S.R.R&C.V.R Govt. Degree College

DEPARTMENT OF BIOCHEMISTRY

BOARD OF STUDIES- AY 2019-20
DATE - 19/02/2019

For program MBC

SRR & CVR GOVERNMENT DEGREE COLLEGE (AUTONOMOUS)

Vijayawada 520004

Minutes of the meeting of the Up gradation of syllabus in the subject of

BIOCHEMISTRY

The meeting of in the subject of BIOCHEMISTRY was held on 19th February 2019 in Dept. of Biochemistry, SRR & CVR Govt. Degree College (Autonomous), Vijayawada 520004. The following members attended the meeting;

LIST OF BOS MEMBERS

S.NO	NAME	QUALIFICATION	DESIGNATION	ADDRESS
1.	Mrs.Syed Vaziha Tahaseen	M.Sc,M.Phil,B.Ed	Chairman	I/c. Dept. of Biochemistry SRR&CVR GDC (Autonomous).
2.	Dr. J. Rajeswari	M.Sc, Ph.D	University Nominee	HOD, Dept. of Biochemistry, ANU, Guntur
3.	Dr. P. Kiranmayi	M.Sc, M.Phil, Ph.D	Subject Expert	Asst. Professor, Dept. of Biochemistry, ANU, Guntur
4.	Mrs. Dorka Vijaya Kumari.B	M.Sc, B.Ed	Subject Expert	I/c. Dept. of Biochemistry GCW (Autonomous), Guntur

AIMS AND OBJECTIVES OF THE COURSE

Aims:

- Understand the scientific basis of life processes at the molecular level.
- Orient towards the application of knowledge acquired in solving clinical problems.

OBJECTIVES:

Knowledge Based:

- Broad understanding of fundamental biological processes
- Describe the molecular & functional organization of a cell & list its sub cellular components.
- Delineate structure, function & interrelationship of various biomolecules & consequences of deviation from normal.
- Summaries the fundamental aspects of enzymology & clinical applications wherein regulation of enzymatic activity is altered.
- Describe digestion & assimilation of nutrients & consequences of malnutrition.
- Integrate the various aspects of metabolism & their regulatory pathways.
- Explain biochemical basis of inherited disorders with their associated sequelae.
- Outline the molecular mechanisms of gene expression.
- Describe the principles of genetic engineering & their applications in medicine.
- Summaries the molecular concepts of body defenses & their applications in medicine.
- Familiarize with principles of various lab investigations & instrumentation analysis & interpretation of a given data.
- Suggest experiments to support theoretical concepts & clinical diagnosis.

Skill Based:

- Make use of conventional techniques/instruments to perform biochemical analysis relevant to clinical screening & diagnosis.
- Demonstrate the skills of solving scientific & clinical problems & decision making.
- Prepare students for higher studies or for employment in industry, academia.

Integration:

- Integrate molecular events with structure & function of the body in health & disease.

Discussions in Bos conducted on 19/2/2019

Discussions made on the Krishna University biochemistry CBCS syllabus for SEM V and SEM VI

The chairperson of the BoS Sd V Tahaseen welcomed the members and introduced the Krishna university syllabus for semester V paper V and Paper VI and semester VI paper VII

As per the feedback report received from the stakeholders on 2017-18 ,SEM 3 and SEM 4 syllabus minor revisions were carried out

Sem V and VI syllabus were taken from Krishna university syllabus and major changes were made.

Sem V -Paper V Immunology & Endocrinology

University nominee Dr. Rajeswari suggested to add immune response in unit 1

Subject expert Dr. P. Kiranmayi suggested that Antigen and antibody reactions are specified to agglutination, precipitation, ELISA and RIA

Mrs. Dorka Vijaya Kumari proposed to permit the hormones of the reproductive system only to estrogen and progesterone.

Sem V Paper VI - Molecular biology and r DNA technology

As per the suggestion of university subject expert Dr. Kiranmayi the concept of gene introdued

Dr. Rajeswari suggested for post translational modifications

All BoS members proposed to keep the production of insulin and growth hormone as a part of animal biotechnology and production of Bt cotton and golden rice as examples for agricultural biotechnology.

Resolutions:

1. Resolved to adopt the present University CBCS syllabus for semester V course with the suggested modifications.
2. Resolved to approve the division of marks for internal and external examination along with the suggested blue print and model paper.
3. Resolved to approve the list of paper setters and examiners submitted by the department

S.NO	NAME	DESIGNATION	SIGNATURE
1.	Mrs.Syed Vaziha Tahaseen	Chairman	
2.	Dr. J. Rajeswari	University Nominee	—
3.	Dr. P. Kiranmayi	Subject Expert	
4.	Mrs. Dorka Vijaya Kumari.B	Subject Expert	

Principal

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BIOCHEMISTRY SYLLABUS FOR V SEMESTER

BIOCHEMISTRY - PAPER – VI

MOLECULAR BIOLOGY & r DNA TECHNOLOGY

Periods: 60 Max. Marks: 60

Unit- I: Gene & genome

1.1 Organisation of genetic material ;

1.2 Experiments to prove DNA as genetic material ;

1.3 Concept of gene, Nature and structure of gene.

1.4 DNA replication- models of replication, Meselson-Stahl's experimental proof for semi conservative model. DNA polymerases I, II and III of E.coli, helicase, topoisomerases. primase, ligase.

1.5 Mechanism of DNA Replication. Bidirectional replication model. Okazaki fragments. leading and lagging strands of DNA synthesis.

1.6 Inhibitors of DNA replication.

UNIT- II: DNA Replication and Transcription in prokaryotes

2.1 Transcription - RNA synthesis, RNA polymerases of prokaryotes. Promoters, Initiation sigma factors and their recognition sites. Elongation- role of core enzyme Termination- rho dependent and rho-independent.

2.2 Regulation of prokaryotic gene expression at transcriptional level- Lac operon concept.

2.3 Introduction to post transcriptional modifications-mRNA capping, polyadenalytion. splicing.

Unit- III Protein Synthesis and Regulation of Gene Expression

3.1 Genetic code, deciphering of genetic code.

3.2 Wobble hypothesis, degeneracy of genetic code.

3.3 Protein synthesis- activation of amino acids (aminoacyl t-RNA synthetase).

3.4 Ribosome structure. Initiation, elongation and termination of protein synthesis.

3.5 Introduction to Post- translational modifications.

3.6 Inhibitors of protein synthesis.

Unit-IV: Recombinant DNA Technology

4.1 Outlines of cloning strategies.

4.2 Tools of r-DNA technology: Enzymes- Restriction endonucleases, T4 DNA ligase,Ecoli DNA ligase phosphatases,reverse transcriptase, polynucleotide kinases, terminal transferases.

4.3 Cloning vectors- Plasmids,λ phage vectors,cosmids. Expression vectors-E.coli.

4.4 Construction of c-DNA and Genomic libraries. Isolation of cloned genes- Colony hybridization.

Unit V -Applied Biochemistry

5.1 DNA sequencing- Maxam Gilbert and Sanger's method.

5.2 Polymerase chain reaction- principle and applications.

5.3 Outlines of blotting techniques-Southern, Northern and Western.

5.4 Applications of gene cloning- production of insulin and human growth hormone. production of Bt cotton and golden rice.

Additional inputs: C-Value paradox, Telomerase,Signal hypothesis.

BIOCHEMISTRY PRACTICAL SYLLABUS FOR V SEMESTER
BIOCHEMISTRY - PAPER – VI
MOLECULAR BIOLOGY & rDNA TECHNOLOGY

Periods: 30 **Max. Marks: 50**

List of Experiments:

2. Estimation of DNA by diphenylamine method.
3. Estimation of RNA by orcinol method.
4. Preparation of Buffer stocks (TBE,TE and TAE)
5. Agarose Gel Electrophoresis (AGE).
6. Extraction of DNA from Agarose gel
7. Plasmid Isolation (Mini prep)
8. Extraction of DNA from Fish Fins
9. Isolation of RNA
10. Restriction Digestion

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BIOCHEMISTRY SEMISTER V

MODEL QUESTION PAPER (THEORY)

MOLECULAR BIOLOGY & rDNA TECHNOLOGY

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions 5×4 M=20 M

Each question carries FOUR marks

1. Wobble hypothesis.
2. Nature of gene.
3. Inhibitors of DNA replication.
4. Messelson & stahl experiment.
5. Post translational modifications.
6. Amino acyl t RNA Synthetases.
7. DNA ligases.
8. Plasmid vector.
9. Southern blotting.
10. Golden rice.

Part-B

Answer ALL THE following questions. 5 X 8M=40M

Each question carries 8marks

I(a). Discuss nuclear genome organization.

Or

(b). Write an account on the experiments carried out on deciphering the genetic code.

2(a). Write about the mechanism of replication in prokaryotes.

Or

(b). Describe in detail the mechanism of transcription in prokaryotes.

3(a). Write in detail about the lac operon concept.

Or

(b) Discuss about the protein synthesis in detail.

4(a). Write about the enzymes used in rDNA technology in detail.

Or

(b). Describe any three cloning vehicles used in rDNA technology.

5(a). Discuss about the DNA Sequencing technique by sanger's method.

Or

(b). Explain about the principle and applications of PCR.

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BIOCHEMISTRY SYLLABUS FOR V SEMESTER
BIOCHEMISTRY - PAPER – VI
MOLECULAR BIOLOGY& r DNA TECHNOLOGY
BLUE PRINT FOR QUESTION PAPER

S.No	Type of Questions→ / Units ↓	SA 4 marks	SA 4 marks	SA 4 marks	LA 8 marks	LA 8 marks	Total 60 Marks
		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Gene & genome	2Q	Student choice	8 M	1 Q	8 M	16M
2	UNIT-II: DNA Replication and Transcription in prokaryotes	2Q		8 M	1Q	8M	16M
3	UNIT-III : Protein Synthesis and Regulation of Gene Expression	2 Q		8M	1Q	8 M	16M
4	UNIT-IV Recombinant DNA Technology	2Q		8 M	1 Q	8 M	16M
5	UNIT- V Applied Biochemistry	2Q		8M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M

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BIOCHEMISTRY SYLLABUS FOR V SEMESTER
BIOCHEMISTRY - PAPER – V
IMMUNOLOGY & ENDOCRYNOLOGY

Periods: 60 Max. Marks: 60

UNIT – I Overview of Immune system

1.1 Introduction to basic concepts in Immunology.
1.2 Innate immunity-mechanism and types of acquired immunity.
1.3 Cells of immune system.
1.4 Organs of immune system, immune response.

UNIT – II Antigens and Antibodies &Immune system in Health and Disease

2.1 Basic properties of antigens, factors influencing immunogenicity.
2.2 Haptens and adjuvants.
2.3 Structure of antibody, classes and functions of antibodies.
2.4 Classification and brief description of various types of hyper sensitivities.
2.5 Types of autoimmunity.

Unit – III Immunological techniques

3.1 Major histo compatibility complexes.
3.2 Monoclonal antibodies.
3.3 General introduction to Vaccines, Types of vaccines.
3.4 Antigen-antibody reactions-Agglutination, Precipitation, ELISA, RIA.

Unit – IV Endocrinology I

4.1 Organization of endocrine system.
4.2 Classification of hormones.
4.3 Mechanism of hormonal action, signal transduction pathways.
4.4 Pituitary hormones - GH, TSH, LH, FSH, oxytocin and vasopressin (physiological role).

Unit –V Endocrinology II

Structure, physiological role and disorders of:

5.1 Hormones of pancreas- insulin, glucagon.
5.2 Thyroid, parathyroid hormones.
5.3 Hormones of Adrenal glands.
5.4 Introduction to gastrointestinal hormones.
5.5 Reproductive hormones-Estrogen,progesterone.

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BIOCHEMISTRY SEMISTER V#

MODEL QUESTION PAPER (THEORY)

IMMUNOLOGY

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions 5×4 M=20 M

Each question carries FOUR marks

1. Lymphocytes.
2. Passive immunity.
3. Adjuvents.
4. Characteristics of antigen.
5. ELISA.
6. Vaccines.
7. Signal transcription.
8. Hormones of placenta.
9. GI Hormones.
10. Parathyroid hormone.

Part-B

Answer ALL THE following questions. 5 X 8M=40M

Each question carries 8marks

11.(a)Discuss in detail about the mechanism of innate immunity

Or

(b) Write about the organs of immune system.

12.(a)Explain about the classes & functions of antibodies.

Or

(b) Define hypersensitivity discuss about the types of hypersensitivity reactions.

13 (a) discuss about the synthesis & applications of monoclonal antibodies.

Or

(b) Write a note on MHC complex

14.(a) Write about the mechanism of hormonal action.

Or

(b) Discuss about the pituitary hormones.

15.(a) Write about the structure physiological role and disorders of thyroid hormones.

Or

(b) Write about the structure, physiological role & disorders of insulin.

BIOCHEMISTRY PRACTICAL SYLLABUS FOR V SEMESTER
BIOCHEMISTRY - PAPER – V
IMMUNOLOGY& ENDOCRINOLOGY

Periods: 24 Max. Marks: 50

List of Experiments:

1. Collection of serum from blood.
2. Determination of blood group and Rh typing.
3. HCG based pregnancy test.
4. Glucose tolerance test.
5. Indirect ELISA
6. Sandwich ELISA
7. Direct ELISA
8. Purification of IgG Antibodies with Ammonium Sulphate
9. Ouchterlony Double Diffusion –Titration
10. Ouchterlony Double Diffusion - Patterns

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BIOCHEMISTRY SYLLABUS FOR V SEMESTER
BIOCHEMISTRY - PAPER – V
IMMUNOLOGY & ENDOCRYNOLOGY
BLUE PRINT FOR QUESTION PAPER

S.No	Type of Questions→ Units ↓	SA 4 marks	SA 4 marks	SA 4 marks	LA 8 marks	LA 8 marks	Total 60 Marks
		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Overview of Immune system	2Q	Student choice	8 M	1 Q	8 M	16M
2	UNIT-II: Antigens and Antibodies &Immune system in Health and Disease	2Q		8 M	1Q	8M	16M
3	UNIT-III : Immunological techniques	2 Q		8M	1Q	8 M	16M
4	UNIT-IV Endocrinology I	2Q		8 M	1 Q	8 M	16M
5	UNIT- V Endocrinology II	2Q		8M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60M

Practical examination pattern for semester end examinations

Practical – I :

Practical examination in Dept. of Biochemistry is held before I st and 2nd semester exams twice in a year to test practical skills among the students.

Total marks allotted for practical are 50 marks which are divided as 25 for internal and 25 for external for the duration of three hours in each semester

The division of marks is as follows

External

Major Experiment	Minor Experiment	To identify the the instrument to give the working principle	Record	VIVA
8 Marks	4 Marks	2 X 2 ½ =5 Marks	5Marks	3Marks

Internal

Record	Project viva	Continuous assessment
10 marks	10 marks	5 marks

INTERNAL ASSESSMENTS

A total of 40 Marks is allotted for internals in Dept. of **Biochemistry**, which facilitate continuous assessment of students, to know their progress. It also facilitates the teacher to take necessary remedial activity for slow learners and to encourage the bright students by giving respective tasks.

Mid Semesters: Among the 40 marks of internals, 10 marks are given for common Written test as Mid sem exam. Two mid sem exams each of 25 marks will be conducted and the average is taken.

Two assignments are conducted for 10 marks,5 marks will be given for each assignment

5 marks are allotted for Student Seminars and 5 marks are allotted for continuous assessment including viva/PPT

10 marks are allotted for project work

Division of 40 Marks of Internal assessment :

1	2	3	4	5	6	5	6
1st Mid semester exam	2nd Mid semester exam	Total of Mid semester exams	Assignments	Student Seminars	Continuous assessment including viva	project	Total Marks of Internal
Written test	Written test	Average of 1 & 2 exams	2 Assignments each for 5 marks				
25marks	25 marks	10 marks	10 marks	5 marks	5 marks	10 marks	40 marks

Panel of examiners & Paper setters

S.No	Name	Qualification	Designation & Address	Contact No.
1.	Dr. J. Rajeswari	M.Sc, Ph.d	Asst. Professor, Dept. of Biochemistry, ANU, Guntur	9494595897
2.	Dr.P. Kiranmayi	M.Sc, M.Phil, Ph.D	Asst. Professor, Dept. of Biochemistry, ANU, Guntur	9441748123
3.	Mrs .B. Durka vijaya kumari	M.Sc,B.Ed	Lecturer in Bio-Chemistry, Govt. College for Women , GUNTUR Email:durga.vjw.gmail.c	Phone 9963928874
4.	Mrs.D.Vijayasree	M.Sc, B.Ed.	Lecturer in Bio-Chemistry, Govt.college for women, GUNTUR Vijayasree.d@gmail.com	9177814172
5	Mrs. K. Ratna Kumari	M.Sc. M.Ed (ph.D)	Asst.Professor (contractual) Dept.of.Biochemistry, Krishna university Machilipatnam, Krishna district.	9848441153
6.	Mr. K.Yesuratnam	M.Sc, B.Ed	HOD., Dept. of Biochemistry Vignan Degree College, Guntur.	9440734416
7.	Mrs. B. Dhanasree	M.Sc., M.Phil	I/c. Dept. of Biochemistry KVR Govt. Degree College for Women, Kurnool.	9247164712
8.	Mr. Satheesh Kumar. B	M.Sc., (Ph.D)	Lecturer in Biochemistry Dept.of.Chemistry Sri ABR GDC, Repalle, Guntur.	9951184576
9.	Mrs. Padmaja. M	M.Sc	Lecturer in Biochemistry Dept.of Chemistry GDC, Bhadrachalm Khammam.	9985748090
10.	Mrs. Sarala	M.Sc	Lecturer in Biochemistry Silver Jubilee College (Autonomous), Kurnool.	8125877632

BIOCHEMISTRY PRACTICAL SYLLABUS FOR V SEMESTER
BIOCHEMISTRY - PAPER – V
IMMUNOLOGY & ENDOCRINOLOGY

Periods: 24 Max. Marks: 50

List of Experiments:

1. Collection of serum from blood.
2. Determination of blood group and Rh typing.
3. HCG based pregnancy test.
4. Glucose tolerance test.
5. Indirect ELISA
6. Sandwich ELISA.
7. Direct ELISA
8. Purification of IgG Antibodies with Ammonium Sulphate
9. Ouchterlony Double Diffusion – Titration
10. Ouchterlony Double Diffusion - Patterns

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BIOCHEMISTRY SYLLABUS FOR V SEMESTER
BIOCHEMISTRY - PAPER – V
IMMUNOLOGY & ENDOCRYNOLOGY
BLUE PRINT FOR QUESTION PAPER

S.No	Type of Questions→ Units ↓	SA 4 marks	SA 4 marks	SA 4 marks	LA 8 marks	LA 8 marks	Total 60 Marks
		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Overview of Immune system	2Q	Student choice	8 M	1 Q	8 M	16M
2	UNIT-II: Antigens and Antibodies &Immune system in Health and Disease	2Q		8 M	1Q	8M	16M
3	UNIT-III : Immunological techniques	2 Q		8M	1Q	8 M	16M
4	UNIT-IV Endocrinology I	2Q		8 M	1 Q	8 M	16M
5	UNIT- V Endocrinology II	2Q		8M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M

S.R.R&C.V.R Govt. Degree College

DEPARTMENT OF BIOCHEMISTRY

BOARD OF STUDIES- AY 2019-20
DATE - 28/08/2019

For MBC program

SRR & CVR GOVERNMENT DEGREE COLLEGE (AUTONOMOUS)
Vijayawada 520004

Minutes of the meeting of the Accreditation of syllabus in the subject of

BIOCHEMISTRY

The meeting of the Board of Studies in the subject of BIOCHEMISTRY was held on 28th Aug 2019 in Dept. of Biochemistry, SRR & CVR Govt. Degree College (Autonomous), Vijayawada 520004. The following members attended the meeting:

LIST OF BOS MEMBERS

S.No	Name	Qualification	Designation	Address
1.	Mrs.Syed Vaziha Tahaseen	M.Sc,M.Phil,B.Ed	Chairman	I/c. Dept. of Biochemistry SRR&CVR GDC (Autonomous)
2.	Dr. J. Rajeswari	M.Sc, Ph.D	University Nominee	HOD, Associate Professor. Dept. of Biochemistry, ANU, Guntur
3.	Dr. P. Kiranmayi	M.Sc, M.Phil, Ph.D	Subject Expert	Assistant professor, Dept. of Biochemistry, ANU, Guntur
4.	Mrs. Dorka Vijaya Kumari.B	M.Sc, B.Ed	Subject Expert	Assistant professor Dept. of Biochemistry GCW (Autonomous), Guntur

Discussions in Bos conducted on 28/07/2019

Discussions made on the Krishna University biochemistry CBCS syllabus for SEM VI

The chairperson of the BoS Sd V Tahaseen welcomed the members and introduced the Krishna university syllabus for semester VI Paper VII

Paper VI Human physiology and clinical Biochemistry

the concept anticoagulants Was added

the concept of neurotransmitters was permitted to only Two neurotransmitters

Discussions on cluster papers

The BOS members discussed on cluster papers and based on the students Student responses for selecting the " B" as the cluster paper The following modifications from the University syllabus was done

Cell Biology VIII B1

In B1 paper

Unit 3 the peroxisomal Assembly is deleted and only functions peroxisomes was kept

In unit 4 only the brief introduction to apoptosis and necrosis was given

Biotechnology VII B2

in B2 paper

Unit 5 enzyme electrodes and biosensors topic is best so only introduction to these is kept in the syllabus

Bioinformatics and Biostatistics

In B3 pape

Unit 1 the basic of computer operating system hardware software and introduction to programming languages topic was given as an introduction to students no questions should be framed from these in the examination

Resolutions:

1. Resolved to adopt the present CBCS syllabus for semester VI course with the suggested modifications.
2. Resolved to approve the division of marks for internal and external examination along with the suggested blue print and model paper.
3. Resolved to approve the list of paper setters and examiners submitted by the department

S.NO	NAME	DESIGNATION	SIGNATURE
1.	Mrs.Syed Vaziha Tahaseen	Chairman	
2.	Dr. J. Rajeswari	University Nominee	25/8/19
3.	Dr. P. Kiranmayi	Subject Expert	28/8/19
4.	Mrs. Dorka Vijaya Kumari.B	Subject Expert	28/8
5.	G.Pravallika	Member	

Principal

AP STATE COUNCIL OF HIGHER EDUCATION
BIOCHEMISTRY COURSE STRUCTURE UNDER CBCS
(w.e.f. 2019-20, Revised)

YEAR	SEMESTER	PAPER	TITLE	MARKS	CREDITS
I	I	I	Theory- PAPER I-Biomolecules BC1325	100	03
			Practical – I Qualitative Analysis	50	02
	II	II	Theory –Paper II BC2325 Nucleic acids and biochemical techniques	100	03
			Practical - II, Isolations and Biochemical Techniques	50	02
II	III	III	Theory-paper III: Enzymology and BC3325Bioenergetics	100	03
			Practical – III, Enzymology	50	02
	IV	IV	Theory – PAPER IV IntermediaryMetabolism	100	03
			Practical - IV: QualitativeAnalysis	50	02
III	V	V	Theory – Paper V Immunology & Endocrinology	100	03
			Practical – V - Immunology	50	02
		VI	Theory – PAPER VI Molecular biology & r DNA technology	100	03
			Practical - Molecular biology & r DNA technology	50	02
	Any one	VII A	Human Physiology &Clinical biochemistry VII A	100	03
			Practical - Human Physiology &Clinical biochemistry VII (A)	50	02
		VII B	Nutrition and health – VII (B)	100	03
			Practical - Nutrition and health VII (B)		

cluster from I and II VI	Cluster VIII-A**	Cluster Electives –VIII-A Medical diagnostics 1.Clinical Microbiology 2.Biochemical Correlations in Diseases 3. Hematology Practical – VIII: 1 Practical – VIII: 2 Project Work	 100 100 100 50 50 50	 03 03 02 02 02
	Cluster VIII-B**	**Cluster Electives –VIII-B : Biotechnology** 1.Cell biology 2. Biotechnology 3.Bioinformatics and biostatistics Practical—VIII: 1 Practical – VIII: 2 Project Work	 100 100 100 50 50 50	 03 03 03 02 02

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY ELECTIVE PAPER – VII(A)
HUMAN PHYSIOLOGY AND CLINICAL BIOCHEMISTRY

Periods: 45

Max. Marks: 60

UNIT- I: Blood and Cardiovascular physiology

1.1 Composition of blood

1.2 Transport of gases in blood (O_2 and CO_2).

1.3 Molecular mechanism of blood coagulation, anticoagulants.

1.4 Heart- structure of the heart, cardiac cycle,

UNIT-II: Gastrointestinal and Renal physiology

2.1 Digestion and absorption of carbohydrates, lipids and proteins, digestive enzymes.

2.2 Metabolic importance of liver.

2.3 Structure of Kidneys, structure and function of Nephron

2.4 Mechanism of Urine formation-GFR, Tubular reabsorption & secretion

UNIT-III: Muscle and Neuronal physiology

3.1 Types of neurons, generalized structure of multipolar neuron.

3.2 Neurotransmission, Resting membrane potential, Action potential, Transmission of nerve impulse along an axon and across a synapse.

3.3 Classification of neurotransmitters (inhibitory and excitatory).

3.4 Types of muscle tissues-skeletal, smooth, and cardiac.

3.5 Mechanism of muscle contraction

UNIT-IV: Clinical biochemistry - I

4.1 Types of anaemias-iron deficiency anaemia, megaloblastic anaemia, haemophilia, sickle cell anaemia.

4.2 Hyper tension, Congestive Heart Disease, Atherosclerosis.

4.3 Urine: Normal composition of urine-volume, pH, colour, specific gravity. Normal constituents-urea, uric acid, creatinine. Abnormal constituents of urine-glucose, albumin, ketone bodies, variations in urea, creatinine and their clinical significances in brief.

UNIT-V: Clinical biochemistry – II

5.1 Diagnostic enzymes: enzymes in health and diseases. Biochemical diagnosis of disease by enzyme assays- SGPT, SGOT, alkaline phosphatase, CPK, cholinesterase, LDH.

5.2 Liver function tests- conjugated and total bilirubin in serum, albumin: globulin ratio

5.3 Renal function tests- creatinine and urea clearance tests, phenol red test.

5.4 Glomerular nephritis, renal failure and Dialysis.

Suggested Readings:

1. Human Physiology, Vol. I & II, - C. C. Chatterjee – Medical Allied Agency – Calcutta.
2. Concise Medical Physiology – Choudhary – New Central Book Agency – Calcutta
3. TextBook of Medical Physiology – Guyton – Prism Books Pvt. Ltd. – Bangalore.
4. Harper's Biochemistry – Murray, Granner, Mayes, and Rodwell – Prentice Hall International Inc.
5. Textbook of medical physiology: A. C. Gyton, and J. E HallSaunders
6. Elsevier Publications, A division of Reed Elsevier India Pvt .Ltd.New Delhi ISBN 81-8147-084-2
7. Human physiology: Chatterjee, Medical Allied Agency.

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BIOCHEMISTRY PRACTICAL SYLLABUS FOR V SEMESTER
BIOCHEMISTRY - ELECTIVE PAPER – VII(A)
HUMAN PHYSIOLOGY AND CLINICAL BIOCHEMISTRY (PRACTICALS)

1. Haematology.
a. RBC and WBC counting.
b. Differential leukocyte count.
c. Clotting time.
2. Separation of plasma proteins.
3. Urine analysis for albumin, sugars and ketone bodies.
4. Estimation of urinary creatinine.
5. Estimation of blood Glucose.
6. Estimation of serum total cholesterol.

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BIOCHEMISTRY SEMISTER VII- A

HUMAN PHYSIOLOGY AND CLINICAL BIOCHEMISTRY

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions 5×4 M=20 M

Each question carries FOUR marks

1. RBC
2. Anticoagulants
3. Brief Account on Digestive Enzymes
4. Structure of Kidneys with Neat Diagram
5. Write a Brief Note on Synaptic Transmission
6. Structure of neuron
7. Write About The Anemia's Related to Genetical Disorders
8. Atherosclerosis
9. Write about Glomerular Nephritis
10. Conjugated and Unconjugated Billirubin

Part-B

Answer ALL THE following questions. 5 X 8M=40M

Each question carries EIGHT marks

11 (a). Write about the Transportation of Gases in the Blood

(OR)

(b). Given an Account on Mechanism of Blood Coagulation

12 (a). Write about the Structure of Nephron in Detail

(OR)

(b). Give an Account on Mechanism of Urine Formation

13 (a). Discuss about the neurotransmitters and inhibitors of neuro transmission in Detail

(OR)

(b). Define Hypertension and Discuss About Heart Diseases

14 (a). Write about the Normal and Abnormal Constituents Of Urine

(OR)

(b). Write about the Mechanism of Muscle Contraction

15 (a). Write about the Diagnostic Enzymes That Are Used In Health and Disease in Detai

(OR)

(b). Discuss About the Liver Function Tests in Detail

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY ELECTIVE PAPER – VII(A)
HUMAN PHYSIOLOGY AND CLINICAL BIOCHEMISTRY
BLUE PRINT FOR QUESTION PAPER

S.No	Type of Questions→ / Units ↓	SA 4 marks	SA 4 marks	SA 4 marks	LA 8 marks	LA 8 marks	Total 60 Marks
		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Blood and Cardio vascular physiology	2Q	Student choice	4 M	1 Q	8 M	16M
2	UNIT-II: Gastro intestinal and Renal physiology	2Q		4 M	1Q	8M	16M
3	UNIT-III : Muscle and Neuronal physiology	2 Q		4M	1Q	8 M	16M
4	UNIT-IV Clinical biochemistry - I	2Q		4M	1 Q	8 M	16M
5	UNIT- V Clinical biochemistry - II	2Q		4M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY ELECTIVE PAPER – VII(B)
NUTRITION AND HEALTH

Periods: 45 Max. Marks: 60

Unit –I: Nutritional Biochemistry - I

1.1 Balanced diet.
1.2 Calorific values of foods and their determination by bomb calorimeter.
1.3 Specific dynamic action of foods.
1.4 BMR and factors affecting it.
1.5 BMI & its determination.

Unit- II: Nutritional Biochemistry - II

2.1Recommended dietary allowance (RDA) for children, adults, Pregnant and lactating women.
2.2 Biological value of proteins.
2.3 Malnutrition- Kwashiorkor, Marasmus and PEM.
2.4 Obesity and starvation.
2.5 Diabetes mellitus (Type I and Type II)

Unit- III: Sources, structure, biochemical roles, deficiency disorders

3.1 Fat soluble vitamins A, D, E, K
3.2 Water soluble vitamins thiamine, riboflavin, niacin, pyridoxine, folate, Vitamine B12, vitamin C.
3.3 Ca, P, Fe, Zn, Cu their distribution in the body, Digestion, Absorption, Utilization, Transport, Excretion, Balance, Deficiency, Toxicity, Sources, RDA.
3.4 Iodine, Fluoride, Mg, Se, Manganese, Molybdenum, their distribution in the human body. Physiology, Function, deficiency, Toxicity and Sources.

Unit- IV: Life style diseases

4.1 Hypertension
4.2 Metabolic syndrome
4.3 Fluorosis
4.4 Effect of Smoking
4.5 Effect of Alcoholism

Unit- V: Food Adulteration

5.2Adulterants in commonly consumed food items
5.3 Accidental contamination: botulism, staphylococcal and aflatoxin intoxication
5.4 Importance of food labels in processed foods and nutritional labelling
5.5 Food laws, regulations and standards
- Prevention of Food Adulteration (PFA) Act
- Agmark
- Fruit Products Order (FPO)
- Meat Products Order (MPO)
- Bureau of Indian Standards (BIS)
- MMPO
- FSSAI

Suggested Readings:

1. Nutritional Biochemistry – MS Swaminathan (2015)
2. Nutrition and Dietetics by Davidson S and Passmor JR (2001)
3. Food science by B. Sreelakshmi (2010)
4. Food facts and principles –Sakunthala Manay, Sadhakshara Swami (2008)

BIOCHEMISTRY PRACTICAL SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY ELECTIVE PAPER – VII(B)
NUTRITION AND HEALTH PRACTICLES

1. Determination of moisture content of food
2. Determination of Vitamin C content in lemon juice
3. Estimation of amino acid by titration
4. Determination of saponification value of oil
5. Determination of iodine value of oil
6. Estimation of reducing sugars by Hedgedon & Jesson method
7. Estimation of minerals in food samples

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BIOCHEMISTRY SEMISTER VI, PAPER VIII(B)

NUTRITION AND HEALTH

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

5×4 M=20 M

Answer any FIVE of the following questions

Each question carries FOUR marks

1. Write a short note on Balanced Diet
2. Define SDA and give it's significance
3. Explain Biological Value of Proteins
4. Explain about Obesity and Starvation
5. What are the sources and deficiency Disorders of Vitamin B_1.
6. What are the sources and deficiency Disorders of Vitamin K
7. Give a short note on Smoking & related Problems
8. Give a short note on Alcoholism & related Problems
9. Write about Botulism and Aflatoxin Intoxication
10. Write short notes on Adulterants in commonly consumed food items

Part-B

5 X 8M=40M

Answer ALL THE following questions.
Each question carries EIGHT marks

11(a) Define Colorific Values of food and discuss about the determination of Calorific values of food by using Bomb Colorimeter.

(OR)

(b). Define BMR and the factors effecting BMR.

12(a). Define RDA and discuss about the Recommended Dietary Allowances for different age groups

(OR)

(b). Discuss about the Malnutritional Diseases in children

13(a). Write about the sources, structure, biochemical roles and deficiency disorders of Vitamin C

(OR)

(b). Write about the sources, structure, biochemical roles and deficiency disorders of Vitamin B_1

14(a). Discuss about the Metabolic Syndrome

(OR)

(b). Write brief account on Life Style Diseases

15(a). Write about Food Laws & discuss about different types of standards that are followed in Food Laws regulation

(OR)

(b). What Is Accidental Contamination of food, discuss about it

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY ELECTIVE PAPER – VII(B)
NUTRITION AND HEALTH
BLUE PRINT FOR QUESTION PAPER

		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Nutritional Biochemistry - I	2Q	Student choice	4 M	1 Q	8 M	16M
2	UNIT-II: Nutritional Biochemistry - II	2Q		4 M	1Q	8M	16M
3	UNIT-III : Sources, structure, biochemical roles, deficiency disorders	2 Q		4M	1Q	8 M	16M
4	UNIT-IV: Life style diseases	2Q		4M	1 Q	8 M	16M
5	UNIT- V : Food Adulteration	2Q		4M	1 Q	8 M	16M.
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M

BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIBA-1
CLINICAL MICROBIOLOGY

Periods: 45 Max. Marks: 60

Unit-I Introduction to microscopy and bacteria

1.1 Microscopy (Bright field, Dark field, Phase contrast and Fluorescence microscopy)
1.2Classification of bacteria
1.3 Morphology of bacteria
1.4 Sterilization techniques-(physical agents & chemical agents)
1.5 Staining of micro-organisms - principle and procedure of gram stain and acid fast stain.

Unit-II Microbial nutrition

2.1 Nutritional requirements of bacteria
2.2 Different types of media for growing bacteria and fungi.
2.3 Bacterial Growth curve
2.4 Batch and continuous culture
2.5 Growth of micro-organisms, factors influencing growth – Nutrition, carbon source, nitrogen source, temperature, pH and oxygen.

Unit-III Bacterial diseases

Infection and pathogenicity, diagnostics, therapeutics and vaccines, drug resistance.
5.1Typhoid.
5.2 Botulism.
5.3 Tuberculosis.
5.4 Cholera.

Unit – IV Viral diseases

3.1 Classification of viruses based on genetic material
3.2 Structure and composition of viruses
3.3 Isolation and cultivation of viruses.
3.4 AIDS: history, causative agent, pathogenesis, diagnostics, drugs.
3.5 Other viral diseases such as Hepatitis, Rabies and Polio-History, causative agent, pathogenesis, diagnostics, drugs

Unit-V Host pathogen interactions, antibiotics and toxins

4.1 Host pathogen interactions of bacteria
4.2 Virulence factors and host pathogen interactions of viruses
4.3 Bacterial toxins, enterotoxins and their mode of action.
4.4 Antibiotics: Definition, mechanism of action of penicillin streptomycin, and chloramphenicol, antibiotic resistance in brief.

Suggested readings:

1. Jawetz, Melnick and Adelbergs Medical Microbiology 27th ed., McGraw Hill Education
2. Klein's Microbiology (2008) 7th ed., Prescott, Harley, Wiley, J.M., Sherwood, L.M., Woolverton, C.J. McGraw Hill International Edition (New York)
3. Sherris Medical Microbiology: An introduction to infectious diseases (2010). Kenneth
J. Ryan, C. George Ray, Publisher: McGraw-Hill.

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIIIA-1
CLINICAL MICROBIOLOGY PRACTICALS

1. Grams staining for bacteria
2. Isolation and culture of bacteria from water/sewage samples.
3. Demonstration of various media for bacterial culture
4. Isolation and enumeration of bacteriophages (PFU) from water/sewage samples
5. WIDAL test
6. Acid fast staining
7. Permanent slides of pathogens: Mycobacterium tuberculosis, Leishmania, Plasmodium falciparum.

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BIOCHEMISTRY SEMISTER VI, PAPER VIIIA-1

CLINICAL MICROBIOLOGY

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions 5×4 M=20 M

Each question carries FOUR marks

1.Acid fast staining

2.Sterlization by dry and moist heat .

3.Batch and continous cultures.

4.Fungal growth media

5.Write a brief note on drug resistance for bacterial diseases .

6.Pathogenicity of Typhoid .

7.Cultivation of viruses.

8.Structure of HIV.

9.Enterotoxins .

10.Chloramphenicol.

Part-B

Answer ALL THE following questions. 5 X 8M=40M

Each question carries **EIGHT** marks

11(a).Discuss about the structure of bacteria in detail .

(OR)

(b). Write about the principle and applications of Bright field microscopy .

12(a).Discuss about the types of media used for growth of bacteria .

(OR)

(b). Write an account on the factors influencing the bacterial growth.

13(a).Discuss about the pathogencity ,diagnosis and therapeutics of Tuberculosis .

(OR)

(b). Discuss about the pathogencity , diagnosis and therapeutics of Cholera .

14(a).Write about the classification of viruses based on genetic material .

(OR)

(b).Describe about the virus isolation and cultivation techniques .

15(a).Discuss about the viral pathogen and host interactions .

(OR)

(b).Define antibiotics and discuss about the mechanism of penicillin.

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIBA-I
CLINICAL MICROBIOLOGY
BLUE PRINT FOR QUESTION PAPER

		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Introduction to bacteria	2Q	Student choice	4 M	1 Q	8 M	16M
2	UNIT-II: Microbial nutrition	2Q		4 M	1Q	8M	16M
3	UNIT-III Bacterial diseases	2 Q		4M	1Q	8 M	16M
4	UNIT-IV: Viral diseases	2Q		4M	1 Q	8 M	16M
5	UNIT- V : Host pathogen interactions, antibiotics and toxins	2Q		4M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M

BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER – VIII(A-2)
BIOCHEMICAL CORRELATIONS IN DISEASES

Periods: 45

Max. Marks: 60

Unit I Inborn errors of metabolism & Hormonal Imbalances

1.1 Inborn errors in amino acid metabolism: Phenylketonuria, alkaptonuria, albinism, tyrosinosis, maple syrup urine disease, Lesch-Nyhan syndrome.
1.2 Disorders of Carbohydrate Metabolism – glycogen storage diseases, pentosuria, galactosemia.
1.3 Disorders of Lipids – Hyperlipidemia, hyperlipoproteinemia, Gaucher's disease, Tay-Sach's and Niemann-Pick disease, ketone bodies.

Unit II Nutritional deficiency based diseases and Life style diseases

1.1 Kwashiorkor, Marasmus, Beri-beri, Scurvy, Pellagra, Anaemia
1.2 Night blindness, Rickets, Osteomalacia, Osteoporosis
1.3 Obesity, Cardiovascular diseases, Atherosclerosis
1.4 Diabetes mellitus-II.
1.5 Wilson's disease, Inflammatory Bowel Disease (IBD).

Unit III Autoimmune diseases

1.1 Concepts in immune recognition - self and non self discrimination
1.2 Organ specific autoimmune diseases – Hashimoto's thyroiditis, Grave's disease, myasthenia gravis.
1.3 Systemic diseases - SLE, rheumatoid arthritis; Diabetes Mellitus-I.

Unit IV Diseases caused due to misfolded proteins and Biochemistry of Cancer

1.1 Alzheimer's, Huntington's disease, Kurt, Creutzfeldt-Jakob disease
1.2 Sickle cell anaemia, Thalessemia.
1.3 Cellular differentiation in cancer, carcinogens and cancer therapy

Unit V Metabolic disorders

5.1 Digestive diseases – Maldigestion, malabsorption, creatorrhoea, diarrhoea and steatorrhoea.
5.2 Disorders of liver and kidney – Jaundice, fatty liver, introduction to nephritic and nephrotic syndrome.
5.3 Abnormalities in Nitrogen Metabolism – Uremia, hyperuricemia, porphyria.
5.4 Haemorrhagic disorders – Haemophilia, von Willebrand's disease.

Suggested readings :

1. Biochemistry (2013) 4thed., Voet, D., Voet, J. & Pratt, C. Wiley & Sons. Inc. (New Jersey), ISBN:978-1-11809244-6.
2. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J. L. and Stryer, L., W.H Freeman and Company (NewYork)
3. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York)
4. Klein's Microbiology, (2008) 7 ed., Prescott, Harley, Wiley, J.M. Sherwood, L.M. Woolverton, C.J, McGraw Hill International Edition (New York)ISBN: 978-007-126727.

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY CLUSTER PAPER – VIII(A-2)
BIOCHEMICAL CORRELATIONS IN DISEASES PRACTICLES

1. Glucose tolerance test.
2. Lipid profile: triglycerides and total cholesterol.
3. Obesity parameters.
4. RBC counting and haemoglobin estimation.
5. Blood pressure measurements.
6. Bone density measurements (visit to a nearby clinic).
7. T4/TSH assays

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER – VIII(A-2)
BIOCHEMICAL CORRELATIONS IN DISEASES

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions 5×4 M=20 M

Each question carries FOUR marks

1. Explain about any two inhibitors of amino acid metabolism.
2. Explain about diabetes mellitus
3. Explain about nutritional deficiency diseases in child.
4. Explain about any two B complex deficiency diseases.
5. Explain about Rheumatoid arthritis.
6. Explain about Hashimoto's thyroidities.
7. Explain about Alzheimer's disease.
8. Explain about Sickle cell anemia.
9. Explain about Jaundice.
10. Explain about Porphyrias.

Part-B

Answer **ALL THE** following questions. 5 X 8M=40M

Each question carries **EIGHT** marks

11(a).Discuss about inborn errors in lipid metabolism

(OR)

(b). Discuss about glycogen storage disease.

12(a).Write about any 4 water soluble vitamin deficiency diseases.

(OR)

(b). Give an account on Cardio vascular disease.

13(a)Discuss about Organ specific autoimmune system.

(OR)

(b). Define autoimmune disease & discuss about any 2 systematic autoimmune disease.

14(a). Write an account on diseases caused due to misfolded proteins.

(OR)

(b). Write an account on cellular differentiated in cancer.

15(a). Explain about disorders of Kidneys.

(OR)

(b). Write an account on abnormalities in nitrogen metabolism.

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER – VIII(A-2)
BIOCHEMICAL CORRELATIONS IN DISEASES
BLUE PRINT FOR QUESTION PAPER

		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Inborn errors of metabolism& Hormonal Imbalances	2Q	Student choice	4 M	1 Q	8 M	16M
2	UNIT-II: Nutritional deficiency based diseases and Life style diseases	2Q		4 M	1Q	8M	16M
3	UNIT-III Autoimmune diseases	2 Q		4M	1Q	8 M	16M
4	UNIT-IV: Diseases caused due to misfolded proteins and Biochemistry of Cancer	2Q		4M	1 Q	8 M	16M
5	UNIT- V : Metabolic disorders	2Q		4M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY CLUSTER PAPER: VIIIA-3

HAEMATOLOGY

Periods: 45 Max. Marks: 60

Unit – I: Laboratory Preparation in Haematology:

1.1 Introduction to basic requirements of Collection of blood.
1.2 Anticoagulants and effects of anticoagulants on blood cell morphology
1.3. Storage of blood.
1.4 Composition of blood.

Unit – II: Routine Haematology:

2.1 Types of haemoglobins, Haemoglobin synthesis.
2.2 Haemopoietic system of the body.
2.3 Blood cell counts, Erythropoiesis, Leucopoiesis and development of blood Corpuscles, Thrombopoiesis.
2.4 Laboratory technique of haemocytometry, Clinical significance of Total erythrocyte count, total leucocyte count, differential count.
2.5 Erythrocyte sedimentation rate and platelet count.

Unit – III: Haemostasis and Haematological Diseases:

3.1 General consideration of blood coagulation. Clinical significance of routine coagulation tests.
3.2 Mechanism of coagulation. The fibrinolytic Mechanism
3.3 Anaemia, Various types of anaemias – Iron deficiency anaemia, Aplastic anaemia, Perinicious anaemia, Sideroblastic anaemia and Sickel cell anaemia, Other haematological diseases – HDNB, Thalassaemia, Leukaemia.
3.4 Inherited disorders of coagulation: Haemophilia A, Haemophilia B
3.5 Inherited disorders of fibrinogen.

UNIT- IV: Automation in Haematology:

4.1 General considerations.
4.2 Blood cell counters.
4.3 Flow through cytochemical differential counter.
4.4 Automated coagulation systems.
4.5 Automated clinical analysers

Unit - V: Immunohematology and Blood banking:

5.1 Human blood Group systems-ABO System & Rh system
5.2 Inheritance of blood group systems.
5.3 Collection of donor blood, processing of donor blood, storage of donor blood unit
5.5 Blood transfusion, adverse effects of transfusion.

Suggested readings

1. Park, K. (2007), Preventive and Social Medicine, B.B. Publishers
2. Godkar P.B. and Godkar D.P. Textbook of Medical Laboratory Technology, II Edition, Bhalani Publishing House
3. Cheesbrough M., A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses
4. Guyton A.C. and Hall J.E. Textbook of Medical Physiology.
5. Robbins and Cortan, Pathologic Basis of Disease, VIII Edition.

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY CLUSTER PAPER: VIII-A-3

HAEMATOLOGY

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions 5×4 M=20 M

Each question carries FOUR marks

1.Explain the various effects of storage of blood.

2.Explain about Erythropoisis and Leucopoisis.

3. Basic requirements for the collection of blood.

4.Explain about ESR.

5.E xplain about inherited disorders of coagulation.

6.Explain about inherited disorders of fibrinogen.

7.Explain about automated coagulation system.

8.Explain about blood cell counters.

9.Explain about ABO blood groups.

10.Write a brief note on inheritance of blood group system.

Part-B

Answer ALL THE following questions. 5 X 8M=40M

Each question carries EIGHT marks

11(a).Discuss about the composition of blood.

(OR)

(b).Write an account on anticoagulants and affects of anticoagulants on blood cell morphology.

12(a).Discuss about the reactions involved in the systems of hemoglobin

(OR)

(b).Give an account on clinical significance of blood cell counts.

13(a).Explain mechanism of coagulation.

(OR)

(b).Discuss about various types of anaemia's in brief.

14(a).Discuss about the working principle blood cell counters and significance.

(OR)

(b).Explain about working principle of the automated clinical analysers.

15(a).Give an account on collection, processing and storage of donor blood.

(OR)

(b).Explain about the process of blood transfusion and mention the adverse effects.

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER

BIOCHEMISTRY CLUSTER PAPER: VIB.A-3

HAEMATOLOGY
BLUE PRINT FOR QUESTION PAPER

		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Laboratory Preparation in Haematology	2Q	Student choice	4 M	1 Q	8 M	16M
2	UNIT-II: Routine Haematology	2Q		4 M	1Q	8M	16M
3	UNIT-III Haemostasis and Haematologic al Diseases	2 Q		4M	1Q	8 M	16M
4	UNIT-IV: Automation in Haematology	2Q		4M	1 Q	8 M	16M
5	UNIT- V : Immunohem atology and Blood banking	2Q		4M	1 Q	8 M	16M
	Total Questions to attenipt	5 Q		20 M	5 Q	40 M	60 M

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIIB3-1
CELL BIOLOGY

Periods: 45 Max. Marks: 60

Unit-I Introduction to cell biology

1.1 Origin of life, Cell theory.
1.2 Structure of prokaryotic and eukaryotic cell.
1.3 Differences between Animal and Plant cell.
1.4 Mycoplasma.
1.5 Viruses, viroids and prions.

Unit-II Structure and function of subcellular organelles –

2.1 Composition of biological membranes.
2.2 Nucleus: Structure of nuclear envelope, nuclear pore complex nucleolus and chromatin.
2.3 Endoplasmic Reticulum: RER - Brief overview of co-translational and post-translational transport of proteins.
2.4 SER – Lipid synthesis, brief overview of export of proteins from ER.
2.5 Golgi apparatus: organization, brief overview of glycosylation of proteins within Golgi, lipid and polysaccharide metabolism in Golgi apparatus.

Unit-III- Cell Organells

3.1 Lysosomes: Different forms of lysosomes, role in cellular digestion, lysosomal storage diseases.
3.2 Peroxisomes: assembly, functions and Glyoxysomes.
3.3 Mitochondria: structure, endosymbiont theory, genome.
3.4 Chloroplast: structure, endosymbiont theory, genome.
3.5 Cell Wall: Structure of prokaryotic and eukaryotic cell wall.
3.6 ECM components– proteins,polysaccharides and adhesion proteins; concept of anchoring junctions, tight junctions and communication junctions (gap junctions and plasmodesmata).

Unit-IV Cytoskeleton

4.1. Microtubules: Axonemal and cytoplasmic microtubules (cilia, flagella, centrioles, basal bodies).
4.2 Microfilaments: Actin and Myosin filaments.
4.3 Role of cytoskeletal elements in the entry of infectious agents.
4.4 Cell Cycle, Cell Division (Mitosis and Meiosis).
4.6 Apoptosis and necrosis (brief introduction).

Unit-V Cell Fractionation techniques:

5.1 Centrifugation, Sedimentation Coefficient, Differential and Density Gradient (isopycnic and rate zonal) centrifugation.
5.2 Cell Visualization techniques: Principle of Light microscope, Phase Contrast microscope
5.3 Principle of Fluorescence microscope, Confocal microscope
5.4 Electron microscope (only principle)
5.5 Staining techniques for microscopy studies (light microscopy, fluorescent microscopy, electron microscopy)

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIII(B-1)
CELL BIOLOGY PRACTICALS

1. To study different parts of microscope
2. Cytochemical staining of proteins by Methylene blue
3. Cytochemical staining of polysaccharides by PAS
4. Cytochemical staining of RNA by Methyl Green
5. Study of stages of Mitosis using onion root tip
6. Study of stages of Meiosis in onion flower buds/ grasshopper testes
7. To study cell organelles using electron micrographs
8. To study the effect of isotonic, hypotonic and hypertonic solutions on cells

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BIOCHEMISTRY SEMISTER VI, PAPER VIII B-I

CELL BIOLOGY

MODEL QUESTION PAPER (THEORY)

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions. 5×4 M=20 M

Each question carries FOUR marks

1. Cell theory .
2. Mycoplasma
3. Nuclear envelope
4. Nucleolus
5. Density gradient centrifugation .
6. Differential centrifugation .
7. Glyoxysomes
8. Lysosomal storage diseases
9. Apoptosis
10. Necrosis

Part-B

Answer ALL THE following questions. 5 X 8M=40M

Each question carries EIGHT marks

11.(a)Discuss in detail about the structure of prokaryotic cell

(OR)

(b)Discuss in detail about the structure of the eukaryotic cell.

12. (a)Discuss in detail about the composition of Biological membranes

(OR)

(b). Write in detail about the structure of nucleus .

13. (a)Give an account on centrifugation technique .

(OR)

(b). Discuss about the principal of light microscopy .

14.(a)Write about the different forms and role of Lysosomes with neat diagram .

(OR)

(b).Write about the assembly and functions of peroxisomes .

15.(a) Discuss about the microtubules in detail .

(OR)

(b).Write about the structure of microfilaments .

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIEB-I
CELL BIOLOGY
BLUE PRINT FOR QUESTION PAPER

		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Introduction to cell biology	2Q	Student choice	4 M	1 Q	8 M	16M
2	UNIT-II: Structure and function of subcellular organelles	2Q		4 M	1Q	8M	16M
3	UNIT-III Cell Fractionation techniques	2 Q		4M	1Q	8 M	16M
4	UNIT-IV: Cell Organells	2Q		4M	1 Q	8 M	16M
5	UNIT- V : Cytoskeleton	2Q		4M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M

BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIIIB-2
BIOTECHNOLOGY

Periods: 45 Max. Marks: 60

Unit I Plant genetic engineering:

3.1 Gene isolation, gene transfer systems, Ti plasmid.

3.2 Plant virus vectors.

3.3 Gene transfer methods :Electroporation, microinjection, microprojectile technology

3.4 Selection and identification of transformed cells.

Unit II Uptake of DNA by cells

2.1 Transduction and transfection.

2.2 Chemical and physical methods of DNA introduction into cells.

2.3 cDNA and Genomic libraries.

2.4 Southern and Northern hybridization.

Unit 1: Principles of gene cloning:

3.1 Restriction and modification systems, restriction endonucleases and other enzymes used in manipulating DNA molecules.

3.2 DNA ligases, linkers and adapters.

3.3 Vectors and characteristics of Plasmids and bacteriophages,viruses as vectors (M_{13},λ). Cloning vectors based on E. coli plasmids- pBR322.

3.4 Viruses as vectors, cloning vectors based on M13 and λ bacteriophage

UNIT 4 Protein engineering

4.1 Production of recombinant pharmaceuticals such as insulin, human growth hormone.

4.2 Recombinant vaccines.

4.3 Yeast two hybrid systems,

4.4 Production of recombinant proteins by eukaryotic cells.

Unit 5 Applied biotechnology

5.1Tissue culture – brief introduction about Plant tissue culture, anther and pollen culture, protoplast culture,animal cell lines and organ culture.

5.2 Transgenic plants and animals

5.3 Fermentation technology – Fermentors, general design of fermentor, fermentation processes, production of alcohols, antibiotics.

5.4 Immobilized enzymes.

5.5 Brief introduction on Enzyme electrodes, biosensors.

Suggested readings :

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIII(B-2)
BIOTECHNOLOGY PRACTICALS

1. Agarose gel electrophoresis for separation of DNA fragments.
2. Isolation of plasmid DNA from E. coli.
3. Transformation of E: coli cells with plasmid DNA.
4. Digestion of plasmid DNA with restriction enzymes.
5. Amplification of a DNA fragment by PCR.
6. Complementation of β–galactosidase for Blue and White selection

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIIIB-2
BIOTECHNOLOGY

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions 5×4 M=20 M

Each question carries FOUR marks

1. Explain about pBR322.
2. Explain about PUC19.
3. Explain c-DNA libraries.
4. Explain about southern hybridization.
5. Explain electroporation.
6. Explain microinjection.
7. Site directed mutagens.
8. Anther and pollen culture
9. Design of fermentor
10. T4 lysozyme

Part-B

Answer ALL THE following questions. 5 X 8M=40M

Each question carries EIGHT marks

11(a). Discuss about Restriction endonucleases.

(OR)

(b). Discuss about Phage vectors used in r-DNA technology.

12(a). Discuss about mechanism of Transduction.

(OR)

(b). Write about the physical and chemical methods of DNA introduction into cells.

13(a). Give a notes on gene transfer systems.

(OR)

(b). Give an account on Ti plasmids.

14(a). Give an account on recombinant vaccines.

(OR)

(b). Discuss about the production of recombinant proteins by eukaryotic cells.

15(a).Discuss about transgenic animals

(OR)

(b).Explain about the production of alcohol by fermentation technology

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIBB-2
BIOTECHNOLOGY

BLUE PRINT FOR QUESTION PAPER

		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Principles of gene cloning	2Q	Student choice	4 M	1 Q	8 M	16M
2	UNIT-II: Uptake of DNA by cells	2Q		4 M	1Q	8M	16M
3	UNIT-III Plant genetic engineering	2 Q		4M	1Q	8 M	16M
4	UNIT-IV: Protein engineering	2Q		4M	1 Q	8 M	16M
5	UNIT- V : Applied biotechnology	2Q		4M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIII-B-3
BIOINFORMATICS AND BIOSTATISTICS

UNIT- I Introduction

1.1 Basics of Computer, Operating systems,Hardware, Software
1.2 Introduction to programming Languages and Paradigms
1.3 Role of supercomputers in biology
1.4 Introductions to bioinformatics
1.5 Applications of bioinformatics

UNIT- II Scope of bioinformatics

2.1 Genomics and Proteomics.
2.1 Comparative and functional genomics
2.2 Genome annotation
2.3 Gene prediction approaches and tools.
2.4 Transcriptome and Proteome: Tools of proteome analysis.
2.5 DNA microarray

UNIT-III Biological databases:

3.1 Primary, secondary and composite databases and useful programs.
3.2 ClustalW, BLASTp. NCBI, EBI,ExPaSy
3.3 Nucleic acid databases (GenBank, EMBL, DDBJ, NDB)
3.4 Protein databases (PIR, Swiss-Prot,TrEMBL, PDB)
3.5 Metabolic pathway database ((KEGG, EcoCyc).

UNIT -IV Data Collection and Presentation:

4.1 Biological data management using statistical tools.
4-2 Concepts of population and sample, advantages of sampling
4.3 Basic concepts in sampling and designing experiments
4.4 Introduction to Analysis of variance: Mean, median, mode; Co-efficient of variation and standard deviation; Range
4.5 Probability

UNIT –V Introduction Hypothesis testing & Regression and Correlation:

5.1 General concepts – Null hypothesis, alternative hypothesis. Rejection of hypothesis.
5.2 P value and sample size estimation.
5.3 Student's t-test. Chi Square Test – Observed and expected frequencies,
5.4 Calculating p values,–Pearson's correlation coefficient
5.5 Regression- Concepts, simple linear regression; ANOVA

NOTE: From underlined concepts no questions should be given.

Suggested readings:

1. Bioinformatics – 2008. Principles and Applications , 1st ed. Ghosh, Z. and Mallick, B., Oxford University Press (India),
2. M. Michael Gromiha, 2010. Protein Bioinformatics: From Sequence to Function, Academic Press.
3. Bioinformatics: Sequence and Genome Analysis (2001), 1st ed., Mount, D.W. Cold Spring HarborLaborator Press (New York)
4. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins (2005), 3rd ed., Baxevanis, A.D. and Ouellette, B.F., John Wiley & Sons, Inc.(New Jersey).
5.1. Principles of Biostatistics, M. Pagano and K. Gauvreau (2000); Duxbury Thomas learnings.
2. Analysis of Biological Data, M. Whitlock and D. Schluter (2009); Roberts and company publishers

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIIIB-3
BIOINFORMATICS AND BIOSTATISTICS

Time: 2 1/2 hrs Max. Marks: 60 M

Part-A

Answer any FIVE of the following questions 5×4 M=20 M

Each question carries FOUR marks

1. Explain in brief about the role of super computers in biology

2. Genomics

3. Proteomics

4. Any two protein data bases

5. Any two nucleic acid data bases

6. Primary data bases

7. Advantages of sampling

8. Methods of analysis of variance

9. Linear regression

10. ANOVA

Part-B

Answer ALL THE following questions. 5 X 8M=40M

Each question carries EIGHT marks

11(a). Give an account on applications of bioinformatics

(OR)

(b). Define bioinformatics and give introduction on bioinformatics

12(a). Write a note on DNA microarray technique

(OR)

(b). Discuss about Comparative and functional genomics

13(a). Write about primary, secondary databases with examples

(OR)

(b). Give note on computer programmes used in bioinformatics

14(a). Discuss about the basic concepts in sampling

(OR)

(b). Give an account on data management using biological tools

15(a). Explain about Student t–test and its significance

(OR)

(b). Write notes on the concept of regression analysis

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BIOCHEMISTRY SYLLABUS FOR VI SEMESTER
BIOCHEMISTRY CLUSTER PAPER: VIB-3
BIOINFORMATICS AND BIOSTATISTICS

BLUE PRINT FOR QUESTION PAPER

		Questions given	Questions to attempt	Total marks	Questions to attempt	Total marks	Total 60 Marks
1	UNIT- I: Introduction	2Q	Student choice	4 M	1 Q	8 M	16M
2	UNIT-II: Scope of bioinformatics	2Q		4 M	1Q	8M	16M
3	UNIT-III Biological databases	2 Q		4M	1Q	8 M	16M
4	UNIT-IV: Data Collection and Presentation	2Q		4M	1 Q	8 M	16M
5	UNIT- V : Introduction Hypothesis testing & Regression and Correlation	2Q		4M	1 Q	8 M	16M
	Total Questions to attempt	5 Q		20 M	5 Q	40 M	60 M