Swami Ramanand Teerth Marathwada University, Nanded.

FACULTY OF SCIENCE

SYLLABUS

B.Sc. (Biotechnology) Vocational

First, Second & Third Year (CBCS Pattern)

(SEMESTER I, II, III, IV, V & VI)

[Syllabus progressively effective from 2016-17 onwards]

Objective of this course is to focus on basic principles of different instruments and their
applications in Biotechnology.

Distribution of credits for B.Sc. Biotechnology (Vocational)

Under Faculty of Science

B. Sc. Syllabus structure

Semester Pattern effective from June 2016

Subject: Biotechnology (Vocational)

Semester	Paper No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluatio	Marks of Semester	Total Marks	Credits
I	CCBT I (Section A)	Cell Biology (PI))	03	45	10	40	50	2
	CCB T I (Section B)	Microbiology (PII)	03	45	10	40	50	2
II	CCBT II (Section A)	Math, Statistics & Computers (PIII)	03	45	10	40	50	2
	CCB T II (Section B)	Genetics & Biochemi-stry (PIV)	03	45	10	40	50	2
	CCBTP I [CCB T I & II (Section A & B)]	Practical's based on Section A & Section B of CCBTP I & CCBT II (PV)	04	20 Practical	20	80	100	4
						Total credits semester I and II: 12		
III	CCBT III (Section A)	Plant tissue culture (P-VI)	03	45	10	40	50	2
	CCBT III (Section B)	Environmental Biotechnology(P-VII)	03	45	10	40	50	2
	CCBTP II [CCBT III & IV (Section A)]	Practical's based on P-VI & P-VII (P-X)	04		10	40	50	2
	CCBTP II [CCBT III & IV (Section B)]	SEC I (1 Skill/ optional)			15×3 = 45	-	-	(02)*
IV	CCBT IV (Section A)	Immunology & Animal cell(P-VIII)	03	45	10	40	50	2
	CCBT IV (Section B)	Recombinant DNA Technology (P-IX)	03	45	10	40	50	2
	CCBTP III [CCBT III & IV (Section B)]	Practical's based on P-VIII & P-IX (P-X)	04	10 practical	10	40	50	2
	CCBTP III [CCBT III & IV (Section B)]	SEC II (1 Skill / optional)			15×3 = 45	-	-	(02)*
							Total credits semester III and IV	12(04)*

Semester	Course No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
V	DECBT I (Section A)	Plant Tissue Culture (P-XII)	03	45	10	40	50	2
	DECBT I [(Section B) Elective]	Environmental Biotechnology (P-XIII)	03	45	10	40	50	2
	DECCBTP I [DECBT I & II (Section A)]	Practical's based on P- XII & PXIV(P-XV)	04	10 Practical	10	40	50	2
	DECBTP II [DECBT I& IV (Section B)]	SEC III (1 Skill/ optional)			15×3 = 45	-	-	(02)*
VI	DECBT II (Section A)	Plant transgenesis (P-XIV)	03	45	10	40	50	2
	DECBT II [(Section B) Elective]	Bioresourse Technology (P-XV)	03	45	10	40	50	2
	DECBTP II) [DECBT I & II (Section B)]	Practical's based on P- XIII & P-XIV (P-XVII)	04	10 Practical	10	40	50	2
	DECBTP II(Section B)	SEC IV (Project))			5O	-	50	(2)*
Total credits semester V and VI								12(04)*

Chairman

(Dr.B.M.Kareppa)

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

B.Sc First Year (Semester I)

Semester Pattern effective from June 2016

Biotechnology (Vocational)

CCBT I (Section A)

Cell Biology (P I)

Maximum Marks: 50 **Hours: 45**

Unit-I (10 periods)

Cell as a basic unit of living systems .the cell theory
Diversity of cell size and shape.
Broad classification of cell types: PPLO's, bacteria eukaryotic microbes,
Plant and animal cells. A detailed classification of cell types within an organism.
Structure and organization of membrane, glycol conjugates and proteins in membrane systems,

Unit-II (10 periods)

Biochemical composition of cells (proteins, lipids, carbohydrates, nucleic acids)
Membrane models: fluid mosaic model.
Structure and function of cell wall.
Cell –cell interaction.

Unit-III (12 periods)

Structure and function of the cell organelles: ultrastucture of cell membrane, cytosol,
Golgi bodies, endoplasmic reticulum (rough and smooth), ribosomes, cytoskeleton structures (actin, microtubules etc.), mitochondria, chloroplast, lysosomes, cilia flagella & melanosomes
Peroxysomes, nucleus (nuclear membrane, nucleoplasm, nucleolus, chromatin).

Unit-IV (13 periods)

Cell division and cell cycle.
Cell locomotion (amoeboid, flagellar and ciliar).
Cell senescence and death.
Introduction of stem cells.

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Text & References:

1. Cytology and Genetic – V R Dnyansagar.
2. Molecular biology of the Cell – Bruce Alberts
3. Molecular Cell Biology - Lodish.
4. Cell Biology CB Powar.
5. Cell and molecular Biology Gerald Karp.
6. Cell Biology – Sadava

Practicals:

Practical 9: Study of different Cell types
Practical 10 : Isolation of Mitochondria & Chloroplast.
Practical 11 : Study of Meiosis and Mitosis.
Practical 12 : Study of Karyotyping.
Practical 13 : Study of Osmosis.
Practical 14 : Microscopy; Bright field microscope

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Choice Base Credit System (CBCS) Course Structure (New Scheme)

B.Sc First Year (Semester I)

Semester Pattern effective from June 2016

Biotechnology (Vocational)

CCBT I (Section B)

Microbiology (P II)

Maximum Marks: 50 **Hours: 45**

UNIT – I (10 periods)

Discovery of the microbial world by Antony van Leeuwenhoek
Development of microscopy (optical, TEM, and SEM)
Pasteur's experiments disproving spontaneous generation
The concept of sterilization, methods of sterilization (dry heat, wet heat, radiation
Chemical and filtration etc)
Various forms of microbes: Bacteria, Archea, Viruses, Eukaryotes

Unit –II (10 periods)

Prokaryotic & Eukaryotic microbial cells.
Mutations-spontaneous & induced; chemical &: Physical mutagens.
Bacterial recombination ; Transformation, Transduction, Conjuration.

Unit –III (12 periods)

Nature of the microbial cell surface, Gram positive and Gram negative bacteria,
Kinds of flagella.
Nutritional classification of microorganisms.
Microbes in extreme environments –the themophiles & alkalophiles.
Pathogenic microorganisms, defence mechanism against microorganisms.

Unit –IV (13 periods)

Primary & secondary metabolites of microorganisms – citric acid, alcohol, antibiotics
N_2 -fixing microbes in agriculture.
Strain improvement , recombinant products from microorganisms – Insulin and growth hormone

Text & References:

1. General Microbiology-Powar and Daginawala.
2. Fundamental Principles of Bacteriology IIed. A.J.Salle. TATA-McGrawHill(Pub.).
3. General Microbiology-Pelczar.
4. Text-book of microbiology- Anantnarayan, C.K. Jayram, Panikar, Orient Longman.
5. General Microbiology – Dey and Dey.
6. Industrial microbiology – Casida
7. General Microbiology – Stryer

Practicals:

Practical 1: Cleaning of glassware and Aseptic techniques
Practical 2: Preparation of media, cotton plugging and sterilization
Practical 3:. Isolation of microorganisms from air, water and soil samples ,dilution
And pour plating .colony purification and Enumeration of microorganisms. Total vs viable counts.
Practical 4 :.Identification of isolated bacteria , Gram staining, other staining methods ,
Metabolic characterization (e.g. IMViC test)
Practical 5 : Determination of cell density by turbidometer and Growth curve of microorganisms.
Practical 6 : Antibiotic sensitivity of microbes ,use of antibiotic discs
Practical 7 : Testing of water quality
Practical 8 :.Alcoholic and mixed -acid fermentation.

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

B.Sc First Year (Semester II)

Semester Pattern effective from June 2016

Biotechnology Vocational

CCBT II (Section A)

Mathematics, Statistics & Computers (P III)

Maximum Marks: 50 **Hours: 45**

Unit –I (12 Periods)

The set theory properties of subsets
Linear and geometric function
Limits of functions ,derivatives of function
The binomial theorem

Unit –II (10 Periods)

Logarithm
Differentiation
Integration
Probability calculation

Unit –III (13 Periods)

Introduction to biostatistics sampling techniques data collection tabular and Graphical Representation of data. Mean, Mode, Median, range variance standard deviation and Test significance: Z test, T-test, Chi-square

Unit – IV (10 Periods)

Computer: Parts of computer, Types of computer, computer generations
Introduction to operating systems - windows and Linux, UNIX,
MS office: MS Word, MS Excel, MS powerpoint
Application of computer in biotechnology

Text and Reference:

1. Bailey N.T.J Statistical methods in biology.
2. Visweshwara R.K. Biostatistics, Jaypee New Delhi.
3. Batschelete : Introduction to Mathematics for life scientists , Springer Verlag New York.
4. Mathematical statistics H.C. Saxena and V.K. Kapoor S Chand.
5. Fundamentals of Statistical Methods - S.P. Gupta
6. Schaum's outline of introduction of computer science - Pushman and R. Mata, Mc. Grawhill
7. Fundamentals of Computer - Rajaramana
8. Computer Fundamentals – Oka
9. Fundamental Computer – Sinha

Practicals:

Practical 1: Problems on Derivations of functions, limits.
Practical 2: Problems on Differentiation, Integration, probability.
Practical 3: Problems on mean mode median & std derivation
Practical 4: Introduction to computers,
Practical 5: Preparation of PowerPoint presentation
Practical 6: Introduction to MS Word

Swami Ramanand Teerth Marathwada University, Nanded

Choice Base Credit System (CBCS) Course Structure (New Scheme)

B.Sc First Year (Semester II)

Semester Pattern effective from June 2016

Biotechnology (Vocational)

CCBT II (Section B)

Genetics & Biochemistry (P IV)

Maximum Marks: 50 **Hours: 45**

Unit –I (10 Periods)

Nature of genetic material; nucleic acids; DNA replication.
Mendelian laws of inheritance, Gene interaction.
Sex determination in plants & animals; Sex linkage.
Linkage; Definition and types

Unit –II (13 Periods)

Chromosomes: chemical composition; structural organization of chromatids,
Centromeres, telomeres, chromatin, nucleosome organization: eu - &
Heterochromatin; special chromosomes (eg polytene & lampbrush chromosome)
Banding patterns in human chromosomes .
Structural & numerical aberrations involving chromosomes; evolution of wheat,
Cotton & rice; hereditary defects –kleinefelter, turner,cri-du –chat & Down
Syndromes.
Mutations-spontaneous & Induced; chemical & physical mutagens in plants, animals
& microbes for economic benefit of man.

Unit –III (10 Periods)

Replica plating; techniques,
Classical & modern gene concepts; pseudoallelism, position effect
Extra chromosomal inheritance, mitochondrial &chloroplast genetic systems
Population genetics: Hardy –Weinberg equilibrium, gene & genotypic frequencies

.**Unit –IV (12 Periods)**

Basic macromolecules: Carbohydrates, Proteins, lipids and Nucleic acids
Enzymes: kinetics of enzyme catalyzed reaction
Various uses of enzymes –enzymes in food processing, medicine, diagnostics and production of new compounds.
Enzymes as research tools –ELISA methods

Text & References:

1. Genetics, P.J. Russel, Benjamin/Cummings.
2. Principles of Genetics, E.J. Gardner, John W.H. Sons Inc.
3. Principles of Genetics, D.P. Suntan & M.J. Simmons, John Wiley & Sons Inc.
4. Molecular Biology of Gene (Fifth Edition) J.D. Watson, A.M. Weiner & N.H. Hopkins, Addison-Wesly publishing.

Practicals:

Practical 1: Two examples each on Dihybrid & Monohybrid cross
Practical 2: One example each on interaction of genes.
Practical 3: Two examples on Hardy Weinberg law.
Practical 4: Study of Human blood group.
Practical 5: Observe sex linked characters in tabulation from surroundings
Practical 6: Assay of enzyme activity
Practical 7: Kinetics studies on enzymes