SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED

B.Sc. GENERAL (SEMESTER PATTERN)

B.Sc. FIRST YEAR

BIOTECHNOLOGY (VOCATIONAL) - REVISED

With Effect from June - 2013

B. Sc. BIOTECHNOLOGY (VOCATIONAL) CURRICULUM

(SEMESTER PATTERN)

Class	Paper No. Code no.	Title of Paper	Periods/ Practicals	Time duration of Examination	Maximum Marks
B.Sc.I Semester-I	Paper -I VBT- 1.1	Cell biology	45	3 Hrs.	40+10*
	Paper -II VBT-1.2	Microbiology	45	3 Hrs.	40+10*
B.Sc.I Semester-II	Paper -III VBT-1.3	Math, Stat's & Computers	45	3 Hrs.	40+10*
	Paper -IV VBT-1.4	Genetics & Biochemistry	45	3 Hrs.	40+10*
B.Sc.I	VBP-1.5 (Practical) Annual pattern	Practical based on theory papers of semester-I&II	26	4 Hrs. for two consecutive days	100

* Internal marks

Workload:

1. **Theory:** Per paper per week three periods
2. **Practical:** Per batch per week one practical (Three periods)

B. Sc. FIRST YEAR BIOTECHNOLOGY (VOCATIONAL)
SEMESTER – I
THEORY PAPER I
VBT- 1.1 (CELL BIOLOGY)

Periods – 45 Maximum Marks – 50

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

B.Sc. FIRST YEAR, BIOTECHNOLOGY (VOCATIONAL)
SEMESTER-I
THEORY PAPER – II
VBT- 1.2 (MICROBIOLOGY)

Periods – 45 Marks – 50

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

B. Sc. FIRST YEAR, BIOTECHNOLOGY (VOCATIONAL)
SEMESTER - II
THEORY PAPER – III
VBT- 1.3 (MATHS, STATS & COMPUTERS)

Periods – 45 Maximum Marks – 50

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

B. Sc. FIRST YEAR, BIOTECHNOLOGY (VOCATIONAL)
SEMESTER - II
THEORY PAPER – IV
VBT- 1.4 (GENETICS & BIOCHEMISTRY)

Periods – 45 Maximum Marks – 50

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.
5. Biochemistry- U. Satyanarayana.
6. General Biochemistry- J.H. Weil.
7. Biochemistry- A.C. Deb.
8. Principle of Biochemistry- Cohn and Stumpf.
9. Biochemistry- Stryer.
10. Biochemistry- Voet and Voet.

B.Sc. FIRST YEAR, BIOTECHNOLOGY (VOCATIONAL)
PRACTICAL PAPER – I (Annual)
BASED ON THEORY PAPERS OF SEMESTER-I & II
VBP-1.5

Practical – 14+13 Maximum Marks – 100

CELL BIOLOGY & MICROBIOLOGY

Practical 1: Cleaning of glasswares 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.

Practical 9: Study of different Cell types

Practical 10 : Isolation of Mitochondria & Chloroplast.

Practical 11 : Study of Meiosis and Mitosis
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Practical 12 : Study of Karyotyping.

Practical 13 : Study of Osmosis.

Practical 14 : Microscopy; Bright field microscope

MATHS, STATS & COMPUTERS, GENETICS & BIOCHEMISTRY

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

Practical 8: Problems on Derivations of functions, limits.

Practical 9: Problems on Differentiation, Integration, probability.

Practical 10: Problems on mean mode median & std derivation.

Practical 11: Introduction to computers,

Practical 12: Preparation of PowerPoint presentation

Practical 13: Introduction to MS Word

SKELETON OF QUESTION PAPER
B.Sc. FIRST YEAR BIOTECHNOLOGY (VOCATIONAL)
SEMESTER-I & II
THEORY PAPER – I /II/III/IV
VBT- 1.1 (CELL BIOLOGY) /
VBT- 1.2 (MICROBIOLOGY) /
VBT- 1.3 (MATH, STATS & COMPUTERS) /
VBT- 1.4 (GENETICS & BIOCHEMISTRY)

Time: *Three hours* ***Maximum Marks:*** *50*

Note: - (i) Attempt all questions

CELL BIOLOGY

Q.1.	Multiple Choice Questions	40 marks
	Internal marks	10 marks

MICROBIOLOGY

Q.1.	Multiple Choice Questions	40 marks
	Internal marks	10 marks

MATHS & COMPUTERS

Q.1.	Multiple Choice Questions	40 marks
	Internal marks	10 marks

GENETICS & BIOCHEMISTRY

Q.1.	Multiple Choice Questions	40 marks
	Internal marks	10 marks

PROFORMA FOR PRACTICAL EXAMINATION
SWAMI RAMANAND TREETH MARATHWADA UNIVERSITY, NANDED
Faculty of Science
B. Sc. I year Vocational Biotechnology (I & II Semester)
Practical Examination
VBP- 1.5

Time: 9.00 am to 1.00 pm (for two consecutive days) Marks: 100

Q 1) Major Question	(Cell biology / microbiology)	15
Q 2) Minor Question	(Cell biology / microbiology	10
Q 3) Major Question	(Math,stats & computers / genetics & biochemistry)	15
Q 4) Minor Question	(Math,stats & computers / genetics & biochemistry)	10
Q 5) Viva-Voce		05
Q 6) Record Book		05