GONDWANA UNIVERSITY

GADCHIROLI

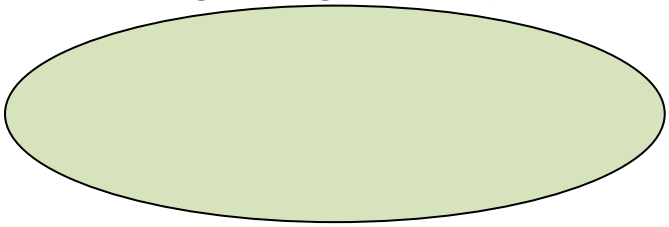
SEMESTER SYSTEM PATTERN SYLLABUS

for

B.Sc.

BIOCHEMISTRY

SEMESTER – V



(With effect from : 2014-15)

Teaching & Examination Scheme

Bachelor of Science

THREE YEAR (SIX SEMESTER) DEGREE COURSE

BIOCHEMISTRY

B. Sc. Part II and Final (Semester III, IV, V and VI)

S. No.	Subject	Teaching scheme			Examination scheme										
					Theory							Practical			Total Marks / credits (Th, Pr, IA)
		Th + Tu (Periods)	Pr (Periods)	Total Periods	Duration Hrs	Max Marks Th paper	Min Passing Marks Th	Max Marks Int Assessment	Min Passing IA	Total	Min passing Marks	Duration Hrs	Max marks practical	Min passing marks	
1	Biochemistry Paper I	3	-	6	3	50	35	10	7	120	42	-	-	-	150
2	Biochemistry Paper II	3	-		3	50		10				-	-	-	
3	Practical	-	6	6	-	-	-	-	-	-	-	6*	30	11	
Grand Total of Semester III -VI: 450 each semester = TOTAL - 450 Marks per semester															

Note: Th = Theory; Pr = Practical; Tu = Tutorial; IA = Internal Assessment; @ = Tutorials wherever applicable; * = If required, for two days.

B.Sc. Part III

Semester V and VI

BIOCHEMISTRY

(with effect from academic session 2014-15)

1) There shall be two semesters in B.Sc. Part III Biochemistry.

2) Each semester comprise of two theory papers, internal assessment and practical.

3) Each theory paper divided into four units.

4) The syllabus is based on six theory periods and six practical periods per batch per week.

5) Students are expected to perform all the practicals mentioned in the syllabus. However a minimum of seven practicals in each semester is mandatory.

6) Each theory paper examination shall be of three hours duration, comprise 5 questions and carry 50 marks. The practical examination shall be of 6 hours duration and carry 30 marks.

7) At the beginning of each semester, every teacher / department / college shall inform his / her students unambiguously the method teacher / department / college propose to adopt a scheme of marking for internal assessment.

8) The internal assessment marks assigned to each theory paper shall be awarded on the basis of attendance / home assignment / class test / Project assignment / seminar /study tour/ any other innovative practice / activity.

9) The B.Sc. students of Biochemistry shall pay at least one visit to any Biochemical/Research Institute as a study tour during three year (six semesters) degree course.

Sr No	Semester	Paper No.	Title of Paper	Total periods/ Week	Max.Marks		Total Marks
					Th	Int.	
1	V	I	METABOLISM I	03	50	10	60
		II	MOLECULAR BIOLOGY	03	50	10	60
			PRACTICAL	6	30		30
2	VI	I	METABOLISM II	03	50	10	60
		II	MOLECULAR BIOLOGY & rDNA TECHNOLOGY	03	50	10	60
			PRACTICAL	6	30		30

The Syllabus is based on six (3x2) theory periods and six practical periods per batch per week.

Marks Distribution:

1. Theory Exam : 50 Marks (for each paper)
2. Internal Assessment : 10 Marks (for each paper)
3. Practical **:** 30 Marks

Distribution of Marks in practical Examination:

1. Experimental work - 20 marks
2. Practical record - 05 marks
3. Viva **-** 05 marks

Study tour:

The B.Sc. students of Biochemistry shall pay at least one visit to any Biochemical/Research Institute as a study tour during three year (six semester) degree course.

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B. Sc. Part III

Semester V

PAPER – I

METABOLISM I

UNIT – I:

Bioenergetics:

a) Concept of free energy, Entropy, Enthalpy & Redox Potential. Determination of $\Delta G^{0'}$ for a reaction.
b) High energy phosphate compounds (Ex.ATP, Phosphoenol pyruvate, Creatine phosphate etc.) – phosphate potential, Free energy of hydrolysis of ATP along with reasons for high $\Delta G^{0,}$. Other high energy compounds.
c) ATP-ADP Cycle, Energy charge (Phosphate potential) & its relation to metabolic regulation.

UNIT II

Techniques involved in metabolic studies: -

a) Studies with intact organisms, Excised organs, Organ slices, Isolated cells, Cell organelles & purified enzymes. Drawbacks & Advantages of each.
b) Studies with microorganisms & tissue culture, Advantages & disadvantages of each.
c) Clinical techniques employed in metabolic studies: Fistula, Catheterization & Organectomy.
d) Tracer studies, Inhibitors & mutation studies.

UNIT – III:

Carbohydrate metabolism: -

a) Detailed account of glycolysis with energy considerations & regulation, Entry of fructose, mannose & galactose in glycolysis, Cori cycle, Futile or substrate cycles in carbohydrate metabolism.
b) Glycogenolysis & Glycogenesis – Detailed account & hormonal control. Glycogen storage diseases.
c) Formation of acetyl CoA & detailed account of TCA Cycle, Isotopic tests of TCA cycle (Concept of Prochirality), Regulation, Amphibolic and anaplerotic nature of TCA cycle.

UNIT IV

Carbohydrate metabolism:-

a) Glyoxylate cycle and its role in conversion of fats into carbohydrates.

b) Gluconeogenesis– Detailed account of bypass reactions, Regulation, Malate & glycerophosphate shuttle system.

c) **Electron Transport chain-** Structure of mitochondria, oxidative and substrate level phosphorylation, Electron carriers of ETC, Incomplete reduction of oxygen (Cell injury – superoxide radicle), ATP Synthase (F1 F0 ATPase), Chemiosmotic hypothesis, Sites of ATP synthesis, Specific inhibitors and uncouplers of oxidative phosphorylation.

B. Sc. Part III

Semester V

PAPER – II

MOLECULAR BIOLOGY

UNIT –I:

DNA Replication in Prokaryotes: -

a) Basic Features of replication: Semiconservative nature of replication with experimental proof, Origin of replication, priming, 5'→3' direction of replication, Leading and lagging strand, bidirectional / unidirectional replication.
b) Different models of replication: Theta (θ) model, Rolling circle or sigma (σ) replication
c) Concept of Okazaki Fragment with experimental proof.
d) DNA replication in E. coli: Initiation, Elongation and Termination

UNIT –II:

DNA Replication in Prokaryotes: -

a) DNA Polymerases: Structure of polymerase I, Structure and properties of Klenow fragment, 5'→ 3' exonuclease activity, Nick translation, DNA polymerase III: Concept of holoenzyme, processivity, Other types of polymerases.

b) Regulation of E. coli Replication: concepts of C and D value.
c) DNA damage & repair: Ames test, types of DNA damage, Mismatch Repair (mut HLS system), Base Excision Repair, Nucleotide Excision Repair, Direct Repair, SOS or Error Prone repair.

UNIT – III:

Transcription: -

a. Basic features of RNA synthesis, Terminology, Prokaryotic RNA polymerases
b. Prokaryotic transcription: Initiation, elongation and termination with reference to Role of promoter, determination of length of promoter by DNA foot printing method. Weak and strong promoters, role of σ subunit, Different kinds of sigma subunits, Promoter binding and activation, RNA chain initiation and promoter escape, abortive initiation, rho dependent and independent termination of transcription.

UNIT – IV:

Transcription: -

a) Inhibitors of prokaryotic transcription: e.g. rifamycins, α-amanatin, Actinomycin D
b) Regulation of gene expression in prokaryotes: Lac Operon & Trp Operon
c) Reverse transcription.
d) Post trancriptional processing of m-RNA : Concept of introns and exons,spliceosome,5' caping and polyadenylation

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B. Sc. Part III Semester V

PRACTICALS

1) To measure concentration of DNA & RNA by UV spectrophotometry.
2) Estimation of protein by Bradford method.
3) UV spectrophotometric estimation of a given protein by E 280\260 method.
4) Colorimetric estimation of inorganic phosphate in serum by Fiske-Subbarow method.
5) Isolation of glycogen from liver source and its estimation by anthrone method.
6) Determination of true glucose by Glucometer/Glucose oxidase method.
7) Determination of glucose by Folin-Wu method.
8) Effect of NaF on glycolysis in RBC by estimating glucose.
9) Determination of creatine & creatinine in urine.
10) Determination of serum acetylcholine esterase.

11) Screening test for glucose-6-phosphate dehydrogenase in RBCs.
12) Determination of serum pyruvate kinase.
13) Isolation of RNA from yeast

(Mandatory to perform at least seven practical)

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Semester V

BOOKS FOR REFERENCE

1) Harper's Biochemistry – Murray, Granner, Mayes, Rodwell – Prentice Hall International Inc.
2) Biochemistry – Lehninger – CBS Publishers.
3) Biochemistry – Stryer – W. H. Freeman & Co. New York.
4) Biochemistry – Geoffrey L. Zubay – McGraw Hill.
5) Biochemistry – J. David Rawn – Neil Patterson publs. NC.
6) Textbook of Biochemistry– West, Todd, Mason, Bruggen – Amerind Publishing Co. Pvt. Ltd.
7) Mol Bio (Fundamentals of molecular biology) – Upadhyay & Upadhyay, Himalaya Publishing House.
8) Molecular Biology – David Friefelder – Narosa Publishing House, New Delhi.
9) Cell Biology, Genetics, Molecular Biology, Evolution & Ecology – Verma, Agarwal – S. Chand & Co.
10) Molecular & Cell Biology – Bhamrah – Anmol Publ. Pvt. Ltd., New Delhi.
11) Molecular Biology of the Cell – Alberts, Bray, Lewis, Raff, Roberts, Watson – Garland Publishers, New York.
12) Molecular Biology of the gene – J. D. Watson, NH Hopkins, Roberts, Stertz, Weiner- Freeman.
13) Molecular Biology of the Gene – Watson, Hopkins, Roberts, Steitz, Weiner – Benjamin Cummings Publishing Co.
14) Molecular Cell Biology – Baltimore, Zipursky, Matsudaria, Darnel – W. H. Freeman & Co., New York.
15) Principles of Biochemistry – White, Handler, Smith – McGraw Hill Publ.
