

UNIVERSITY OF KALYANI

REVISED SYLLABUS

FOR THREE YEARS B.Sc. DEGREE COURSE

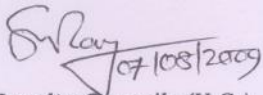
(GENERAL)

IN

MOLECULAR BIOLOGY

**According to the New Examination Pattern
Part – I, Part- II & Part- III**

**WITH EFFECT FROM THE SESSION
2009 – 2010**


Secretary, Faculty Councils (U.G.)
University of Kalyani
Kalyani, Nadia

UNIVERSITY OF KALYANI
KALYANI, NADIA
COUNCIL FOR UNDER GRADUATE STUDIES
PROCEEDINGS OF THE 21ST MEETING OF THE (PREVIOUS) COUNCIL FOR UG
STUDIES HELD ON 13/09/2005

Revised Structure and Distribution of Marks for Practical Based S subjects at UG
Level w.e.f. Academic Session 2005-2006

BACHELOR OF SCIENCE (GENERAL)	PART-I	PART-II	PART-III
Compulsory English : One half paper : 50 Marks Modern Indian Language : One half paper : 50 Marks	50 Marks 50 Marks	- - -	- - -
Environmental Studies : One full paper* : 100 Marks*	100 Marks*		
Elective Subjects : Three : Four full papers : 3x4x100 each = 1200 Marks	3x1x100 =300 Marks	3x2x100 =600 Marks { Th: 3x1x100 = 300 Marks Pr: 3x1x100 = 300 Marks	3x1x100 =300 Marks { Th : 3x1x 60 = 180 Marks Pr : 3x1x40 = 120 Marks
AGGREGATE MARKS : 1400	500 Marks	600 Marks	300 Marks

BACHELOR OF SCIENCE (HONOURS)	PART-I	PART-II	PART-III
Compulsory English : One half paper : 50 Marks Modern Indian Language : One half paper : 50 Marks	50 Marks 50 Marks	- -	- -
Environmental Studies : One full paper* : 100 Marks*	100 Marks*	-	-
Elective subjects : Two : Three full papers : 2x3x100 each = 600 Marks	2x1x100 Marks =200 Marks	2x2x100 =400 Marks { Th: 2x1x100 =200 Marks Pr: 2x1x100 =200 Marks	- -
One Honours Subject = 800 Marks			
Theory: Seven Papers = 540 Marks Practical: Four Papers = 260 Marks	200 Marks (Th: 2 x 75 Marks) (Pr : 1 x 50 Marks)	200 Marks (Th: 2 x 75 Marks) (Pr : 1 x 50 Marks)	400 Marks (Th: 3 x 80 Marks) (Pr : 2 x 80 Marks)
<u>For Computer Science Honours</u>		<u>For Computer Science Honours</u>	
Theory : Seven Papers = 440 Marks Practical : Four Papers = 280 Marks Project : One Paper = 80 Marks	200 Marks (Th: 2 x 50 Marks) (Pr: 1 x 100 Marks)	200 Marks (Th: 2 x 50 Marks) (Pr: 1 x 100 Marks)	400 Marks (Th: 3 x 80 Marks) (Pr : 1 x 80 Marks) (Project : 1 x 80 Marks)
AGGREGATE MARKS : 1600	600 Marks	600 Marks	400 Marks

* With effect from the session 2009-2010.

S. Ray
07/08/2009
Secretary, Faculty Councils (U.G.)
University of Kalyani
Kalyani, Nadia

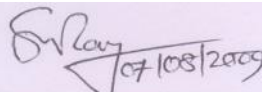
University of Kalyani

Revised Syllabus of Molecular Biology (General Course)

(w.e.f. the session 2009-2010)

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PART – I

Paper – I

Full Marks : 100

Group A : Biochemistry

Full Marks : 50

1. Biochemical characteristics of living matter :
Nature, scope and development of Biochemistry as a discipline, Biochemistry and the living state, Chemical Origin of living matter.
2. Cell Biology :
Salient feature of prokaryotic and eukaryotic cells, mentioning structure and function of : Cellwall, Plasma membrane, nucleus, mitochondria, endoplasmic reticulum, Golgi complex, lysosomes and ribosomes.
3. Carbohydrates :
Structure and function of mono, di and polysaccharides, Reducing & non -reducing sugar, deoxy sugars, reactions of monosaccharides.
4. Lipids : Types of lipids;
Triglycerides , fatty acids, Phospholipids, Glycolipids; Structure, Function and Localization ; active transport.
5. Aminoacids and Proteins :
Structure and reactions of aminoacids, Structure of Proteins (concepts of primary, secondary, tertiary and quaternary), General reactions of Proteins, N-terminal and C- terminal aminoacid determination.
6. Enzymes :
Role as biocatalyst, nature, nomenclature; An outline of classification with example of each type, enzyme kinetics, Coenzymes, Cofactors, enzyme inhibitors, isozymes, Ribozyme.
7. Nucleic acids :
Purine and Pyrimidine bases, nucleosides, nucleotides, basic differences in structure and function of RNA and DNA.

Group B : Biophysics

Full Marks : 50

1. Biophysical Principles :

Thermo dynamics (Basic Principle)

Diffusion in liquids : Osmosis, Viscosity, Centrifugation, Sedimentation Velocity, Sedimentation equilibrium, Density gradient Centrifugation .

Light absorption : Beer- Lambert law. Gel electrophoresis and Gel chromatography.

X-ray Production and Properties, basic principles of diffraction , medical application s.

2. Optical and electron microscopy :

Compound and light microscope : Basic working principles, bright and dark field microscope. Resolving power, limit of resolution, physical basis of electron microscopy. Transmission electron microscope, ray diagram, basic working principle, preparation of biological samples – sectioning, staining and shadow-casting (in brief). Scanning electron microscope.

3. Biostatistics :

Frequency distribution, Mean, Median, Mode, Standard-deviation, Binomial, Poisson and Gaussian distribution t-test and Chi-square test with biological examples.

PART – II**Paper – II****Full Marks : 100**

Group A : Biochemistry

Full Marks : 50

1. Bioenergetics :

Concept of free energy, Biological oxidation, Electron-transport chain, Energy rich compounds, Oxidative Phosphorylation including chemiosmotic hypothesis.

2. Metabolism of Carbohydrate :

Glycolysis , TCA cycle, Pentose Phosphate Pattway , Glycogenesis and Glycogenolysis.

3. Metabolism of fat :

Catabolism of fat, Oxidation of fatty acids.

4. Metabolism of amino acid :

Biosynthesis of amino acid with reference basic groups citing example of each, Glucogenic and Ketogenic amino acids, transamination,amination, Oxidation of α -aminoacids, Urea cycle.

5. Nutrition :

Deficiency symptoms, Food sources, Required dietary allowance, chemical nature, cocozyme function of water soluble vitamins. Fat soluble vitamins – chemical nature function.

6. Hormones : Steroid & peptide hormones.

Definition, classification and molecular basis of hormone action.

Group B : Biophysics

Full Marks : 50

1. Fundamentals of Genetics :

Concept of heredity, Mendilion concept, Heredity factor & chromosomes, gene concept chemical nature of gene.

2. Physical foundation of Molecular Biology :

Types of DNA replication, transcription and translation of prokaryotic system. Damage of genetic materials and their repair. Genetic mutation & Molecular basis of mutation, Molecular diseases.

3. Radiation Biology :

Different types of radiation – ionizing and non-ionizing radiations. Radioactivity – type of radiation from radioactive substances (α, β, γ - radiation), Radioactive decay equation, Physical and biological half lives, Radiation units, Radiation counting systems – G.M. Counter and Scintillation Counter (Working Principle) only.

Interaction of radiation with matter. Biological effects of different types of radiation s. Application of radioactive material in Biology and medicine, Radiation Protection.

Paper – III (Practical)

Full Marks : 100

Group A : Biochemistry

Full Marks : 50

1. Preparation of buffers(acetate & phosphate).
2. Qualitative tests for Glucose, Fructose, Ribose, Starch and Sucrose.
3. Test for cholesterol.
4. Chemical test for amino acids and proteins, Estimation of amino acid by formal titration.
5. Estimation of ascorbic acid in lemon juice by titration with 2,6 Dichlorophenol Indophenol.
6. Separation of amino acids by filter paper chromatography.

Group B : Biophysics

Full Marks : 50

1. To determine the absorption spectrum of hemoglobin/chlorophyll/ cytochrome C solution by a colorimeter.
2. To determine the refractive index of different solutions using a travelling microscope.
3. To measure the viscosity/fluidity of a solution by Oswald Viscosimeter.
4. To determine the relative sizes of nucleus and cytoplasm of squamous cells using a biological microscope.
5. To measure the concentration of R.B.C. cells in a suspension using haemocytometer and to test its distribution.

PART – III

Paper – IV

Full Marks : 100

Group A (Theoretical)

Full Marks : 60

(I) Biochemistry

Full Marks : 30

1. Recombinant DNA technology :

Preliminary aspects of recombinant DNA technology — basic concepts of genetic engineering.

2. Clinical Biochemistry :

Molecular mechanism of diseases (sickle cell anemia, Malaria, Thalassemia, Cholera). Clinically important enzymes. Drug metabolism and Drug toxicity.

3. Microbial Biochemistry :

A brief idea about different types of microorganism – both pathogenic and non-pathogenic. Mode of action of the antibiotics – penicillin, streptomycin and chloramphenicol. Antibiotic resistance in microbes.

(II) Biophysics

Full Marks : 30

1. Bioelectricity :

Physical basis of bioelectric potential (Gibbs Donnan effect, membrane transport – basic ideas) ; Biophysics of the neural spike, electrocardiogram, electroencephalogram.

2. Physics of Nuclear Medicine :

Radioisotope as tracer, Organ scan as examples of tracing, Isotope dilution analysis, Radioimmuno assay, Thyroid function test by radioiodine, Basic Principle of autoradiography, Gamma camera, Magnetic resonance imaging , LASER in medicine (brief qualitative treatment).

3. Physics of Vision :

Optical elements of the eye, defects of vision and their correction (Qualitative) mechanism of vision (red and cone vision), visual sensitivity (Qualitative); Electroretinogram(basic principle).

4. Physics of Hearing :

Intensity level, noise and its biological effects, hearing elements of the ear, mechanism of hearing. Echolocation by bats (elementary ideas), Ultrasonic Production (by Piezoelectric effect) and medical application (basic principle)

Group B (Practical)

Full Marks: 40

(I) Biochemistry

Full Marks: 20

1. Estimation of Glucose in blood.
2. Estimation of Cholesterol in blood.
3. Detection of blood groups and Rh factor.
4. Simple Staining and Gram staining of Bacteria.
5. Estimation of Urea SGOT/SGPT in blood.
6. Estimation of protein by Lowry/ Binate.
7. Growth curve of a bacterium.

(II) Biophysics

Full Marks: 20

1. Blood Pressure Measurement (Demonstration & interpretation)
2. E.C.G. (Demonstration & interpretation)
3. Interpretation of X-ray Photographs
4. Interpretation of ultra sonograms
5. Interpretation of EEG
6. Estimation of DNA by Diphenylamine method
7. Estimation of RNA by orcinol method.