SHIVAJI UNIVERSITY, KOLHAPUR.

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Accredited By NAAC with 'A' Grade

Syllabus For

B.Sc. II Biochemistry (Optional)

Choice Based Credit System

(Sem.- III & IV)

(To be implemented from June 2019 onwards)

A

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UNIT - I **15**

A. Glycolysis and TCA cycle:

Glycolysis - a universal pathway, reactions and energetics of glycolysis, Anaerobic glycolysis for ethanol production and its energetic Oxidation of pyruvate to acetyl CoA, PDH complex. Citric acid cycle, amphibolic role, glyoxalate pathway,

B. Carbohydrate metabolism:

Synthesis of glucose from non-carbohydrate sources, pentose phosphate pathway and its importance. Glycogenesis and glycogenolysis

UNIT – II **15**

A. Fatty acid oxidation:

Digestion, mobilisation and transport of cholesterol and triacylglycerols, fatty acid transport to mitochondria, β oxidation offatty acid, ωoxidation, ketone bodies metabolism, ketoacidosis.

B. Fatty acid synthesis:

Fatty acid synthase complex. Biosynthesis fattyacids and energetic

PAPER – VI :METABOLISM OF AMINO ACIDS AND NUTRITION

UNIT - I **15**

A. Amino acid metabolism:

General reaction of amino acid metabolism

i) Transamination, ii) Deamination, iii) Decarboxylation,

Urea cycle,

Inborn errors of amino acid metabolism viz. i) PKU, ii) Alkaptonuria, iii) Tyronosis,

B. Nutrition:

Nutrition, food, nutrient definition

Balanced diet, source, requirement

Nutritional aspects of carbohydrates, proteins and lipids

Brief account of vitamins andminerals in the diet.

UNIT - II **15**

A. Calorimetry:

Caloric value of food stuffs and its measurement (bomb calorimeter).

Respiratory quotient,

BMR and its measurement (Douglass bag method),

Factors affecting BMR and its significance.

B. Biological oxidation:

High-energy compounds and their significance viz. ATP, PEP, 1,3-DPG.

Mitochondrial respiratory chain, components & carriers of ETC,

Inhibitors of ETC,

Mechanism of oxidative phosphorylation (chemiosmotic hypothesis)

PAPER – VII : GENE ORGANIZATION, REPLICATION AND REPAIR

UNIT- I **15**

A . **Replication & Transcription:**
Introduction to central dogma process
Mechanism of prokaryotic replication
Mechanism of prokaryotic transcription

B. Translation:
Mechanism of prokaryotic translation
Genetic code,
Regulation of gene expression, with operon concept (*E.coli* lac operon model)

UNIT - II **15**

A. Chromosome & Packing of DNA:
Chromosome structure
Gene, gene number, gene clusters and pseudogene.
Polytene and lampbrush chromosomes.
Role of Histone proteins, Packing of DNA, supercoiled DNA, nucleosome,

B. Mutations:
Types of mutations - transition, transversion, frame shift mutations, mutations induced by chemicals, radiation, transposableelements,
Repair of DNA damage - direct repair, base excision repair, nucleotide excision repair, and recombination repair
Ames test.

Syllabus for B. Sc. II – Biochemistry (CBCS)

Semester IV

PAPER – VIII : BIOCHEMICAL TECHNIQUES

UNIT - I **15**

A. **Absorption spectroscopy:**

Beer Lambert's law, its mathematical derivation, meaning of theterms-transmittance,absorbance, molar and specific absorbance.

Limitations of Beer Lambert's law.

Construction, working and applications of colorimeter andspectrophotometer.

Advantages of spectrophotometer over colorimeter

Absorption spectra of proteins, nucleic acids,cytochrome and NAD+.

B.Enzyme immobilization:

Introduction, Definition, Types and technique of immobilization -Adsorption on carriers, covalent binding, intermolecular crosslinking, gel entrapment

Industrial applications of immobilization.

UNIT - II **15**

A. Chromatography:

Introduction, definition and classification

Principle, techniqueand applications of Paper and Thin layer chromatography.

(Discussion should include selection of adsorbent and types ofadsorbents, preparation of plates, and column packing, and sampleapplication, mechanism of separation, important applications andadvantages.)

Introduction, definition, principle, technique and applications ofIon exchange and Gel permeation chromatography.

(Discussionshould include selection of matrix, column packing, sampleapplication, mechanism of separation, important applications andadvantages.)

B. Electrophoresis:

Definition of the terms electrophoresis - electrophoretic mobility

Factors affecting electrophoretic mobility

Principle, technique and applications of paper and starch gel electrophoresis.

(Discussionshould include preparation of gel plates, sample application,mechanism of separation, development of plates, importantapplications and advantages of the method.)

The practical course is to be covered in two days per week (total eight periods per week). At the end of the year there should be practical examination of 100 marks conducted in two consecutive days for not less than six hours on each day. Figures shown to the right indicate number of practical required.

Practical Course : BHC 201

A. Colorimetric estimations:

1. Estimation of inorganic phosphate by Fiske-Subbarow method. (1)
2. Estimation of glucose from blood, Folin-Wu or o-Toluidine method. (1)
3. Estimation of RNA by Bial's orcinol method. (1)
4. Estimation of creatinine in urine. (1)
5. Estimation of urea from blood by DAM method.(1)

B. Isolations:

1. Extraction of lecithin from egg yolk.(1)
2. Isolation of DNA (1)

C. Problems on Bioinformatics:

1. Problems on DNA - RNA sequence (2)

2. Genetic code (2)

3. Bioinformatics experiment To determine three dimensional structure of proteins by visualizing software - RasMol. (2)

4. Browsing and understanding NCBI Web page, Introduction to literature database-PubMed. (1)

Practical Course : BHC 202

A. Enzyme Study:

1. Estimation of diastase (amylase) activity (1)
2. Quantitative Estimation of amylase activity. (2)
3. Immobilization of baker's yeast cells by gel entrapment for invertase activity.(2)

B. Volumetric Estimations:

1. Estimation of total chlorides in urine by Volhard's method (1)
2. Determination of saponification value of oil. (1)
3. Determination of iodine number of oil. (1)

C. Qualitative Analysis:

1. Detection of normal and abnormal constituents of urine. (2)
2. Determination of blood groups.(1)
3. Qualitative analysis of saturated and unsaturated lipids. (2)

D. Demonstration Experiments:

1. Separation of indicators/ proteins by gel electrophoresis. (1)
2. Separation of amino acids by paper electrophoresis. (1)

There shall be a study tour for not more than four days to visit industries and institutions of biochemical importance. One teacher will accompany a batch of 16 students. As per university rules T.A. and D.A. should be paid to the teacher.

List of the Laboratory Equipments :

1. Colorimeter
2. pH meter
3. Electrophoresis apparatus
4. Computer with printer.
5. Water bath / Incubator
6. Mixer
7. Oven
8. Chemical balance / Singlepan balance
9. Suction pump
10. Centrifuge machine
11. Heating mantle with magnetic stirrer
12. Soxhlet extraction apparatus.
13. Micropipetes
14. Glassware

Reference Books for Theory & Practical :

1. Practical Biochemistry-David Plummer (Tata McGraw Hill)
2. Biochemical Methods- Sadashivam and Manikam
3. Introductory Practical Biochemistry-Sawhney S.K. and Randhir Singh (Narosa publication).
4. Hawk's Physiological Chemistry-Oser
5. Viva and Practical Biochemistry-Dr. A. C. Deb (New central Book Limited).
6. Introduction to Practical Biochemistry - P. D. Boyer (Wiley International).
7. Biochemistry-Lubertstryer
8. Introduction to Bioinformatics-T.K.Attwood & D.J.Parry- Smith
9. Cell and Molecular Biology-P.K.Gupta
10. Biophysical Chemistry – Nath, Nath &Upadhya

Nature of Question Theory Paper

B.Sc. Part – II (Sem. ---) Examination, ---
Biochemistry
Paper : - Title of the Paper

Day & Date : Total Marks : 50
Time :

Instructions : 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat and labelled diagram wherever necessary.

Q.1. Rewrite the sentences using correct alternative (1 x 10)

10 multiple choice questions

Q.2. Write detail notes on any TWO (2 x 10)

3 sub questions

Q.3. Write short notes on any FOUR (4 x 5)

6 sub questions