases

27. In which biochemical process is oxygen directly used?
a) Glycolysis
b) Krebs cycle
c) Electron transport chain
d) Fermentation

28. The enzyme responsible for adding nucleotides to a growing DNA strand is:
a) DNA ligase
b) DNA polymerase
c) RNA polymerase
d) Helicase

29. The primary function of the electron transport chain is to:
a) Synthesize proteins
b) Generate ATP
c) Replicate DNA
d) Transport ions

30. Which of the following best describes a non-competitive inhibitor?
a) It binds to the active site of the enzyme
b) It decreases the enzyme's affinity for the substrate
c) It binds to a site other than the active site and affects enzyme activity
d) It increases the rate of reaction

Answer Key

1. a) Energy storage
2. d) The arrangement of multiple polypeptide chains

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3. d) Glycogen
4. a) The rate of enzyme-substrate interaction
5. b) To increase the rate of reaction
6. b) Mitochondria
7. c) Vitamin B5
8. a) The breakdown of fatty acids
9. b) Gel electrophoresis
10. c) Electron transport chain
11. b) Non-competitive inhibition
12. b) Protease
13. c) Thymine
14. b) Pyruvate
15. a) Hydrogen bonds
16. b) Urea
17. b) Spectrophotometry
18. b) The breakdown of molecules
19. a) Adenine
20. b) Krebs cycle
21. b) To synthesize new DNA strands
22. c) Oxidative phosphorylation
23. b) Protein synthesis
24. b) It is regulated by binding to a site other than the active site
25. c) mRNA
26. c) To synthesize ATP from ADP and inorganic phosphate
27. c) Electron transport chain
28. b) DNA polymerase
29. b) Generate ATP
30. c) It binds to a site other than the active site and affects enzyme activity

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