

Annexure No.	30 A
SCAA Dated	29.02.2008

BHARATHIAR UNIVERSITY :: COIMBATORE – 641 046

**REGULATIONS FOR B. Sc. BIOCHEMISTRY DEGREE COURSE
WITH COMPULSORY DIPLOMA IN BIOINFORMATICS**

**Semester System
(with effect from 2007-2008)**

1. Eligibility for Admission to the Course

Candidate for admission to the first year of the **B. Sc. Biochemistry** degree course shall be required to have passed the higher secondary examination conducted by the Govt. of Tamil Nadu with Physics/Botany/Chemistry/Zoology/Biology/Nursing/ Biochemistry/ Microbiology/ Computer Science/ Home Science/DMLT or Diploma in Pharmacy or Pharmacology as one of papers only eligible or other examinations accepted as equivalent there to by the Syndicate, subject to such other conditions as may be prescribed therefor.

2. Duration of the Course

The course shall extend over a period of three years comprising of six semesters with two semesters in one academic year. There shall not be less than 90 working days for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

3. Course of Study

The course of study for the UG degree course shall consist of the following

a) Part - I

Tamil or any one of the following modern/classical languages i.e. Telugu, Kannada, Malayalam, Hindi, Sanskrit, French, German, Arabic & Urdu. It shall be offered during the first four semesters with one examination at the end of each semester.

b) Part – II : English

The subject shall be offered during the first four semesters with one examination at the end of each semester. During third semester Part II English will be offered as communication skills.

c) Foundation Course

The Foundation course shall comprise of two stages as follows:

Foundation Course A : General Awareness (I & II semesters)

Foundation Course B : Environmental Studies (III & IV semesters)

The syllabus and scheme of examination for the foundation course A, General awareness shall be apportioned as follows.

From the printed material supplied by the University	-	75%
Current affairs & who is who?	-	25%

The current affairs cover current developments in all aspects of general knowledge which are not covered in the printed material on this subject issued by the University.

The Foundation course B shall comprise of only one paper which shall have Environmental Studies.

d) Part – III

Group A : Core subject – As prescribed in the scheme of examination.

Examination will be conducted in the core subjects at the end of every semester

Group B: allied subjects -2 subjects-4 papers

Examination shall be conducted in the allied subjects at the end of first four semesters.

Group C: application oriented subjects: 2 subjects – 4 papers

The application –oriented subjects shall be offered during the last two semesters of study viz., V and VI semesters. Examination shall be conducted in the subjects at the end of V & VI semesters.

Group D: field work/institutional training

Every student shall be required to undergo field work/institutional training, related to the application-oriented subject for a period of not less than 2 weeks, conveniently arranged during the course of 3rd year. The principal of the college and the head of the department shall issue a certificate to the effect that the student had satisfactorily undergone the field work/institutional training for the prescribed period.

Diploma Programme:

All the UG programmes shall offer compulsory diploma subjects and it shall be offered in four papers spread over each paper at the end of III, IV, V, & VI semesters.

e) Co-Curricular activities: NSS/NCC/Physical education

Every student shall participate compulsorily for period of not less than two years (4 semesters) in any one of the above programmes.

The above activities shall be conducted outside the regular working hours of the college. The principal shall furnish a certificate regarding the student's performance in the respective field and shall grade the student in the five point scale as follows

A-Exemplary

B-very good

C-good

D-fair

E-Satisfactory

This grading shall be incorporated in the mark sheet to be issued at the end of the appropriate semester (4th or 5th or 6th semester).

(Handicapped students who are unable to participate in any of the above activities shall be required to take a test in the theoretical aspects of any one of the above 3 field and be graded and certified accordingly).

4. Requirement to appear for the examinations

- a) a candidate will be permitted to appear for the university examinations for any semester if
- i) He/she secures not less than 75% of attendance in the number of working days during the semester.
 - ii) He/she earns a progress certificate from the head of the institution, of having satisfactory completed the course of study prescribed in the subjects as required by these regulations, and
 - iii) His/her conduct has been satisfactory.

Provided that it shall be open to the syndicate, or any authority delegated with such powers by the syndicate, to grant exemption to a candidate who has failed to earn 75% of the attendance prescribed, for valid reasons, subject to usual conditions.

- b) A candidate who has secured less than 65% but 55% and above attendance in any semester has to compensate the shortage in attendance in the subsequent semester besides, earning the required percentage of attendance in that semester and appear for both semester papers together at the end of the latter semester.
- c) A candidate who has secured less than 55% of attendance in any semester will not be permitted to appear for the regular examinations and to continue the study in the subsequent semester. He/she has to rejoin the semester in which the attendance is less than 55%
- d) A candidate who has secured less than 65% of attendance in the final semester has to compensate his/her attendance shortage in a manner as decided by the concerned head of the department after rejoining the same course.

5. Restrictions to appear for the examinations

- a) Any candidate having arrear paper(s) shall have the option to appear in any arrear paper along with the regular semester papers.
- b) "Candidates who fail in any of the papers in Part I, II & III of UG degree examinations shall complete the paper concerned within 5 years from the date of admission to the said course, and should they fail to do so, they shall take the examination in the texts/ revised syllabus prescribed for the immediate next batch of candidates. If there is no change in the texts/syllabus they shall appear for the examination in that paper with the syllabus in vogue until there is a change in the texts or syllabus. In the event of removal of that paper consequent to change of regulation and / or curriculum after 5 year period, the candidates shall have to take up an equivalent paper in the revised syllabus as suggested by the chairman and fulfill the requirements as per regulation/ curriculum for the award of the degree.

6. Medium of Instruction and examinations

The medium of instruction and examinations for the papers of Part I and II shall be the language concerned. For part III subjects other than modern languages, the medium of instruction shall be either Tamil or English and the medium of examinations is in English/Tamil irrespective of the medium of instructions. For modern languages, the medium of instruction and examination will be in the languages concerned.

7. Submission of Record Note Books for practical examinations

Candidates appearing for practical examinations should submit bonafide Record Note Books prescribed for practical examinations, otherwise the candidates will not be permitted to

appear for the practical examinations. However, in genuine cases where the students, who could not submit the record note books, they may be permitted to appear for the practical examinations, provided the concerned Head of the department from the institution of the candidate certified that the candidate has performed the experiments prescribed for the course. For such candidates who do not submit Record Books, zero (0) marks will be awarded for record note books.

8. **Passing Minimum**

- a) A candidate who secures not less than 40% of the total marks in any subject including the Diploma and Foundation courses (theory or Practical) in the University examination shall be declared to have passed the examination in the subject (theory or Practical).
- b) A candidate who passes the examination in all the subjects of Part I, II and III (including the Diploma and Foundation courses) shall be declared to have passed, the whole examination.

9. **Improvement of Marks in the subjects already passed**

Candidates desirous of improving the marks awarded in a passed subject in their first attempt shall reappear once within a period of subsequent two semesters. The improved marks shall be considered for classification but not for ranking. When there is no improvement, there shall not be any change in the original marks already awarded.

10. **Classification of Successful candidates**

- a) A candidate who passes all the Part III examinations in the First attempt within a period of three years securing 75% and above in the aggregate of Part III marks shall be declared to have passed B.A/ B.Sc./B.Com./B.B.M. degree examination in **First Class with Distinctions**
- b)
 - (i) A candidate who passes all the examinations in Part I or Part II or Part III or Diploma securing not less than 60 per cent of total marks for concerned part shall be declared to have passed that part in **First Class**
 - (ii) A candidate who passed all the examinations in Part I or Part II or Part III or Diploma securing not less than 50 per cent but below 60 per cent of total marks for concerned part shall be declared to have passed that part in **Second Class**
 - (iii) All other successful candidates shall be declared to have passed the Part I or Part II or Part III or Diploma examination in **Third Class**

11. **Conferment of the Degree**

No candidate shall be eligible for conferment of the Degree unless he / she,

- i. has undergone the prescribed course of study for a period of not less than six semesters in an institution approved by/affiliated to the University or has been exempted from in the manner prescribed and has passed the examinations as have been prescribed therefor.
- ii. Has satisfactorily participated in either NSS or NCC or Physical Education as evidenced by a certificate issued by the Principal of the institution.
- iii. Has successfully completed the prescribed Field Work/ Institutional Training as evidenced by certificate issued by the Principal of the College.

12. **Ranking**

A candidate who qualifies for the UG degree course passing all the examinations in the first attempt, within the minimum period prescribed for the course of study from the date of admission to the course and secures I or II class shall be eligible for ranking and such ranking will be confined to 10 % of the total number of candidates qualified in that particular branch of study, subject to a maximum of 10 ranks.

The improved marks will not be taken into consideration for ranking.

13. Additional Degree

Any candidate who wishes to obtain an additional UG degree not involving any practical shall be permitted to do so and such candidate shall join a college in the III year of the course and he/she will be permitted to appear for part III alone by granting exemption from appearing Part I, Part II and common allied subjects (if any), already passed by the candidate. And a candidate desirous to obtain an additional UG degree involving practical shall be [permitted to do so and such candidate shall join a college in the II year of the course and he/she be permitted to appear for Part III alone by granting exemption from appearing for Part I, Part II and the common allied subjects. If any, already passed. Such candidates should obtain exemption from the university by paying a fee of Rs.500/-.

14. Evening College

The above regulations shall be applicable for candidates undergoing the respective courses in Evening Colleges also.

15. Syllabus

The syllabus for various subjects shall be clearly demarcated into five viable units in each paper/subject.

16. Revision of Regulations and Curriculum

The above Regulation and Scheme of Examinations will be in vogue without any change for a minimum period of three years from the date of approval of the Regulations. The University may revise /amend/ change the Regulations and Scheme of Examinations, if found necessary.

17. Transitory Provision

Candidates who have undergone the Course of Study prior to the Academic Year 2007-2008 will be permitted to take the Examinations under those Regulations for a period of four years i.e. up to and inclusive of the Examination of April 2012 thereafter they will be permitted to take the Examination only under the Regulations in force at that time.

BHARATHIAR UNIVERSITY, COIMBATORE – 641 046
B.Sc., BIOCHEMISTRY WITH COMPULSORY DIPLOMA IN BIOINFORMATICS
(For the students admitted during the academic year 2007-2008 Batch and onwards)
Scheme of Examination

Sem	Part	Subjects/Paper	Instructional hours/week	University Examination	
				Duration in Hours	Max Marks
I	I	Language Paper I	6	3	100
	II	English Paper I	6	3	100
	III	Core Paper I – Biomolecules	4	3	100
		Paper II – Cell biology	4	3	100
		Core Biochemistry Practical –I	2	-	-
		Allied A Paper I – Chemistry	6	3	75
		Allied Chemistry Practicals	2	-	-
II	I	Language Paper II	6	3	100
	II	English Paper II	6	3	100
	III	Core Paper III –Bio-medical Instrumentation	5	3	100
		Core Biochemistry Practical –I	3	3	100
		Allied A Paper II – Chemistry	6	3	75
		Practical – Chemistry	2	3	50
		Foundation Course A – General Awareness	2	3	100
III	I	Language Paper III	6	3	100
	II	English Paper III	6	3	100
	III	Core Paper IV – Enzyme And Enzyme Technology	4	3	100
		Paper V – Microbiology	3	3	100
		Core Biochemistry Practicals - II	2	-	-
		Allied B Paper I – Basic Mathematics	6	3	75
		Diploma Course - Bioinformatics	3	3	100

Sem	Part	Subjects/Paper	Instructional hours/week	University Examination	
				Duration in Hours	Max Marks
IV	I	Language Paper IV	6	3	100
	II	English Paper IV	6	3	100
	III	Core Paper VI – Intermediary Metabolism	4	3	100
		Core Biochemistry Practical - II	3	6	100
		Allied B Paper II – Computer Practical –Computer	4	3	75
			2	3	50
		Foundation Course B	2	3	100
		Diploma Course – Basics of Information Technology	3	3	100
V	III	Core Paper VII–Human Physiology	4	3	100
		Paper VIII – Clinical Biochemistry	4	3	100
		Paper – IX – Molecular Biology	4	3	100
		Core Biochemistry Practical – III	4	-	-
		AOS Biochemistry Practical IV	4	-	-
		App.Ori.Sub Paper - I Genetic Engineering and Bioprocess Technology	3	3	75
		Paper – II Immunology and Immunotechniques	4	3	75
		Diploma Course – Genomics and Proteomics	3	3	100
		VI	III	Core Paper X – Plant Biochemistry and Plant therapeutics	4
Paper VIII –Medicinal Chemistry	4			3	100
Core Biochemistry Practical – III	4			6	100
AOS Biochemistry Practical - IV	4			6	100
App.Ori.Sub Paper-I Plant & Animal Technology	4			3	75
Paper-II Diagnostic Biochemistry	4			3	75
Diploma Course – Practical – I	3			3	50
Diploma Course – Practical - II	3			3	50

SEMESTER I

SUBJECT TITLE: BIO-MOLECULES

SUBJECT DESCRIPTION:

This course emphasizes on various bio-molecules and its significance.

GOALS: To enable the students to learn the basic functions, structures and biological importance of lifeless chemical compounds.

OBJECTIVES: On successful completion of the course the students should have understood the significance of the complex bio-molecules, polysaccharides, lipids, proteins, nucleic acids, vitamins and minerals.

CONTENTS:

UNIT - I

Carbohydrates: Definition, classification, stereochemistry, cyclic structures and anomeric forms, Haworth projections.

Monosaccharides-Reactions-Characteristics of aldehyde and ketone groups. Action of acids and alkalies on sugars. Reactions of sugars due to hydroxyl groups.

Disaccharides- Structure, chemistry and function – Sucrose, Lactose, Maltose and Cellobiose.

Trisaccharides-Structure of Raffinose.

Polysaccharides. [Structures not required].

Homopolysaccharides-starch, glycogen, cellulose, chitin, dextrin and inulin.

Heteropolysaccharides-hyaluronic acid, chondroitin sulfate and heparin.

Artificial sweeteners – Saccharin Aspartame, Monellin, Neohesperidine dihydrochalcone.

UNIT - II

Lipids; Definition, classification of lipids, simple compound and derived.

Simple lipids-Physical and chemical properties of fats.

Characterisation of fat – Saponification number, acid number, Iodine number and RM number.

Compound lipids-Structure and function of phospholipids, glycolipids and lipoproteins.

Derived lipids-Fatty acids-saturated and unsaturated. Essential fatty acids.

Steroids-Structure of cholesterol, ergosterol and stigma sterol.

Value of lipids in cardiovascular diseases (Atherosclerosis).

UNIT- III

Amino acids and peptides.

Definition, amino acids as ampholytes. Structure and classification of amino acids based on chemical nature, chemical reaction of amino acids due to carbonyl and amino groups. Essential amino acids

Peptides; Structure and properties. Identification of N and C terminal residues.

Determination of primary structure of peptides-Glutathione, Oxytocin and Vasopressin.

UNIT- IV

Nucleic acids; Structure of Purines and Pyrimidines; Nucleotides and Nucleosides.

DNA: double helix: A, B and Z forms; DNA denaturation and renaturation.

RNA: types, unusual bases. DNA as genetic material

Structure of chromatids, nucleosome and histones.

UNIT- V

Vitamins and Minerals

Vitamins: Definition, Classification.

Fat soluble vitamins- sources, structure and physiological functions;

Water soluble vitamins-sources, structure and physiological functions.

Minerals: Mineral requirement, essential macro minerals and essential micro minerals, sources and functions.

REFERENCES

1. Ambika Shanmugam, Fundamentals of Biochemistry for Medical Students.
2. Deb, A.C., Fundamentals of Biochemistry, New Central Agency, Calcutta, 3rd Edition, 1989.
3. Lehninger, A.L., Nelson, D.L., Cox, M.M., Principles of Biochemistry, CBS Publishers, 2nd Edition, 1993.
4. Lubert stryer, Biochemistry, Freeman and company, 4th Edition, 1995.
5. Rastogi S.C, V.N. Sharma, Anuradha Tanden, Concepts in molecular biology, 1993.
6. Jain J.L, Fundamentals of biochemistry, S.Chand Publication 6th Edition, 2005.

SEMESTER – I

SUBJECT TITLE: CELL BIOLOGY

SUBJECT DESCRIPTION:

This course presents to identify the range of the cellular activities that are very much specific to the multicellular activities and also the basic ways that cells associate to form the tissue.

GOALS:

To enable the students to get themselves aware on how different tissue types are combined to form organs and how the organs function which follows from the structure and function of the constituent tissue.

OBJECTIVES:

On successful completion of the course the students should have:

- Understood the relationship between cellular organization and biological function of normal cell, pro and eukaryotic cells.

- Learnt on the various cell organelles with their functions and actions.
- Learnt the application of cell biology in research.

CONTENTS:

UNIT – I

An Overview of cells – Origin and evolution of cells. Cell theory, Classification of cells – Prokaryotic cells and Eukaryotic cells. Comparison of prokaryotic and eukaryotic cells. Molecular composition of cells: - Water, Carbohydrates, lipids nucleic acids and proteins.

Cell Cycle: Phases, Meiotic and Mitotic division.

UNIT – II

Cell Membrane – Fluid mosaic model of membrane structure. Membrane proteins and their properties. Membrane carbohydrates and their role. Transport across membranes – Diffusion - active and passive diffusion.

UNIT – III

Endoplasmic reticulum – Types, structure and function. Golgi apparatus – Structure and function. Lysosome – Structure and functions. Morphology and functions of peroxisomes and glyoxisomes. Ribosomes – Types structure and function.

UNIT – IV

Nucleus: Structure and function. Chromosomes, chromatin structure. Mitochondria – Structure and functions. Cytoskeleton: Types of filaments and their functions. Microtubules – Chemistry and functions – Cilia and flagella.

UNIT – V

Oncogenesis: Development and causes of cancer, Types of cancer, Properties, early detection, Treatment.

Oncogenes: Retro viral, proto, tumor suppressor gene.

REFERENCES:

1. Cell Biology. Organelle structure and function, David E Sadava, Jones Bartlett Publishers.
2. Cooper M 1995. The cell molecular approach, ASM Press.
3. Principle of cell and molecular biology 2nd edition – Lewis J Kleinsmith, Valerie M Kish.
4. DeRobertis, EDP, E.M.F Robertis, 7th edition 1980. Cell and molecular biology, Saunders Company.
5. Harvey Lodish, Baltimore. Arnold Berk et al 1995. 3rd edition. Molecular cell biology.

SEMESTER II

SUBJECT TITLE: BIO - MEDICAL INSTRUMENTATION

SUBJECT DESCRIPTION:

This course presents the principles, instrumentation, working and application of the instruments commonly used in the laboratories.

GOALS:To enable the students to learn about the functioning components of the various instruments.

OBJECTIVES: On successful completion of the course the students would have learnt the principles and applications of the instruments.

CONTENTS:

UNIT-I

PH meter- pH scale, Henderson- Hassalbalch equation, Buffer solutions, Buffer systems of blood-Hb, Protein and Phosphate buffer system.

Various ways of expressing and conversion of concentration of solutions-molality, molarity, normality, mole fraction. Simple problems to be worked out.

UNIT-II

Chromatography-principle, materials, methods & applications of paper chromatography, TLC, GLC, Adsorption, Ion-exchange, Affinity chromatography and Molecular sieve.

HPLC, FPLC and GC-MS [principles only].

UNIT-III

Electrophoresis-principles, instrumentation and applications of paper electrophoresis, agar gel, starch gel, SDS-PAGE, immuno electrophoresis, isoelectric focusing; ELISA (Principles Only).

Centrifuges-Bench top, high speed, Ultra centrifuge.

Principle and description of Analytical Centrifuge.

Determination of Molecular weight by Sedimentation velocity method.

Separation of Cell Organelles.

UNIT-IV

Principle, Instrumentation and application of Colorimetry, Spectrophotometry, Fluorimetry and Flame photometry.

ECG, EEG, CT-Scan, Doppler, MRI scan- Principle and application only.

UNIT-V

Tracer and other Techniques-Radioactive decay, units of Radioactivity, detection and measurement of Radioactivity, GM counter, Scintillation counter, Auto radiography.

Applications of Radio isotopes in biological and medical sciences.

REFERENCES:

1. Sharma B.K. (1981) 11th Edition. Instrumental method of chemical analysis.
2. Kudesia V.P. Sawhney H., (1989) Instrumental method of chemical analysis.
3. David T. Plummer, 3rd Edition (1998), An Introduction to Practical Biochemistry.
4. Keith Wilson, Kenneth H. Goulding, 3rd Edition 1992. A Biologists guide to Principles and Techniques of practical Biochemistry. Cambridge University Press.
5. Leslie Cromwell, Fred J. Weibell, Erich A. Pfeiffer, Biomedical Instrumentation and Measurement- 2nd Edition.

SEMESTER I & II

SUBJECT TITLE: CORE - BIOCHEMISTRY PRACTICALS – I

COURSE NUMBER:

QUALITATIVE ANALYSIS

1. ANALYSIS OF SUGARS

- a) Monosaccharides-Glucose, Fructose, Galactose, Mannose, Pentose.
- b) Disaccharides-Sucrose, Maltose and Lactose.
- c) Polysaccharides-Starch and Dextrin.

2. ANALYSIS OF AMINO ACIDS

- a) Histidine b) Tyrosine c) Tryptophan
- d) Methionine e) Cysteine f) Arginine

3. LIPID ANALYSIS [GROUP EXPERIMENTS]

- a) Determination of Saponification number.
- b) Determination of Acid number.
- c) Determination of Iodine number.
- d) Determination of RM number.

4. DEMONSTRATION EXPERIMENTS

- a) Preparation of buffer and its pH measurements using pH meter.
- b) Separation of amino acids by TLC.
- c) Separation of Carotenoids by Adsorption chromatography.

REFERENCES

1. David T. Plummer, An introduction to practical bio-chemistry.
2. Pattabiraman, Laboratory manual in bio-chemistry.
3. J.Jayaraman, Practical bio-chemistry.

SEMESTR – III**SUBJECT TITLE: ENZYME AND ENZYME TECHNOLOGY****SUBJECT DESCRIPTION:**

Enzymes are protein catalyst that regulates the rates at which physiological process takes place. Consequently defects in enzyme function frequently cause diseases. Hence, sound knowledge about enzymes is essential for life science students.

GOALS:To enable the students to learn about the different types of enzymes and its isolation and purification which will pave the ways in which the students can enter in research field.

OBJECTIVES:

- ❖ On successful completion of the course the students will acquire knowledge about
- ❖ Techniques of isolation & purification of the enzymes.
- ❖ Kinetics of the enzymes
- ❖ Enzymes that are used in medicine and industry

CONTENTS:**UNIT – I**

Enzymes: Introduction, Definition, International Classification of enzymes, Numbering and nomenclature. Enzyme units.

Definition of active sites. Theories proposed – Lock and Key or template model and induced fit model, ordered and random binding of substrate. Enzyme specificity – Group specificity, optical specificity.

Enzyme as proteins Structure: Primary, Secondary, Tertiary and Quaternary structure with reference to examples.

Extraction, Purification and characterization of enzymes: Source and extraction procedures.

Purification: Dialysis Ultra filtration, density gradient centrifugation, Fractional precipitation by change of pH, Fractional denaturation by heating, Fractional precipitation with organic solvents, Fractional precipitation by salts, Fractional adsorption, column chromatography, Electrophoresis, Crystallization, sequence of fractional methods, Temp, organic solvents, salts, chromatography – adsorption, affinity and ion exchange chromatography, electrophoresis – Starch gel, agarose, Polyacrylamide, SDS PAGE, IEF.

Criteria of Purity of Enzymes.

Characterization: Using ultracentrifugation – Molecular exclusion chromatography. SDS gel electrophoresis, amino acid sequence determination by Sanger's method.

UNIT – II**Enzyme kinetics and enzyme inhibitors:**

Enzyme Kinetics: Derivation of Michalies-Mentons equation, transformation of MM equation, Line-Weaver Burk plot and Eadie Hoffste plot. Effect of pH, Temperature, enzyme activity, turn over number of enzymes.

Enzyme Inhibition: Competitive, non-competitive and un-competitive inhibition. Regulatory enzymes, allosteric enzymes with reference to aspartate transcarbamoylase, covalent by modulate enzymes and Isoenzymes. Ribozymes, Abzymes.

UNIT – III

Coenzymes: Definition, Structure and functions of TPP, NAD, NADP, FAD, FMN, Coenzyme A, Metal cofactors.

Multienzyme Complex: Pyruvate dehydrogenase.

Mechanism of enzyme action: General acid base catalysis, covalent catalysis, Proximity orientation. Mechanism of action of Lysozyme and chymotrypsin.

Measurement of enzymatic reactions: Spectrophotometry and radio assay.

UNIT – IV

Enzyme Technology: Immobilized enzymes: Source and techniques of immobilization. Effect of immobilization on enzyme activity. Application of immobilized enzymes.

Industrial Production of enzymes: Amylase, Proteases, Pectinases. Industrial uses of enzymes.

UNIT – V

Uses of Enzymes in analysis: Enzymes as Biosensors – Calorimetric biosensors, Potentiometric biosensors, Amperometric biosensors, Optical biosensors and immunosensors. It's Principle, technique, mechanism and examples.

Enzyme engineering: Artificial enzymes. Enzymes used in diagnosis and various diseases with normal and abnormal values. Antioxidant enzymes.

REFERENCES:

1. Trevor Palmer, 3rd edition, 1991. Understanding enzymes. Ellis-Horwood Limited.
2. Enzymes – Dixon and Webb.
3. Enzyme Technology – Chapline & Bucke.
4. Alan Welshman, 2nd edition, Hand book of enzyme biotechnology.

SEMESTER - III

SUBJECT TITLE : MICROBIOLOGY

SUBJECT DESCRIPTION :

This course presents the Morphological characteristics of Micro organisms, their cultivation methods, identification. Life cycle, economic importance and microbial diseases.

GOALS: To enable the students to learn the basic functions and components of microorganisms and their economic uses.

OBJECTIVES:

On successful completion of the course the student should have:

- ★ Understood the structure and types of microorganisms
- ★ Learnt the economical uses of microorganisms
- ★ Learnt about the pathogenesis of various microbes in the environment

CONTENTS:

UNIT-I

Historical development of microbiology ; microscopy ; light path, principle and uses of light microscope, phase contrast and electron microscopes, sterilization techniques ; culture methods ; pure culture: Isolation and maintenance ; culture media - selective and enrichment media.

Staining and smearing: Simple staining, Negative staining, and Gram's staining, Acid - fast staining and spore staining.

Growth curve and generation time. Microbial Nutrition.

UNIT –II

Prokaryotes: - Morphology of bacteria; component parts; cell wall structure .

Photosynthetic bacteria; cyanobacteria.

Eukaryotes: - Morphological characteristics and importance of algae;

Characteristics, reproductive structures and importance of fungi.

UNIT –III

Morphology of viruses, classification and cultivation of viruses; plaque assay.

Phages: - T₄ Phages stages - lifecycle; synthesis and assembly of protein

Lambda Phages - Life cycle; switch between lysogeny and lytic cycle.

RNA viruses: - Retroviruses and life cycle- HIV.

DNA viruses: - Oncogenic viruses.

Mechanism of oncogenesis.

UNIT- IV

Microbial diseases: - Normal human micro flora; host - parasitic interaction ; epidemics; exo Endotoxins.

Air borne diseases: - Aetiology, symptoms and prevention of Tuberculosis, Diphtheria, Polio - myelitis and Influenza, Food and Waterborne diseases:- Aetiology, symptoms and pathogenesis of Typhoid, Cholera, Bacillary dysentery and Hepatitis.

Direct contact disease: - Aetiology and symptoms of Rabies

UNIT –V

Water microbiology: - Microbes in water, Bacteriological examination of water; sewage and its treatment; purification of drinking water.

Soil microbiology: - Symbiotic and Non- symbiotic Nitrogen fixing organisms: Rhizosphere

Food microbiology ; Microbiology of food borne diseases- Botulism, Salmonellas, Staphylococcal poisoning Perfringens poisoning and Mycotoxins.

REFERENCES:

1. Pelczer J, R E. C .S John Noel R Krieg, Microbiology: MC Graw Hill Book Company, 1986.
2. Prescott L. M; J.H Harley and D. A Klein, Microbiology, C. Brown Publishers, 1993.
3. Ronald M. Atlas, Microbiology-Fundamentals and Applications, Macmillan Publishing Company, New York, 1993.
4. Anantha Narayanan R; C .K Jayaram panicker, 4th edition, Text Book of Microbiology -Orient Longman Publication, 1992.

SEMESTER – III (DIPLOMA) BIOINFORMATICS

UNIT I

BioInformatics:

Introduction, definition, objectives and scope.

BioInformatics and Internet.

Useful BioInformatics sites on www.

Application of BioInformatics.

UNIT II

Biological databases:

Primary protein database – SWISS PROT, TrEMBL, PIR, PDB.

Primary nucleic acid database – EMBL, GEN BANK, DDBJ.

Data mining of biological databases.

UNIT III

Tools for database search:

FASTA- Histogram, Sequence listing, Search and Programs.

BLAST – Algorithm, Services, MEGABLAST, PHI BLAST, PROTEIN BLAST,
GRAPPED BLAST, PSI BLAST

UNIT IV

Protein Primary structure analyses and prediction:

Identification and characterization.

Gene Identification and prediction – pattern recognition, prediction method – laboratory based approaches – southern blotting, northern blotting, zoo blot, *In situ* hybridization.

UNIT V

BioInformatics and drug design:

Introduction, approaches – ligand based, target based.

Methods of drug designing – CAMD, docking program

REFERENCES

1. Westhead D.R, Parish J.H and Twyman R.M. (2003) Instant notes in BioInformatics, 1st Edition
2. Attwood.T.K. Parry D.J. and Smith (2001). Introduction to BioInformatics, 1st Indian Report.
3. Rastogi.S.C, Namita – Mendiratta and Parag Rastogi, (2004) BioInformatics – Concepts, Skills and applications.
4. Mani.K and Vijayraja (2005), BioInformatics – A practical approach

SEMESTER IV**SUBJECT TITLE : INTERMEDIARY METABOLISM****SUBJECT DESCRIPTION :**

The nature of the diet sets the basic pattern of metabolism in the tissues. Mammals such as humans need to process the absorbed products of digestion of dietary carbohydrates, lipids and protein. These are mainly glucose, fatty acids, glycerol and amino acids respectively. The fate of dietary components after digestion and absorption constitutes intermediary metabolism. Knowledge of metabolism in the normal human being is a pre requisite to a sound understanding of abnormal metabolism underlying many diseases.

GOALS:To enable the students to learn the basic functions, principles and concepts of metabolism.

OBJECTIVES:Provides much information related to carbohydrate, fat and protein metabolism that takes place in our body.

- Interrelationship between carbohydrate, fat and protein metabolism.
- Role of purine and pyrimidines in nucleic acid metabolism.
- Various disorders related to each metabolism.

CONTENTS:**UNIT I:**

Approaches to Biochemical investigations: Perfusion of isolated organs, slice techniques, tracer techniques and mutant studies for elucidation of metabolic pathways.

Bioenergetics: - Free energy and the laws of thermodynamics; Role of high energy compounds as energy currency of the cell; free energy of hydrolysis of ATP and other organophosphates. The basic metabolic pathways, anabolic, catabolic and amphibolic pathways.

UNIT II:

Fate of absorbed carbohydrates. Glycolysis: - Pathways and energetics; Oxidation of pyruvate to acetyl CoA. TCA Cycle: - Pathway and energetics; anaplerotic reaction. Gluconeogenesis; Pasteureffect. Glycogenesis and glycogenolysis. Pentose Phosphate Pathway (HMP shunt).

UNIT III:

Glucuronic Acid Cycle and glyoxylate cycle (Entner- Duodorfi pathway)
Metabolism of other hexoses: - Fructose and galactose. Biological oxidation: - oxidation – reduction equilibria; redox potential, enzymes and coenzymes involved in oxidation and reduction. Electron transport chain: - Role of respiratory chain in mitochondria; in energy capture; respiratory control. Oxidative phosphorylation: - Mechanism of oxidative phosphorylation; Chemiosmotic theory; uncouplers of oxidative phosphorylation.

UNIT IV:

Blood lipids and phase of dietary lipids. Oxidation of fatty acids: - Carnitine cycle; beta oxidation. Alpha oxidation and omega oxidation. Biosynthesis of propionyl CoA. Biosynthesis of saturated fatty acids: - Extra – mitochondrial in a microsomal system for synthesis of fatty acids. Biosynthesis of unsaturated fatty acids: - Monounsaturated and polyunsaturated fatty acids.

Biosynthesis and degradation: - Lecithin, cephalin, inositol, phosphatidyl serine, cholesterol and plasma lipoproteins. Biosynthesis of glycolipids.

UNIT V:

Fate of dietary proteins, metabolic nitrogen pool. Catabolism of amino acid: Oxidative deamination, non – oxidative deamination, transamination, amino – acid decarboxylation, catabolism of carbon skeleton of amino acids. Catabolism of glycine, phenylalanine and tyrosine. Interrelation between carbohydrates, fat and protein metabolism. Metabolism of purines: - de novo synthesis, salvage pathways; catabolism. Metabolism of pyrimidines: - de novo synthesis, salvage pathways; catabolism.

REFERENCE:

1. Lehninger, L.S., *et al.*, - *Principles of Biochemistry*. 2nd edition. CBS Publishers, 1993.
2. Murray, K. Robert, *et al.*, - *Harper's Biochemistry*. 21st edition, 1998.
3. Voet and Voet - *Biochemistry*. 2nd edition. John Wiley and Sons, 1995.
4. Mathews, Freeland and Miesfeld - *Biochemistry – a short course*. Wiley & sons. 1996.
5. Garrett and Grisham – *Biochemistry*. Saunders College Publishers, 1995.

SEMESTER – III & IV

SUBJECT TITLE: CORE BIOCHEMISTRY PRACTICAL - II

I. Colorimetry:

1. Estimation of Glucose by O-Toluidine
2. Estimation of phosphorus by Fiske-Subbarow method
3. Estimation of Urea by DAM-TSC method
4. Estimation of Uric acid by Carraway method
5. Estimation of Iron by Wong's method
6. Estimation of Protein by Lowry's method
7. Estimation of Creatinine by Picric acid method
8. Estimation of RNA by Orcinol method.

II. Titrimetry:

1. Estimation of Ascorbic acid – Dye method
2. Estimation of Chloride – Vanslyke's method
3. Estimation of Reducing sugar by Benedict's method

III. Enzymes: (Group Experiment)

1. Assay of salivary amylase activity.
2. Assay of lipase activity.

IV. Separation Techniques: (Demonstration)

1. Separation of serum protein by electrophoresis
2. Column packing.

SEMESTER IV (DIPLOMA)
BASICS OF INFORMATION TECHNOLOGY

UNIT-I

General format of representing a number-Classification of number system: Positional and Non-positional number system. Decimal, Binary, Octal and Hexadecimal. Conversion from one system to another.

UNIT-II

Fundamentals of Information technology: History and Generations of computers-classification of programming languages- Operating systems and their types.

Definitions of Compilers, Linker, Loaders, Assembler and Interpreter.

Algorithms Flowchart and its components.

UNIT-III

Internet: Evolution of Internet-Internet terminologies: WWW, FTP, HTML, HTTP, Gopher, E-mail browsers, protocol Archie Telnet, Search engines.

Application of Computers in education, business, entertainment, science, engineering and medicine

UNIT IV

Database systems; Definitions: Data abstraction, Instances, Schemes, Entity, Entity set: Strong and weak entity sets, Primary key, Foreign key, Super key.

Database models: Basic concepts of E-R model, Hierarchical model.

UNIT-V

Networking: Network architectures, Topologies, LAN, WAN, MAN AND Components of a network: Hubs, Routers, Repeaters, Bridges, Modems and cables.

Linux: Installation-Basic commands.

REFERENCES

1. Leon A and Leon M **Fundamentals of Information technology.**
2. Date C.J. **Introduction to Database systems.**
3. Andrew S. Tanenbaum **Computer networks.**

SEMESTER – V

SUBJECT TITLE : HUMAN PHYSIOLOGY

SUBJECT DESCRIPTION : This course presents an Introduction and provides a comprehensive, balanced introduction to this exciting, evolving and multi-disciplinary field.

GOALS: To enable the students to learn or to know the biological, physiological activities along with the mechanism of action of various organs.

OBJECTIVES:

On successful completion of the course the students should have:

- Understood clearly on various alimentary parts of human body.
- Learnt more specific on the endocrinal activities
- Learnt the mechanisms and actions of vital organs.

CONTENTS:

UNIT – I

Physiology of vision: Structure of eye, image formation and defects of the eye, Receptor mechanism of the eye, photopigments, Visual cycle and colour adaptation

Skeletal Muscle: Structure of skeletal muscle, contraction of muscle fibre, chemical changes during muscle contraction, sources of energy of muscle contraction.

UNIT – II

Blood and Body fluids: Composition and function, Red blood cells, Hemoglobin, white blood cells and platelets. Blood coagulation, blood groups and blood transfusion. Formation and functions of lymph. Body buffers.

Digestive system: Secretion of digestive juices, digestion and absorption of carbohydrates, proteins and fats. Gastro intestinal hormones.

UNIT – III

Respiratory system: Diffusion of gases in lungs, transport of oxygen from lungs to tissues through blood, factors influencing the transport of oxygen. Transport of CO₂ from tissues to lungs through blood, factors influencing the transport of CO₂.

Excretory System: Mechanism of formation of urine, composition of urine, Micturition. Renal regulation of acid balance, hormone of the kidney.

UNIT – IV

Nervous system: Structure of neuron, resting potential and action potential, Propagation of nerve – impulses, Structure of synapse, synaptic transmission (electrical and chemical theory). Structure of Neuro muscular junction and mechanism of neuro muscular transmission, neuro transmitters.

Endocrine system: Chemical nature of hormones, mechanism of action of hormones – intracellular receptor mechanism and second messenger mechanism (cAMP, cGMP, Ca²⁺) Structure function and deficiency symptoms of hormones of pituitary, thyroid, parathyroid and adrenal glands. Functions of pancreatic hormones.

UNIT – V

Male Reproductive system: Structure of testis, Spermatogenesis, functions of testis.

Female Reproductive system: Ovarian cycle, Structure and hormones of ovaries, menstrual cycle, menopause, pregnancy and lactation.

Steroids as contraceptives

REFERENCES:

1. Chatterjee, C.C - Human Physiology – Volume I & II, 11th edition, 1992.
2. Chatterjee. C. Text book Medicinal Chemistry.

3. Saradha Subramaniam. Text book of human physiology.
4. Guyton, Text book of Medical physiology.
5. Agarwal G.R & Agarwal B.P. Text book of Biochemistry. (Agarwal physiological chemistry)
6. Murray. R.G. Harper's Biochemistry, 24th edition.
7. Lecture notes on human physiology, M. M. Muthiah Vol II, 1991.

SEMESTER V

SUBJECT TITLE: CLINICAL BIOCHEMISTRY

SUBJECT DESCRIPTION

This course emphasizes the students to realize the diagnostic importance of various metabolic disorders.

GOALS : This course enables the students to know the clinical aspects of various metabolic disorders.

OBJECTIVES

This course would have made the students understand the significance of diagnostic bio chemistry.

CONTENTS:

UNIT –I

Disorders of Carbohydrate metabolism.
Normal sugar level in blood, renal threshold and regulation of blood glucose concentration.
Hypoglycemia; Definition and causes.
Hyperglycemia; Definition and causes.
Diabetes mellitus; Introduction, aetiology, types of diabetes mellitus, clinical pathology and diagnosis. Urine testing, random blood sugar and GTT
Acute and chronic complications of Diabetes mellitus
Glycosuria- Differential diagnosis of glycosuria, Fructosuria, Pentosouria, Galactosemia and Glycogen storage diseases

UNIT –II

Disorders of Lipid metabolism.
Plasma lipids and lipoproteins. Introduction
Hyperlipoproteinemia-Types I, II, III, IV and V .Alphalipoproteinemia.
Hypolipoproteinemia- A beta lipoproteinemia, Hypo beta lipoproteinemia.
Tangier's disease and LCAT deficiency. Atherosclerosis, Fatty liver and hyper lipidemia.
Hypercholesterolemia, Lipidosis and Xanthomatosis, Tay-Sach's disease, Niemann-Pick disease.

UNIT - III

Disorders of Amino acid metabolism

Plasma protein abnormalities; Total plasma (Serum) protein, Fibrinogen, Albumin, Pre-albumin and Globulins. Abnormal non-protein nitrogen; Urea, Uric acid, Creatinine and Ammonia, Porphyria.

Aminoacid metabolism: Cystinuria, phenylketonuria, maple syrup disease, alkaptonuria, Albinism and Hartnup disease.

Disorders of Purine and pyrimidine metabolism

Disorders of Purine metabolism: Normal level of uric acid in blood and urine, miscible uric acid pool, hyper uricemia and Gout; Hypouricemia – Xanthinuria and Liathiasis.

Disorders of pyrimidine metabolism: Orotic acid urea.

UNIT – IV

Gastric, pancreatic and intestinal functions.

Gastric function: Introduction, tests of gastric function – The insulin stimulation test, determination of Gastrin in serum and Tubeless gastric analysis.

Pancreatic Function: Introduction, pancreatic function tests, serum amylase and lipase.

Intestinal function: Introduction, test of monosaccharide absorption (xylose excretion test) and determination of total protein (Lowry's method).

UNIT – V

Liver disease and liver function tests: Introduction, bilirubin metabolism and jaundice, liver function tests. Estimation of conjugated and total bilirubin in serum (Diazo method). Detection of bilirubin and bile salts in urine (Fouchet's test and Hay's sulphur test). Thymol turbidity test, prothrombin time, serum enzymes in liver disease – serum transaminases (SGPT & SGOT) and lactate dehydrogenase (LDH).

Kidney function test: Introduction, Physical examination of urine, elimination tests, clearance tests; inulin clearance, Creatinine clearance test and urea clearance test, Renal blood flow and filtration fraction.

REFERENCES:

1. Burtis A. Carl and Edward R.Ashwood, Tietz text book of clinical chemistry W.B.Saunders company, 2nd edition, 1994.
2. Phlip.D.Mayne, Clinical Chemistry in diagnosis and treatment. ELBS Publication, 6th edition, 1994.
3. Montgomery, Conway, Spector, Biochemistry – A case oriented approach. The C.V.Moshby Company, 5th edition, 1990.

SEMESTER – V
SUBJECT TITLE : MOLECULAR BIOLOGY

SUBJECT DESCRIPTION :

This course presents the mechanism of synthesis of DNA, RNA and proteins, gene regulation and gene mutation. Techniques used in molecular biology.

GOALS: To enable the students to learn about the synthesis and functions of molecules that make up living organisms, their mutation and identification of mutants.

OBJECTIVES:

On successful completion of the course the student should have

- ✦ Understood the synthesis of genetic material, RNA and proteins.
- ✦ Learnt about gene repair mechanism and gene mutation.
- ✦ Learnt about the techniques used in identifying gene mutation.

CONTENTS:

UNIT – I

Evidences for DNA as genetic material: - Experimental proof
DNA replication in prokaryotes; Formation of DNA from nucleotides; Semiconservative mechanism and experimental proof; RNA priming; Bidirectional replication; theta mode, rolling circle model.
Enzymology of DNA replication; Initiation, elongation and termination; Fidelity of replication.
Differences in eukaryotic replication; Inhibitors of replication [names only].
DNA repair mechanism: - Excision repair, mismatch repair, photo activation and SOS repair.

UNIT –II

Prokaryotic transcription: - Central dogma; RNA polymerases;
Initiation, elongation and termination of transcription.
Role of eukaryotic RNA polymerases.
RNA splicing and processing of mRNA, tRNA and rRNA.
Reverse transcription.

UNIT - III

Genetic code: - Experimental evidences; Features of genetic code. Composition of prokaryotic and eukaryotic ribosomes.
tRNA - structure; activation of amino acids, coding and non - coding strands of DNA.
Translation: - Initiation, elongation and termination of protein synthesis; Inhibitors of protein synthesis. Post - Translational modifications of proteins.

UNIT – IV

Recombination in bacteria: - Transformation, Transduction and Conjugation.
Recombination: - Mechanism; forms of recombination, Holliday model for homologous recombination.

Prokaryotic gene regulation: - Operon model; lac operon - positive and negative control; trp operon - repression and attenuation.

UNIT – V

Gene mutations:- Types - Nutritional, Lethal, Conditional mutants. Missense mutation and other point mutations.

Spontaneous mutations; chemical and radiation – induced mutations – Ames test; reversion techniques; selection of mutants; Auxotrophs; Replica plating; Penicillin cycling.

Bacterial transposons:- Insertion sequences; Mechanism of transposition in bacteria.

REFERENCES:

1. Weaver, F., Robert, Hedrick, W. Philip, Genetics, W.C. Brown Publishers 1997, 3rd ed.
2. David Freifelder, Jones and Bartlett publishers, 2nd edition, Molecular Biology, Reprint, 1993, Narosa Publishing House, 1993.
3. Gardner, Simmons, 8th edition, Principles of Genetics 1994.

SEMESTER – V AOS PAPER I

SUBJECT TITLE : GENETIC ENGINEERING AND BIOPROCESS TECHNOLOGY

SUBJECT DESCRIPTION :

This course presents the basis of gene cloning, vectors, genetic engineering techniques and large scale production of biochemicals by fermentation technology.

GOALS:To enable the students to have a sound knowledge on cloning methods, techniques and applications of genetic engineering and fermentation technology.

OBJECTIVES:

On successful completion of the course the student should have

- Understood the basics, vectors, methods of gene cloning.
- Techniques and application of gene technology
- Bioprocess technology – fermentation methods and production of important compounds by using fermentation technology.

CONTENTS:

UNIT – I

Basis of gene cloning; Restriction endonucleases – Types and Features; Ligations; Linkers and Adaptors.

Vectors of gene cloning: - Plasmid Vectors – Basic feature, pBR332. Bacteriophage vectors; Cosmids. Cloning hosts.

Preparation of Plasmid DNA from bacteria.

UNIT – II

Introduction of DNA into bacterial cells: Transformation of E. coli, selection of transformed cells, Identification of recombinants.

Introduction of phage DNA into bacterial cell, Identification of recombinant phage.

Genomic library and cDNA library.

Hybridization probes; Southern, Northern and Western blotting techniques.

UNIT – III

DNA sequencing: Outline of Sanger's method – Applications.

Genetic Finger Printing – Oligonucleotide directed mutagenesis;

Protein engineering.

PCR – Technique and Applications.

UNIT – IV

Expression vectors for E.Coli:- Constituents; Examples of promoters – Expression cassettes – Problems caused in expression of eukaryotic genes:

Fusion proteins: - Applications of gene technology: Recombinant insulin; Recombinant growth hormones.

Cloning HBV surface antigen in yeast.

Insect cells as host system.

Safety aspects and hazards of genetic engineering.

UNIT – V

Bioprocess technology: Fermentation: Design of a commercial fermenter; Solid substrate fermentation:

Media for industrial fermentations; Batch culture and fed – batch culture.

Down – stream processing.

Production of amino acids; SCP; Penicillin and alcohol.

REFERENCES:

1. T.A. Brown, Gene cloning- An introduction, Chapman and Hall, 1995.
2. Balasubramaniam, D, C.F.A., Bryce, K. Dharmalingam, J. Green, Kunthala Jayaraman concepts in Biotechnology, COSTED – IBN university press, 1996.
3. R.W. Old & S.B. Primrose, Principles of Gene manipulation, Black well scientific publications, 1994.
4. Glick.R, Bernard and Pasternak.J, Jack, Molecular Biotechnology, Asm press, Washington D.C, 1994.
5. Glazier. N. Alexander, Hiroshnikaido, Microbial Biotechnology, W.H. Freeman & co., New york, 1995.

SEMESTER – V - AOS PAPER II

SUBJECT TITLE: IMMUNOLOGY AND IMMUNO TECHNIQUES

SUBJECT DESCRIPTION:

This course will provide the basic concepts of immunology which follows the course of immune response. The course will introduce the various mechanisms by which microbial pathogens cause disease and the interaction with the host.

GOALS: To enable the students to acquire a knowledge in the field of infectious diseases and interaction with the host's immune system.

OBJECTIVES:

On successful completion of the course the students should have:

- Understood the foundation for the future subjects in microbiology and immunology.
- Learnt the basic terminology and techniques in microbiology and immunology.
- Learnt on how much immune system is important to the humans.

CONTENTS:

UNIT – I

Historical development of the science of the immunology. Innate and acquired immunity, Antibody mediated and cell mediated response tolerance. Primary and secondary lymphoid organs. Structure of T, B and NK cells. Receptors on the surface of lymphocytes. Structure and functions of neutrophils, Macrophages – phagocytosis and inflammation, eosinophils and basophils.

UNIT – II

Antigen: Properties, Specificity and Cross reactivity, antigenicity, immunogenicity, antigen determinants, Haptens, adjuvants, Self antigens (MHC) an outline only.

Antibodies: Properties, classes and subclasses of immunoglobulins: Structure, specificity and distribution, Clonal selection theory of antibody formation.

Antigen-antibody interaction – Precipitation and agglutination – Definition and mechanism of formation. Complement component. Cytokines and their junctions.

UNIT – III

Precipitation in gel. Oudin procedure, oahley – Fulthope procedure, immune diffusion, Ouchterlony procedure, Immuno electrophoresis and electro immuno diffusion.

Agglutination: Slide agglutination, Table agglutination, Widal test.

Principle and application: RIA, ELISA, Flouresent antibody technique, monoclonal antibodies and their application.

UNIT – IV

Allergy and Hypersensitivity – Type I, II, III and IV, their clinical manifestations.

Immuno Disease: Rheumatoid arthritis, Myasthenia gravis.

Immunity to bacteria and viruses.
Skin Test: Montex and Penicillin test.

UNIT – V

Transplantation: Allograft rejection: Graft Vs Host Diseases: Immuno suppressors: mechanism of graft rejection.

Resistant to tumors: NK Cells: Tumor immuno therapy: Lymphoid tumors.

Vaccination: Passive and active immunization: Recombinant vaccines: DNA vaccines. Benefits and adverse effects of vaccination.

CD⁴ Cell count in HIV infection.

REFERENCES:

1. Immunology – An introduction, Tizzard R Jan, 1995.
2. Immunology – Roitt Ivann, Jonathan Brastoff, David Male, 1993.
3. Text book of microbiology – Ananthanarayanan. R. and Yayaraman Panikar, 1996.
4. Immunology – Janis Kuby, 3rd edition.

SEMESTER V (DIPLOMA)

GENOMICS AND PROTEOMICS

UNIT – I:

Genome maps

Types of Genome maps and their uses: High and low resolution maps – Map elements – polymorphic markers, line sine, RFLP, SNP

Types of Maps:

Cytogenic – Linkage map, Transcript map

Physical map – Comparative map, integrated map

Practical uses of Genome maps:

Locating Genomic regions, target identification, arrangement of genes, SMP diagnosis, Positional specific cloning, Predicting Gene function, identifying regulatory genes.

UNIT –II:

Structural annotations – Locating coding regions and other structural elements of the gene.

Various approaches in gene prediction – ORF prediction, gene prediction in prokaryotes and eukaryotes. Hidden Markov model, Pattern discrimination

UNIT –III:

Human Genome and Genomic analysis: Size, features, composition and characteristics of human genome – Sequence repeats, transposable elements, gene structure and pseudogenes.

Genome analysis – Gene order (Synteny), Chromosome rearrangement, compositional analysis, clustering of genes and composite genes.

UNIT –IV:

Proteomics: - Structural elements and terminology – phi and psi bonds, letter code for amino acids, helix, sheet strand, loop and coil.

Active site, Architecture, blocks, class and domains, fold, motif, PSSM, profile.

Protein structure prediction: Use of sequence pattern – Leucine zipper, coiled coil, transmembrane, signal peptide and cleavage site.

Secondary structure prediction: Chou-Fasman/ GOR method, neural network, nearest neighbour method, tertiary structure prediction, threading, profile, contact potential and modeling.

UNIT –V:

Proteome-analysis:

2D Electrophoresis – Immobilized pH gradient, Sample preparation, first dimension criteria, second dimension criteria, stabilization.

Data analysis – Mass spectrometry based methods for protein identification and analysis.

Database for 2D gel.

REFERENCES

1. David W.Mount, (2001), **Bio-informatics sequence and genome analysis**, Cold Spring Harbor Laboratory press
2. Ed. Andreas D.Baxewanis and Francis quellette, **Bio-informatics a practical guide to the analysis of genes and proteins**, John willey & sons publications
3. Pennigtons S.R and Dunn M.J (2002), **Proteomics**, Viva books pvt ltd

SEMESTER - VI

SUBJECT TITLE : CORE PAPER X - PLANT BIOCHEMISTRY AND PLANT THERAPEUTICS

SUBJECT DESCRIPTION :

This course presents the plant and animal tissue culture methods, explains the mechanism of gene transfer, Methods of selection, Production of novel proteins and their applications.

GOALS: To enable the students to have a sound knowledge on the methods of tissue culture and large scale production of recombinant proteins.

OBJECTIVES:

On successful completion of the course the students should have:

- Understood the components of culture media and various tissue culture techniques.
- Learnt about the technique of genetic engineering in plants and animals.
- Learnt about the synthesis and applications of recombinant proteins from cell cultures.

CONTENTS:

UNIT – I

Plant cell: - Structure and functions.

Photo synthesis: - Photo synthetic pigments – chlorophyll, carotenoids and phycobillin.

Light reactions – two kinds of chemical system – photo system I and II –evidences in support of light reaction – Hill’s reaction, Arnon’s work and Emerson effect.

Dark reaction – Calvin’s cycle (C₃ plants)

Hatch – Slack cycle (C₄ cycle) and CAM plants.

Photo respiration.

UNIT – II

Cycles of elements:

Nitrogen cycle: – Ammonification, nitrification, nitrate reduction and denitrification, nitrogen fixation- symbiotic and non-symbiotic nitrogen fixation.

Sulphur cycle, phosphorus cycle and carbon cycle.

Plant nutrition: Specific roles of essential elements and their deficiency symptoms in plants.

Macro nutrients: - Carbon, Hydrogen, Oxygen, Nitrogen, Sulfur, Phosphorus, Calcium, Potassium, Magnesium and Iron.

Micro nutrients: - Manganese, Boron, Copper, Zinc, Molybdenum and Chlorine.

UNIT – III

Plant growth regulators:

Chemistry, biosynthesis, mode of action and Practical applications of auxins, gibberellins, cytokinins, abscisic acid and Ethylene. Plant growth inhibitors and retardants.

UNIT - IV

Photo morphogenesis: Photo periodism. Phytochrome - Function in growth and development of plant.

Biochemistry of seed germination.

Senescence: Biochemical changes during senescence. Senescence process in life cycle of plants.

UNIT – V

Secondary metabolites:

Nature, distribution and biological functions of alkaloids, terpenes, flavonoids, poly phenols, tannins and steroids.

Role of secondary metabolites in pathogens, insects, animals and mankind.

REFERENCES:

1. Molecular activities of plant cell – An Introduction to Plant Biochemistry. John. W. Anderson and John Brardall, Black well Scientific Publications, 1994.
2. Plant Biochemistry and Molecular Biology – Lea and Lea wood, John Wiley and sons, 1997.
3. Plant Physiology –Devlin N. Robert and Francis H. Witham, CBS Publications.
4. Plant Biochemistry and Molecular Biology – Hans Walter Heldt, Oxford University Press, New York, 1997.
5. Introduction to Plant Physiology – William G.Hopkins, John Wiley and sons.
6. Tissue culture of economic plants – C.K. John, Rajani, S. Nadyanda AF. Mascarenhas, Niscom, New Delhi, 1997.

SEMESTER – VI

SUBJECT TITLE: MEDICINAL CHEMISTRY

SUBJECT DESCRIPTION:

This course presents to focus on the chemical principles used for drug discovery and it also covers human biology where ever relevant.

GOALS: Course provides for the specific needs and interests of students wishing to obtain experience in a modern research program

OBJECTIVES:

On successful completion of the course the students should have:

- Understood the development of the traditional and modern methods used for drug discovery; of how molecules interact.
- Learnt the fact that the pharmaceutical industry is by far the largest employer of medicine
- Learnt and developed skills in the use of reaction mechanisms and how knowledge of reaction mechanisms can aid in understanding the mode of action of a drug, and the method by which it can be synthesized, and developed.

UNIT –I

Introduction and receptor concept; Introduction to drugs, classification of drugs, passage of drugs across biological membrane; absorption and distribution of drugs; binding of drugs to plasma proteins.

Drug receptor interaction, binding forces in drug receptor interaction, types of receptors. Receptor theories, isolation of receptors, consequences of drug receptor interaction

UNIT –II

Drug metabolism and elimination: Drug metabolism, methods of study of drug metabolism, microsomal drug metabolism, metabolism via hydroxylation, conjugation deamination, N-Oxidation, azo and nitro reduction, non-microsomal oxidation, Oxidative deamination, purine oxidation, dehalogenation, hydrolysis, action of choline esterase. Elimination of drugs from the body with reference to renal system

UNIT - III

Chemotherapy: Mode of action of sulfonamides, anti-metabolites of folate, purines and pyrimidines. Antibacterials - mode of action and resistance to penicillin, streptomycin, tetracycline and chloramphenicol.

Antiviral, antimalarial and antiTB drugs.

UNIT – IV

Drugs acting on CNS and cardio-vascular system.

CNS – structure and mode of action of barbiturates, salicylates, MAO inhibitors and drugs for Parkinson's disease.

Cardio-vascular disease: Structure and mode of action of cardiac glycosides, heparin and coumarin.

UNIT – V

Drugs of plant origin: Drug dependents and abuse – management of self-poisoning.

Cancer chemotherapy- cytotoxic drugs. Immunosuppressive drug therapy.

REFERENCES

1. Satoskar, R.S.Bhandarkar, S.D and S.S. Ainapure, 14th edition, 1995. Pharmacology and pharamacotherapeutics. Popular Prakashnan Bombay.
2. William Foye (1986), 3rd edition, Principles of medicinal chemistry.
3. Patrick.L.Graham (1995), An introduction to medicinal chemistry, Oxford University Press.
4. Grahame, D.G.Smith and Aronson, J.K. Oxford T.B of clinical pharmacology and drug therapy.

SEMESTER – VI

SUBJECT TITLE : AOS – PAPER I - PLANT & ANIMAL TECHNOLOGY

SUBJECT DESCRIPTION :

This course presents the plant and animal tissue culture methods, explains the mechanism of gene transfer, Methods of selection, Production of novel proteins and their applications.

GOALS:

To enable the students to have a sound knowledge on the methods of tissue culture and large scale production of recombinant proteins.

OBJECTIVES:

On successful completion of the course the students should have:

- Understood the components of culture media and various tissue culture techniques.
- Learnt about the technique of genetic engineering in plants and animals.
- Learnt about the synthesis and applications of recombinant proteins from cell cultures.

CONTENTS:

UNIT – I:

Plant tissue culture: - Media composition, nutrients & growth regulators, MS medium & B₅ medium. Callus & suspension culture. Initiation & differentiation of PTC.

Micropropagation:- Methods, Production of haploid plants, phytochemicals from plant tissue culture.

UNIT – II:

Protoplast technology:- Isolation, fusion of protoplasts, Electroporation, Biolistics, Regeneration of plants from protoplasts.

Gene Transfer in plants:- Ti plasmid vectors, mechanism of T- DNA transfer, Vir genes.
Transgenic plants:- Herbicide, Virus, Pest resistance plants, Male infertility, Genetic engineering of plant oils.

UNIT - III:

Mammalian cell culture:- Establishment of cell in culture: Requirements for invitro growth; importance of serum.

Cell-lines; cell transformation – properties of transformed cells, cell separation, Mass cultivation of cells: suspension culture; immobilized cultivation.

UNIT - IV:

Genetic Engineering of Animal cells: - Mammalian cell culture in protein production.

Gene transfer into mammalian cells, Selectable markers ρ SV plasmids; retroviral vectors; Expression vectors; reporter genes.

UNIT – V:

Animal Biotechnology:- Artificial insemination and embryo transfer, Invitro fertilization (IVF): embryo cloning. Human embryo research, transgenic mice, Gene therapy; the Human Genome Project.

Recombinant proteins from cell cultures: - Interferons, Viral vaccines, Hybridoma technology- Monoclonal antibodies- production and applications.

REFERENCES:

1. D. Balasubramanian and others, Concepts in Biotechnology, Universal press India 1996.
2. BIOTOL series, Invitro cultivation of animal cells- Butler worth Heineman, 1993
3. Walsh Gary and Headon R. Denis, Protein Biotechnology. John Wiley publishers, 1994.
4. Plant tissue culture; Razdan; Oxford IBH publishers, 1994.
5. Freshney; Animal cell culture; IRL press.

SEMESTER VI

SUBJECT TITLE: AOS – Paper II DIAGNOSTIC BIOCHEMISTRY

SUBJECT DESCRIPTION:

This course presents about the diagnostic values and significance and the interpretation of various enzymes, bio-chemical parameters, hormones and immunoglobulins.

GOALS

The students will have the knowledge about the basic functions in clinical lab test and their interpretations.

OBJECTIVES

After the completion of this course the student would have understood

- The aim and objective of various clinical laboratory test
- The significance of various test and interpretation in diseased conditions.

UNIT I

Clinical chemical test- Blood group, glycosylated haemoglobin, fructosamin, GTT, uric acid, Ca, P, Fe, Cu, CSF analysis.

UNIT II

Enzymes: Acid phosphatases, LDH, CPK, CPK-MB, Alpha amylase,

Harmones – T₃, T₄, TSH, LH

Immunoglobulins – IgA, IgM, IgE.

UNIT III

Serodiagnostic procedures – precipitation tests, VDRL test, Vidal Test, (Slide and Tube method)

Brucella agglutination test, ASO test, RA test, CRP test.

Complement fixation test, skin test – Montaux test, Lepramin test.

UNIT IV

Complete haemogram, complete urine analysis, complete motion analysis, semen analysis.

UNIT V

Blood bank – Blood group and Rh factor – Coomb's test, coagulation studies, prothrombin test (PT), partial PT, Plasma fibrinogen.

Test for aminoacid urias – test for phenyl ketonuria, DNPH test for keto acids, Cyanonitroprusside test for cystinuria and homocysteine.

REFERENCES

1. Varley, H. (1985), **Practical clinical BioChemistry, 4th Edition**
2. Tietz, N. (1982) **Fundamentals of Clinical Chemistry** W.B. Saunders Company
3. Jacques Wallach, (1992) **Interpretation of Diagnostic Test – A Synopsis, 5th Edition**, Little brown and company
4. Joan Zilva and Pannall P.R., **Clinical Chemistry and diagnosis and treatment**, PG Publishing Pvt Ltd

SEMESTER – V & VI

SUBJECT TITLE: CORE BIOCHEMISTRY PRACTICAL – III

CLINICAL PRACTICALS:

I. Urine Analysis:

1. Estimation of creatinine by picric acid method.
2. Estimation of Urea by DAM-TSC method method
3. Estimation of Uric acid by Carraway's method
4. Estimation of Calcium by Permanganate method
5. Estimation of Phosphorus by Fiske-Subbarow method.

II. Blood Analysis:

1. Estimation of Urea in serum by DAM –TSC method
2. Estimation of Uric acid in serum by Carraway method
3. Estimation of Phosphorus in serum by Fiske-Subbarow method
4. Estimation of Glucose in serum by O- Toluidine method
5. Estimation of Alkaline phosphatase in serum
6. Estimation of Acid phosphatase in serum
7. Estimation of Cholesterol in serum by Zak's method

III. Kit Method: (Demonstration Experiment)

1. Estimation of SGOT
2. Estimation of SGPT
3. Estimation of Triglycerides
4. Estimation of Hemoglobin

SEMESTER – V &VI

SUBJECT TITLE: AOS - BIOCHEMISTRY PRACTICAL – IV

COURSE NUMBER:

Microbiology:-

1. Microscopic measurements of micro organisms.
2. Hanging drop techniques.

Microbiology:-

3. Simple staining
4. Gram staining
5. Endospore staining
6. Negative staining
7. Fungal staining

Enzymes

8. Preparation of crude enzyme extract.
9. Effect of pH on the activity of acid phosphatase and catalase.
10. Effect of temperature on the activity of acid phosphatase and catalase.
11. Effect of enzyme concentration on the activity of acid phosphatase and catalase.
12. Effect of substrate concentration on the activity of acid phosphatase and catalase.

Immunology:

13. RA factor (Kit method)
14. Pregnancy test – Gravindex test (Kit method)

Plant Biochemistry:

15. Estimation of Chlorophyll
16. Estimation of Starch

Demonstration on plant tissue culture

17. Preparation of media; sterilization
18. Initiation of callus culture

Physiology:

19. Identification blood group
20. Enumeration of RBC
21. Enumeration of WBC
22. Differential staining method
23. Bleeding time and clotting time determination.

SEMESTER VI (DIPLOMA)

PRACTICAL I

Working with MS-Office Packages One exercise each in Word, Excel, Power point and Access.

- Working with HTML Tags and HTML Forms. Creating HTML Pages.
- Basic commands in MS-DOS and command line execution in LINUX.
- Biological Databanks Sequence Databases, Structure Databases, Specialised Databases.
- Data retrieval tools and methods.
- Database file formats.
- Molecular visualization.

REFERENCES

1. Mani.K.and Vijayaraj,N. **Bioinformatics a Practical Approach.**

PRACTICAL II

- Gene structure and function prediction (using Gen Scan, GeneMark).
- Sequence similarity searching (NCBI BLAST).
- Protein sequence analysis (ExpASy proteomics tools).
- Multiple sequence alignment (Clustal).
- Molecular phylogeny (PHYLP).
- Analysis of protein and nucleic acids sequences
- Sequence analysis using EMBOSS or GCG Wisconsin Package

REFERENCE:

1. **Bio-informatics a practical approach** by K.Mani and N.Vijayaraj, *Aparna publications, Coimbatore.*

MODEL QUESTION PAPERS

BIOMOLECULES

Time : Three hours

Maximum: 100 marks

Answer all questions

SECTION – A (10X2=20 marks)**Fill in the blanks**

1. The ionic product of water is 1×10^{-14} the H^+ ion concentration in pure water is -----
2. Iodine value of oil shows the extent of -----.
3. Amino acids are ----- in nature.
4. ----- is necessary for blood coagulation.
5. A lipid containing steroid ring is -----.

Write short note on the following:

6. Define a isomer.
7. Give the structure of cholesterol.
8. What are trace elements?
9. What is Sanger's reagent?
10. Define nucleotide.

SECTION – B (5X6=30 marks)

11. (a). Give an account on solvent properties of water OR
(b). How are polysaccharides classified?
12. (a). Explain the physical and chemical properties of fat OR
(b). How are lipids classified on the basis of their chemical structure?
13. (a). Discuss the chemical reactions of aminoacids due to their carbonyl groups OR
(b). Write short note on peptides.
14. (a). Discuss briefly on different forms of DNA OR
(b). Discuss on different types of RNA.
15. (a). Explain on water soluble vitamins. OR
(b). Give a note on iodine deficiency.

SECTION – C (5X10 = 50 marks)

16. (a). Write a note on the following: (i). Anomers (ii) Stereoisomers OR
(b). Explain the Haworth projection formula of monosaccharides.
17. (a). How are lipids classified? Explain by giving examples. OR
(b). Explain in detail on fatty acids – types and properties.
18. (a). Discuss the tertiary and quaternary structure of proteins OR
(b) Explain the following reactions:
(i) Ninhydrin reaction (ii) Sanger's reaction (iii) Edman's reaction.
19. (a). Illustrate the structure of DNA and properties OR
(b). Differentiate DNA from RNA.
20. (a) . Explain the physiological functions of Vitamin-A. OR
(b). Write about the clinical disorders that happens due to the disturbances in lipid metabolism.

CELL BIOLOGY

Time: 3hrs

Marks:100

SECTION A - (10 x 1 = 10 marks)**Answer ALL the questions**

1. The base which is not found in DNA is _____
a) adenine b) guanine c) cytosine d) uracil
2. The simplest unit of golgi complex is _____
a) mesosome b) microsomes c) dictyosome d) cisternae
3. Proteins transporting a single solute from one side of the membrane to the other side is called as _____
a) Uniport b) Symport c) Antiport d) Coupled transport
4. Cancer cells are characterised by _____
a) Uncontrolled growth b) Invasion of other tissues
c) dissemination d) All the above
5. The transport of sodium and potassium against the concentration gradient requires the enzyme _____
a) ATPase b) Adenyl cyclase c) Cytochrome C d) all the above
6. Name the cells engaged in membrane protein synthesis.
7. Name the plastids which store fats and essential oils.
8. Which organelle lacks the cell wall?
9. Who proposed the fluid mosaic model?
10. What are residual bodies?

SECTION – B - (5 X 6 = 30 marks) - Answer ALL the questions

11. a) Give the difference between prokaryotic and eukaryotic cells. (or)
b) Give a brief account on cell theory.
12. a) Discuss the fluid mosaic model of plasma membrane (or)
b) Give a detailed account on cell adhesion molecules.
13. a) Differentiate between RER and SER (or)
b) Give the structure and functions of lysosomes.
14. a) What are micro-filaments, give its chemical composition and functions. (or)
b) With a suitable diagram explain cilia and flagella.
15. a) Enlist the functions of Nucleus. (or)
b) Write a brief note on chromosomes.

SECTION – C - (5 X 12 = 60 marks)**Answer ALL the questions**

16. a) Discuss the structure of prokaryotic cell with two examples. (or)
b) Explain the molecular composition of cells
17. a) Write in detail the ion channels involved in transport across membranes. (or)
b) Discuss the tight and gap junctions
18. a) Discuss the lipid synthesis occurring in SER.(or)
b) Explain lysosomes with reference to acid hydrolysis and autophagy.
19. a) Give the chemistry and functions of microtubules. (or)
b) Describe in detail the functions of Mitochondria
20. a) Describe the different types of cancer and oncogenesis (or)
b) Explain the receptor mediated cell signaling mechanism.

BIOMEDICAL INSTRUMENTATION

Time: 3 Hrs

Max : 100 Marks

Answer **ALL** the questions
SECTION A (10 X1 = 10 Marks)

Fill up the blanks

- 1) The pH of blood is _____
- 2) R_f value is always _____
- 3) For fractionation of subcellular organelles _____ is used.
- 4) Ultrasonic sound waves are used in _____
- 5) GM Counter works on the principle of _____

Answer the following

- 6) Define Mole fraction?
- 7) Give the technique by which volatile substances are separated?
- 8) Name the technique by which serum proteins are separated?
- 9) What is used as radiation source in colorimetry
- 10) Name the isotopes used for long term dating?

SECTION B (5 X 6 = 30 Marks)

- 11) – a) Define molality and molarity. OR
–b) Define equivalent weight and normality.
- 12) –a) Give the principle and working of HPLC OR
–b) Give the application of GC-MS
- 13) –a) Explain the principle of ELISA OR
–b) Explain the principle and description of analytical centrifuge.
- 14) –a) Explain the principle of CT Scan and MRI Scan OR
–b) Give the principle of fluorimetry
- 15) –a) Explain the technique and application of auto-radiography OR
–b) Explain the principle and working of liquid scintillation counter

SECTION C (5 X 12 = 60 Marks)

- 16) –a) Derive the Henderson Hasselbatch equation OR
–b) Elaborate on the blood buffers
- 17) –a) Give the principle and application for molecular sieve chromatography OR
–b) How are enzymes purified using affinity chromatography
- 18) –a) Give the technique, types and application of immunoelectrophoresis OR
–b) How will you determine the molecular weight of a macromolecule by sedimentation velocity method.
- 19) –a) Explain the principle, instrumentation of spectrophotometry OR
–b) Explain the Beer-Lambert law. Compare and contrast the colorimeter and spectrophotometer.
- 20) –a) How are radioisotopes used for scanning different organs. Explain its applications OR
–b) Explain the principle and working of GM Counter.

MICROBIOLOGY

Time: 3hrs

Marks: 100

Section A (10 X 1 = 10 marks) - Answer ALL the questions

1. _____ are caused by invasion of roots of majority of plant species by specific fungi
a) ectomycorrhiza b) endomycorrhiza c) ascomycetes d) none of the above
2. _____ are shallow ponds used to treat waste water using misro algae.
a) Deration pool b) Algae microsystem c) oxidation ponds d) none of the above
3. Lytic phage is otherwise called as _____.
a) avirulent b) virulent c) temperate d) both (a) & (c)
4. The genetic material in T4 is _____.
a) ds DNA b) ss DNA c) ds RNA d) ss RNA
5. A resting spore which carries the organism over a period of unfavourable conditions is called _____.
a) heterocyst b) akinite c) trichome d) none of the above
6. Define exotoxin.
7. Give the significance of darkfield microscopy.
8. What are the components of gram negative bcteria?
9. Define Hemilithotrophs.
10. Define virulence.

Section B (5 X 6 = 30)

11. a) Explain the principle & uses of bright field microscope. (or)
b) Explain Gram staining.
12. a) Describe the sexual reproduction in fungi. (or)
b) Explain the morphology of a Gram -ve bacteria with a suitable diagram.
13. a) How are viruses cultivated. (or)
b) Wth a neat sketch explain the life cycle of RNA viruses.
14. a) Describe the normal microflora of human beings. (or)
b) Write a short note on hepatitis.
15. a) Discuss the role of microorganism in symbiotic nitrogen fixation. (or)
b) Write short notes on Mycorrhizae.

Section C (5 X 12 = 60)

16. a) Write a note on
(i) Bacterial growth curve (ii) Selective & enrichment media (or)
b) Explain principle & applications of electron microscope and describe any one differential staining method.
17. a) Explain the morphology & economic importance of algae (or)
b) Explain (i) photosynthetic bacteria (ii) beneficial effects of fungi
18. a) Describe the different stages in lifecycle of T4 phage (or)
b) Explain (i) Switch between lytic & lysogeny (ii) Mechanism of oncogenesis
19. a) Explain i) Endotoxins (ii) Host parasitic interaction (or)
b) Expain aetiology, symptoms & pathogenesis of influenza.
20. a) Explain (i) Perfringes poisonong (ii) Botulism (or)
b) Give composition of sewage & describe the method of treating the same.

INTERMEDIARY METABOLISM

Time: 3hrs

Marks: 100

Section A (10 X 1 = 10 marks)**Answer ALL the questions**

1. The carrier of citric acid cycle is
a, Malate c, Fumurate , Succinate d, Oxaloacetate
2. When oxygen supply is inadequate pyruvate is converted to
a, Phosphopyruvate b, Lactate c, Acetyl CoA d, Alanine
3. Long chain fatty acyl CoA esters are transported across the mitochondrial membrane by
a, CAMP b, Prostaglandin c, Carnitine d, Choline
4. Lecithin contains a nitrogenous base called
a, Ethanolamine b, Choline c, Inositol d, Serine
5. Which of the following is not essential amino acid?
a, Leucine b, Threonine c, Valine d, Alanine
6. Transamination is
a, Reversible process b, Irreversible process c, Both of the above d, None of the above
7. The metabolism of protein is integrated with that of carbohydrate and fat through
a, Malate b, Acetyl CoA c, Isocitrate d, Oxaloacetate
8. The phenomenon of increased heat production is known as
a, Basal metabolism b, Specific dynamic action c, Exergonic d, Endergonic
9. Carbon 6 of purine skeleton comes from
a, Atmospheric CO₂ b, 1- Carbon carried by folate c, Betaine d, Methionine
10. The three common bases in DNA and RNA are
a, Adenine, Guanine and Cytosine b, Adenine, Guanine and Uracil
c, Adenine, Guanine and Thymine d, Adenine, Guanine and Xanthine.

Section B (5 X 6 = 30)**Answer ALL the questions**

11. a) Explain the reactions involved in Glyoxalate cycle. How it differs from TCA cycle. (or)
b) How does Galactose convert to Glucose in the liver?
12. a) What is β oxidation? Explain it with examples. (or)
b) Account on Glycolipids.
13. a) Explain the process of denaturation and decarboxylation with example (or)
b) List out the amino acids which on degradation give rise to pyruvate. Write the degradative pathway of any one of it.
14. a) Write in brief the protein sparing effect of carbohydrate (or)
b) Discuss the rate limiting steps involved in Glycolysis. How do enzymes regulate this pathway?
15. a) Discuss the salvage pathway of purine nucleotides. (or)
b) How is pyrimidine nucleotide biosynthesis regulated?

Section C (5 X 12 = 60)**Answer ALL the questions**

16. a) Discuss in detail the enzymes, reactions involved in pentose phosphate pathway . (or)
 b) Explain in detail the allosteric regulation and hormonal regulation with suitable examples.
- 17.a) Briefly explain the β oxidation of fatty acids. Compute the energy yield if one molecule of palmitic acid is completely oxidized. (or)
 b) Outline the reactions involved in the biosynthesis of cholesterol.
18. a) Discuss the catabolism of phenylalanine and tyrosine. (or)
 b) How is ammonia formed in the system? How it is transported and converted in to urea?
19. Citric acid cycle unifies and integrates the whole of the metabolism. Justify the statement with suitable example. (or)
 b) Discuss the protein sparing effect of carbohydrates and add a note on specific dynamic action.
20. Discuss the denova biosynthesis of purine nucleotides. (or)
 b) Outline the pathways for the degradation of cytosine, uracil and thymine. Add a note on salvage pathways.

HUMAN PHYSIOLOGY

Time : Three hours

Maximum: 100 marks

Answer all questions

SECTION – A (10X2=20 marks)**Fill in the blanks**

- acts as an antithrombin though it also inhibits other parts of coagulation mechanism
- Deficient formation of RBC's due to depression of bone marrow is called -----.
- Carboxy peptidase A enzyme of pancreatic juice contains -----.
- TSH is inactivated by -----.
- The outer surface of the ovary is covered by -----.

Write short notes on the following:

- Name a committed stem cell that produces erythrocytes.
- Name the factor responsible for blood coagulation
- Which effect is the reversal of Bohr's effect?
- Give the structure that resembles somatomedin.
- Give the nature of thrombin.

SECTION – B (5X6=30 marks)

- (a). Explain the composition and functions of the digestion of proteins OR
 (b). what are the functions of gastric juice?
- (a). Schematically explain the "cycle of vision". OR
 (b). Write a note on the transport of gases from blood to the tissues
- (a). Explain the synaptic transmission OR
 (b). with suitable diagrams explain the mechanism of muscle contraction.
- (a). Write a note on the functions of kidney. OR

- (b). Explain the mechanism of action of steroid hormones.
 15. (a). Explain the importance of estrogen in maintaining pregnancy. OR
 (b). Describe spermatogenesis.

SECTION – C (5X10=50 marks)

16. (a). Explain the different types of digestive juices. OR
 (b). Explain rhodopsin and list out the defects of eye
 17. (a). What is action potential? Write a brief account on action potential. OR
 (b). Explain the various stages of blood coagulation
 18. (a). What are the functions of respiratory system? OR
 (b). Write an account on neurotransmitters.
 19. (a). What are second messengers? Explain the mode of action of any two of them in detail.
 OR
 (b). List out the hormones secreted by anterior pituitary hormones and explain its functions.
 20. (a). Write an elaborate note on the nutritive and respiratory function of placenta. OR
 (b). Bring out the functions of pineal gland and note on deficiency diseases associated with it.

CLINICAL BIOCHEMISTRY

Time: 3 Hrs

Max : 100 Marks

Answer **ALL** Questions
 SECTION A (10 X1 = 10 Marks)

Fill up the blanks

- 1) Glucose 6 phosphatase enzyme defect leads to _____
- 2) Gaucher's disease is due to the deficiency of _____
- 3) Fibrinogen content of plasma is _____
- 4) GTT is usually done to assess _____
- 5) Icteric index is used to detect _____

Answer the following

- 6) What is the normal renal threshold level for glucose?
- 7) What is LCAT?
- 8) Give the amino acid that leads to Alkaptonuria?
- 9) Which acid is predominant in gastric juice?
- 10) What is the normal value of creatinine clearance?

SECTION B (5 X 6 = 30 Marks)

- 11) – a) Mention the sugar levels for a normal healthy individual at various states. Or
 –b) What is meant by Glycosuria. How does it occur.
- 12) –a) What is the normal level of cholesterol in blood. Explain Xanthomatosis OR
 –b) Write about various lipoproteins
- 13) –a) Explain Orotic aciduria OR
 –b) Mention the normal levels of various serum proteins
- 14) –a) What do you mean by stimulants. Give two examples for weak and strong stimulants. OR –b) Explain fat balance test.
- 15) –a) Explain the various urinary tests for determination of urobilinogen OR

–b) What do you mean by RBF and FF

SECTION C (5 X 12 = 60 Marks)

- 16) –a) How will you perform GTT. Interpret the results OR
–b) Write about glycogen storage diseases
- 17) –a) Explain various types of hyperlipo proteinemia OR
–b) Write about (i) Fatty Liver (ii) LCAT Deficiency
- 18) –a) What is meant by aminoaciduria's . Explain any four aminoaciduria's OR
–b) Detail on the disorders of purine metabolism
- 19) –a) Explain tubeless gastric analysis OR
–b) Write about the monosaccharide absorption test.
- 20) a) Discuss on the clinical significance of serum enzymes in liver diseases OR
–b) Write a clearance test for estimating GFR.

Core paper IX - MOLECULAR BIOLOGY-

Time : 3 Hours

Max : 100 marks

SECTION – A [10X1=10 Marks]

Answer **ALL** the questions

- The two replicating forks travel in opposite directions until they reach either end of the unit, the two end point are called -----
- The RNA polymerase II produces -----
- The 23s rRNA functions as _____ in protein synthesis
- CAP is a -----
- A type of point mutation which could be detected only after nucleic acid sequencing is known as -----
- Who proved DNA replication is discontinuous?
- At which site holo enzyme contacts the promoter?
- Who formulated the Operon concept ?
- Which inhibits translocation in larger subunit of prokaryotes?
- Where Shine Dalgarno sequence is located?

SECTION – B [5X6=30 Marks]

Answer **ALL** the questions

- a. Compare and contrast prokaryotic and eukaryotic replication [or]
b. Explain rolling circular model of replication
- a. Enumerate the structure and function of prokaryotic RNA polymerase. [or]
b. Mention the types and functions of eukaryotic RNA polymerases.
- a. Compare and contrast prokaryotic and eukaryotic ribosomes [or]
b. Describe the structure of t-RNA with a neatly labeled diagram

14. a. Explain the prototypical model for general recombination proposed by Robin Holliday.
[or] b. Explain mechanism of conjugation in bacteria
15. a. Explain with example (i) condition lethal mutation (ii) misense mutation [or]
b. How are mutants selected? Describe any one method in detail

SECTION – C [5X12=60 Marks]

Answer **ALL** the questions

16. a. Describe the enzymatic machinery of DNA replication [or]
b. Explain in detail on the following
(i) Elongation of DNA replication
(ii) Mismatch DNA repair mechanism
(iii) Inhibitors of DNA replication
17. a. With a neat labeled diagram discuss the formation of primary transcript. [or]
b. (i) Discuss the importance of sigma and rho factors in transcription.
(ii) Compare and contrast replication and transcription.
18. a. Describe activation of amino acids and initiation of protein synthesis. [or]
b. Explain unambiguity and degeneracy of genetic code. Explain 'Wobble' hypothesis.
19. a. Describe the genetic map of lac operon. Explain the influence of repressor and activator on the regulation of lac operon. [or]
b. Describe the mechanism of regulation of trp operon.
20. a. Define: mutation. Explain different types of mutation with examples. [or]
b. Explain invitro mutagenesis.

AOS paper II – IMMUNOLOGY AND IMMUNOTECHNIQUES**Model Question paper**

Time : 3 Hours

Max : 100 marks

SECTION – A [10X1=10 Marks]

Answer **ALL** the questions

1. Immunoglobulins are markers of -----
2. Epitopes are deeply buried in -----
3. ----- is an antigen presenting cells.
4. HLA antigens are -----
5. T4 is the surface antigen present on -----
6. Define: Innate immunity
7. Define: Monoclonal antibodies
8. Name the test used to identify typhoid.
9. What causes Type I hypersensitivity?
10. What type of cancer is developed in AIDS patients?

SECTION – B [5X6=30 Marks]Answer **ALL** the questions

11. (a) Give the structure and functions of macrophages (or)
 (b) Explain acquired immunity.
12. (a) Explain complement components in detail (or)
 (b) What are cytokines?
13. (a) Write a note on gel diffusion method. (or)
 (b) Write an account on fluorescent antibody technique.
14. (a) Describe type II hypersensitivity reactions (or)
 (b) Discuss the immunity formed against viral infections
15. (a) Explain benefits and adverse effects of vaccination (or)
 (b) Give an account on graft rejection.

SECTION – C [5X12=60 Marks]Answer **ALL** the questions

16. (a) How are T and B lymphocytes differentiated? (or)
 (b) Describe in detail about primary lymphoid organs.
17. (a) Describe the classification and properties of immunoglobulins (or)
 (b) Write an account on antigen antibody interactions.
18. (a) Explain agglutination. (or)
 (b) Write about the applications of RIA and ELISA
19. (a) Discuss in detail on rheumatoid arthritis and myasthenia gravis (or)
 (b) Write in detail about type I and type IV hypersensitivity reactions
20. (a) Explain AIDS in detail (or)
 (b) Discuss about tumor immunology

Core paper X – PLANT BIOCHEMISTRY & PLANT THERAPEUTICS
Model Question paper

Time : 3 Hours

Max : 100 marks

SECTION – A [10X1=10 Marks]Answer **ALL** the questions

1. Ribulose biphosphate is converted into ----- by rubisco enzyme during photo respiration
2. Cysteine desulfurase converts cysteine into -----
3. Fruit ripening is induce by ----- hormone
4. The phytochromes are responsible for -----
5. The ability of a plant cell to grow into an entire new plant is known as -----
6. What is the membrane enclosing the vacuole is?
7. Which form of nitrogen do plants assimilate?
8. What is the function of auxin?
9. What is the reversal of promotion of flowering is?
10. Which of the following is a flavanoid?

SECTION – B [5X6=30 Marks]Answer **ALL** the questions

11. (a) Explain the structure and function of cell wall. (or)
(b) Discuss the Hatch Slack pathway
12. (a) Write notes on micronutrients of plants. (or)
(b) Explain sulphur cycle.
- 13.(a) Explain the practical applications of auxins. (or)
(b) Write a note on plant growth inhibitors and retardants.
- 14.(a) Describe the process of seed germination (or)
(b) Describe photoperiodism.
- 15.(a) Describe the biological functions of alkaloids (or)
(b) Explain the role of secondary metabolites in elimination of pathogens.

SECTION – C [5X12=60 Marks]Answer **ALL** the questions

16. (a) Give an over view of absorption of water. (or)
(b) Explain Kalvin cycle.
17. (a) Write an essay on symbiotic nitrogen fixation. (or)
(b) Explain the importance of macronutrients in plants.
18. (a) Discuss about the chemistry and function of ethylene. (or)
(b) Write a note on Gibberlins
19. (a) Describe about the biochemical changes taking place during fruit ripening. (or)
(b) How do you know about senescence? Explain the biochemical changes involved in this process?
20. (a) Describe the nature, distribution and biological functions of
(i) Terpenes (ii) Tannins (or)
(b) Discuss the role of secondary metabolites in development of animals and mankind

Core paper VII – MEDICINAL CHEMISTRY
Model Question paper

Time : 3 Hours

Max : 100 marks

SECTION – A [10X1=10 Marks]Answer **ALL** the questions

1. For safe therapeutic application of a drug, its therapeutic index must be -----
2. Example for cell surface receptor is -----
3. Allopurinol is used as a inhibitor in -----
4. Prontosil and sulfasalazine are the examples of -----
5. Co-Trimoxazole is the ----- drug
6. What is the mechanism for basic drug absorption?
7. Who is the father of modern chemotherapy ?
8. Which mechanism is inhibited by Acyclovir?
9. Which dose produces a desired response in 50% of the test population?
10. Which mechanism converts Amphetamine to phenylacetone?

SECTION – B [5X6=30 Marks]Answer **ALL** the questions

11. a. What are the effects of protein binding on drugs? [or]
b. Define LD 50 and ED50.
12. a. Explain oxidative deamination of drugs with examples. [or]
b. Explain nitroreduction with examples.
13. a. Explain the mode of action of penicillin [or]
b. Write a short note on antimalarial drugs.
14. a. Write a brief note on coumarin [or]
b. Give two uses of salicylates.
15. a. Explain the mode of action of streptomycin. [or]
b. Outline the classification of sulfonamide according to their therapeutic utility.

SECTION – C [5X12=60 Marks]Answer **ALL** the questions

16. a. Describe the classification of drugs or
b. Give an account on receptor theories.
17. a. Give an account on conjugation of drugs [or]
b. Explain the non microsomal oxidation with examples.
18. a. Explain the structure, mechanism of action, absorption, excretion and adverse reaction of INH. [or]
b. Write down the chemistry and pharmacological actions of any two antimetabolites of purine.
19. a. Brief on beta oxidation [or]
b. Give an account on heparin and coumarin
20. a. Write an essay on phase-I reactions of drug metabolism [or]
b. Give an account on the consequences of drug abuse.

AOS Paper –PLANT & ANIMAL TECHNOLOGY
Model Question paper

Time : 3 Hours

Max : 100 marks

SECTION – A [10X1=10 Marks]Answer **ALL** the questions

1. ----- is naturally occurring auxin?
2. The mass of actively dividing parenchymatous cells is called -----
3. The pH of animal cell culture medium is maintained at -----
4. _____ is an example for reporter gene
5. Genetically engineered vaccine is otherwise called -----
6. Which of the following induce root development from callus?
7. Which is not effective way to deliver DNA to plant cells?
8. What is the disadvantage of using serum as culture media?
9. What is the substrate for selecting the dihydrofolate reductase (dhfr) marker gene?
10. Name the cell line obtained by fusion?

SECTION – B [5X6=30 Marks]

Answer **ALL** the questions

11. a. How will you isolate protoplasts from the plant cells? Give its application. [or]
b. How will you prepare culture medium? Explain the composition of nutritional culture medium.
12. a. Explain the Mechanism of T-DNA transfer. [or]
b. Describe : Establishment of cells in culture
13. a. Explain the techniques involved immobilized cultivation [or]
b. Describe : Establishment of cells in culture
14. a. Explain the pSV plasmids [or]
b. What are expression vectors? Give suitable examples.
15. a. Explain embryo cloning. Mention its advantages.[or]
b. What is gene therapy? Explain the different types of gene therapy.

SECTION – C [5X12=60 Marks]

Answer **ALL** the questions

16. a. Describe the steps involved in anther and pollen culture. [or]
b. How are Phytochemicals prepared in the large scale?
17. a. How can plants be genetically engineered to be resistant to viruses? [or]
b. Explain the following i) Ti plasmid vectors (4) (ii) Virulence genes (4)
18. a. Describe different available methods for disaggregation of animal tissue, as a prerequisite for animal tissue culture. [or]
b. What is cell transformation? How are these transformed cells differ from normal cells?
19. a. Explain the following i) Retroviral vectors (4) (ii) Selectable vectors (4) [or]
b. How is mammalian cell culture used for the production of proteins of medical importance.
20. a. Describe the production of monoclonal antibodies. Give their applications [or]
b. How is transgenic mice produced by microinjection method?

AOS PAPER – GENETIC ENGG AND BIOPROCESS TECHNOLOGY

Time: 3hrs

Marks: 100

Section A - (10 X 1 = 10 marks)

Answer **ALL** the questions

1. The cleavage site of ECO R1 is _____.
a) GGATCC, CCTAGG b) AGATCT, TCTAGA
c) GTTAAC,CAATTG d) GAATTC, CTTAAG
2. Specificity of PCR is increased by _____.
a) Nester primer b) Primer dimer c) DNA probe d) Enzymes
3. The analog of lactose is _____.
a) IPTG b) Sucrose c) Glucose d) All the above

4. The recombinant serum albumin is _____.
- a) Growth promoter b) Plasma supplement
c) Cancer treatment d) Antiviral agent
5. On treatment with _____ the cells lyse and DNA gets denatured.
Polymerase b) Probes c) Alkali (NaOH) d) Radiation
6. Which produces the enzyme Bam HI?
7. What is a vector?
8. Which vector has the markers of ampr and Lacz genes
9. Who developed DNA sequencing ?
10. Which enzyme is used in the manufacture of paper from wood pulp.

Section B - (5 X 6 = 30 marks)

Answer ALL questions

7. a) Describe in brief about the enzymes of Genetic Engineering. (or)
- a) List out the applications of Restriction enzymes.
8. a) Describe phage vectors. (or)
- b) Describe western blotting technique
9. a) Describe in brief about Gene clones. (or)
- b) Write a short note on site directed mutagenesis.
10. a) Explain marker inactivation method. (or)
- b) Write about indirect method of screening of r-DNA.
11. a) Describe Down-Stream processing. (or)
- b) Describe the designing of a commercial fermenter.

Section C - (5 X 12 = 60 marks)

Answer ALL questions

16. a) Describe the steps involved in Gene Manipulation techniques. (or)
- c) Describe in detail about Restriction enzymes.
17. a) Explain the role of plasmids as vectors. (or)
- b) Describe about transposons as vectors.
18. a) Explain about the enzymatic method of sequencing of DNA. (or)
- b) Write a brief note on Genomic libraries.
19. a) Describe the basic principles of r-DNA technology. (or)
- b) Describe the immunological methods used for identification of r-DNA.
20. a) Brief on the production of Pencillin. (or)
- b) Elaborate on the media used in the industrial fermentation adding a note on batch culture technique.

AOS-DIAGNOSTIC BIOCHEMISTRY

Time: 3 Hrs

Max : 75 Marks

Answer **ALL** the questions
SECTION A (10 X1 = 10 Marks)

Fill up the blanks

- 1) The increased levels of uric acid in blood is observed in _____
- 2) The immunoglobulin elevated in allergic reactions is _____
- 3) Montaux test is used for detecting _____
- 4) VDRL test is used to detect _____
- 5) The enzymes defect in phenylketonuria is _____

Answer the following

- 6) Give the normal level of serum calcium?
- 7) Which serum enzymes is elevated in myocardial infection?
- 8) Give the Hb content in normal adult male?
- 9) Name the coloring pigment of feces?
- 10) Which blood group is considered as universal blood donor?

SECTION B (5 X 5 = 25 Marks)

- 11) – a) Write notes on glycosylated hemoglobin. Give its clinical significance. Or
–b) How are blood groups identified. Give the diagnostic importance of blood grouping.
- 12) –a) Give the diagnostic importance of thyroid hormones. OR
–b) Give the diagnostic importance of creatine phosphokinase
- 13) –a) Write on precipitation tests. OR
–b) Explain complement fixation test
- 14) –a) Write on various qualitative tests in motion. OR
–b) Explain and interpret on microscopic examination of semen.
- 15) –a) Write on the tests for ketoacids.. OR
–b) Give the diagnostic importance of prothrombin test

SECTION C (5 X 8 = 40 Marks)

- 16) –a) How will you perform GTT. Interpret results OR
–b) How will you analyse CSF. Give composition.
- 17) –a) Explain the assay and the diagnostic importance of acid phosphatase. OR
–b) Write an essay on Immunoglobulins
- 18) –a) Elaborate various skin tests. OR
–b) Explain the RA and CRP test.
- 19) –a) Interpret on the analysis of organic constituents in blood. OR
–b) Interpret on the routine analysis of urinary constituents.
- 20) –a) Explain the various tests for aminoaciduria's OR
–b) How are blood preserved in blood bank. What are the difference between blood, plasma and serum.

Model Question Paper
SEMESTER-III BIOINFORMATICS (DIPLOMA)

SECTION A 10X2 =20 marks

- 1.Information extracted from the nucleotide sequence of a gene is used to synthesize RNA & then to make a protein is termed as
a)Central dogma b)Transcription c)Translation d)Replication
- 2.Ramachandran plot is concerned with
a)X-ray crystallography b)Bragg's law c)Electrophoresis d)Protein structure
- 3.X-ray crystallography technique is used in the determination of the structure of
a)Proteins b)Xanthophyll c)Proteins & Nucleic acid d)Chlorophyll
- 4.The species that dominates the equilibrium at isoelectric point is
a)Dipolar ion b)Conjugate acid c)Conjugate base d)all the above
- 5.Expand FASTA
- 6.Expand BLAST
- 7.Virtual screening is a part of
a)Chemoinformatics b)Medinformatics c)Bioinformatics d)Docking
- 8.Nucleic acids are polymers of
a)Nucleosides b)Peptides c)Phosphorylated nucleotides d)Glycosides
- 9.NCBI stands for -----
- 10.EMBL stands for
a)European Molecular Biology Laboratory b)Eastern Mechanical biology Lab
c) Eastern Micro Biology Lab d)None of the above

Section B 5 x 6 = 30 marks

- 11 a) Give the definition & introduction for bioinformatics or
b)What are the objectives & scope of Bioinformatics
- 12a) Write a short note on Biological databases or
b) Write about the significance of Primary Protein Database
- 13a)Describe PHIBLAST or
b)Describe PSIBLAST
- 14a) Comment on protein primary structure analysis and its prediction or
b)Discuss the laboratory based approaches in prediction method
- 15a)Write on Docking Program or
b)Describe ligand based approach in Drug Design

Section C 5 X 10 = 50 marks

- 16a)Elaborate on the useful bioinformatics sites on www or
b)Comment on the application of Bioinformatics
- 17a)Describe in detail the primary protein database or
b)Describe in detail the primary nucleic acid database
- 18a)Depict the outline of FASTA & write about the programs used in it or
b)Comment on BLAST algorithm & its various types
- 19a)Elaborate on Gene identification & prediction methods or
b)Describe Southern & Northern Blotting in detail
- 20a)Discuss the types of approaches in drug designing or
b)Define drug design? Explain about the various types of drug design

Diploma Course – GENOMICS & PROTEOMICS
Model Question paper

Time : 3 Hours

Max : 100 marks

SECTION – A [10X2=20 Marks]

Answer **ALL** the questions

1. RFLPs are NOT _____
2. As the complexity of an organism increases, all of the following characteristics emerge except _____
3. The Human Genome project, an international research effort to characterize the genome of human began in -----
4. The single letter code for aminoacid Valine is -----
5. ----- allows proteins to link peptide mass data
6. What are needed to construct Transcript maps?
7. Which is an useful way to detect genes in bacterial genome?
8. What would be a likely explanation for the existence of pseudogenes?
9. What is the protein form in Chow Fasman method?
10. What is/are the Database(s) for 2D gel?

SECTION – B [5X6=30 Marks]

Answer **ALL** the questions

11. (a) Explain LINE and SINE (or)
(b) (i) Write about Cytogenic linkage maps. (ii) Write a note on SNP
12. (a) How coding regions of the gene are located? (or)
(b) How structural elements of the gene are located?
13. (a) Write a note on Transposable elements. (or)
(b) Explain: Gene structure and pseudogenes
14. (a) Explain about phi and psi bonds (or)
(b) Explain: Helix, sheet strand, loop and coil
15. (a) Explain immobilised pH gradient of 2D electrophoresis (or)
(b) Explain first and second dimension criteria for 2D electrophoresis.

SECTION – C [5X10=50 Marks]

Answer **ALL** the questions

16. (a) Describe the practical uses of genome maps. (or)
(b) Explain:
(i) High and low resolution maps (ii) Comparative and integrated maps.
17. (a) Explain various approaches in gene prediction. (or)
(b) Explain Hidden Markov model.
18. (a) Explain: Gene order, chromosome rearrangement (or)
(b) (a) Explain: Compositional analysis and clustering of genes
19. (a) Explain protein structure prediction (or)
(b) Explain Chou-Fasman method and neural network for secondary protein structure prediction.
20. (a) Explain: Mass spectrometry (or)
(b) Explain databases for 2D electrophoresis.