

V.S.K University, Ballari

**BIOTECHNOLOGY
SYLLABUS**

2019-20 onwards

BIOTECHNOLOGY STRUCTURE

Semesters	Subject code	Title of the paper	Teaching Hrs/ week	Duration of Exam/Hrs	Marks in examination				
					Theory	IA	LAB	IA	Total
I Semester	BT: 1.1	Cell Biology & Genetics	04	03	70	30	-	-	100
	BT Lab:1.1		03	03	-	-	40	10	50
		Total for I Semester	-	-	-	-	-	-	150
II Semester	BT: 2.1	Biochemistry & Biophysics	04	03	70	30	-	-	100
	BT LAB 2.1		-	03	-	-	40	10	50
		Total for II Semester							150
III Semester	BT :3.1	Molecular Biology	04	03	70	30	-	-	100
	BT LAB:3.1		03	03	-	--	40	10	50
		Total for III Semester	-	-	-	-	-	-	150
IV Semester	BT:4.1	Microbiology	04	03	70	30	-	-	100
	BT Lab:4.1		03	03	-	-	40	10	50
		Total for IV Semester	-	-	-	-	-	-	150
V Semester	BT:5.1	Immunology	04	03	70	30	-	-	100
	BT Lab:5.1		03	03	-	-	40	10	50
	BT:5.2	Recombinant DNA Technology	04	03	70	30	-	-	100
	BT Lab:5.2		03	03	-	-	40	10	50
		Total for V Semester	-	-	-	-	-	-	300
VI Semester	BT:6.1	Agriculture & Environmental Biotechnology	04	03	70	30	-	-	100
	BT: Lab6.1		03	03	-	-	40	10	50
	BT:6.2	Plant & Animal cell culture	04	03	70	30	-	-	100
	BT: Lab 6.2		03	03	-	-	40	10	50
		Total for VI Semester		-	-	-	-	-	300

BIOTECHNOLOGY
B.Sc I semester
Paper : Bt :1 – Cell biology & Genetics

52 hrs

Theory

Section-A: **Cell biology**

Unit:1

Cell as a basic unit of living organisms . Discovery of cell, the cell theory. Classification of cells (prokaryotic and eukaryotic) and characteristics of plant and animal cell. 03 Hrs

Unit:2

Cell organelles: Structure and functions- Plasma membrane, Endoplasmic reticulum, Golgi bodies, mitochondria, chloroplast , ribosome's , lysosomes , nucleus (nuclear envelope, nuclear pore, nucleolus, chromatin), vacuole, cytosol. 12 Hrs

Unit:3

Cell division- cell cycle, mitosis and meiosis and differences between mitosis and meiosis. 05 Hrs

Unit:4

Cell motility- Amoeboid, flagellar and ciliary movement. Cell senescence and programmed cell death (Apoptosis), intrinsic and extrinsic path ways of the cell death. Apoptosis in relation with cancer. 06 Hrs

Section-B: **Genetics**

Unit:1

Structure of DNA and RNA, replication of DNA and their functions. 03 Hrs

Unit:2

Mendalism: Mendel's work, laws of inheritance, test cross, back cross, incomplete dominance with Simple examples. 05 Hrs

Unit:3

Interaction of genes: Supplementary factors- Ex. Comb pattern in fowls, complimentary genes- Ex. Flower colour in sweet peas. Multiple factors- Ex.Skincolour in human beings. Epistasis- Ex. Plumage colour in poultry fowls. Multiple alleles' -Ex. Blood groups in human beings. 05 Hrs

Unit:4

Chromosomes: structure of typical chromosome, euchromatin, heterochromatin. Structural organisation of nucleosome, Polytene and Lamp brush chromosomes, hereditary defects. - Down's, Klienfelter's and Cri-Du chat syndromes, Turner's syndrome. 06 Hrs

Unit:5

Extra-chromosomal inheritance, sex-linked inheritance in humans, .
Mutations: spontaneous and induced mutations, chemical and physical mutagens. 07 Hrs

References:

1. Strickberger M.W., "Genetics".
2. De Robertis E.D.P. and De Roberties E.M.F., (1980), Cell and Molecular Biology, Saunder' s College, Philadelhia.
3. Goodenogh.U. (1990), Genetics.
4. Lewin B. (1990) Genes IV.

B.Sc I semester
Paper : Bt :1 – Cytogenetics

Practical

1. Laboratory rules & regulations observed in biotechnology lab.
2. Study of Microscope- simple and compound.
3. Squash preparation of onion root tips to study of mitosis
4. Squash preparation of grasshopper testis/ onion flower bud to study of meiosis.
5. Study of Monohybrid cross with different examples.
6. Study of Dihybrid cross with suitable examples.
7. Study of Incomplete dominance.
8. Karyotype analysis. Genetic disorders- Down's, Klienfelter's and Cri-Du chat syndromes.
9. Survey on Pedigree analysis.

VSK University, Ballari
B. Sc. I Semester Degree Examination, Nov/Dec-2019

BIO-TECHNOLOGY

Bt-1: Cell Biology & Genetics

[Max. Marks: 70]

[Time: 3 Hours]

Instruction: 1.) Answer all the questions.
2.) Draw diagrams wherever necessary.

SECTION A

Answer **any FIVE** of the following :

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer **any SIX** of the following:

(6X5=30)

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

Answer **any THREE** of the following:

(3X10=30)

- 15.
- 16.
- 17.
- 18.

VIJAYANAGAR SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

B.Sc. I Semester Practical Examination in Biotechnology Oct/Nov 2019

B.Sc I Semester

Paper Bt: 1 –Lab: Cytogenetics

Center: Veerashaiva College, Ballari.

Time: 3 Hrs

Max Marks: 40

- I. Prepare a temporary slide of the given material “A “and identify any on Two stage of Mitosis/Meiosis and draw a labeled diagram of the stage observed. 10 marks**
- II. Determine and Represent the Karyotype of Given Sample. 05 Marks**
- III. Genetic Problems- Monohybrid/ Dihybrid/ Incomplete dominance. 05 Marks**
- IV. Identification Spots. 5×3=15**
- 1. Identify and describe**
 - 2. Identify sketch and label.**
 - 3. Identify and write its genetic significance.**
- V. Record Submission. 05**

Examiners:

1.

2.

BIOTECHNOLOGY

B.Sc II semester

Paper : Bt : 2 - Biochemistry and Biophysics

52 hrs

Theory

SECTION-A (Biochemistry)

Unit-1

Introduction to Biochemistry

General properties of organic and inorganic compounds.

Types of chemical bonds and their functions: Ionic bond, Co-valent bond, hydrogen bond, Peptide bond, Vander walls and principles of thermodynamics.

06 Hrs.

Unit-2

Carbohydrates: Structural aspects- Introduction and occurrence, classification of monosaccharide's, disaccharides and polysaccharides, reducing and non reducing sugars and their properties. 05 Hrs

Proteins: Structural aspects- Introduction, classification and general characteristics, structure of primary, secondary , tertiary and quaternary proteins, classification of Amino acids. 06 Hrs

Lipids: Structural aspects- Introduction, classification and structure of simple and compound lipids and their properties. 05 Hrs

Vitamins: Fat soluble and water soluble vitamins- sources, functions and deficiency diseases. 04 Hrs

Nucleic acid: Structural aspects- components of DNA and RNA, nucleosides, nucleotides, double helical structure of DNA (Watson & Crick model), Various forms Of DNA. RNA- types 05 hrs.

Unit-3

Water: Structure and interactions, water as solvent, proton mobility, acid-base reactions, pH and buffers, isoelectric pH. 04 Hrs

SECTION-A (Bio-Physics)

Unit-1

Spectroscopy: Visible spectroscopic, Raman spectroscopy, NMR, IR, X-ray crystallography, fluorescence and atomic absorption. 09 Hrs

Unit-2

Isotopes: Importance in biological studies, measures of radio activity, GM counters and Scintillation. 04 Hrs

Unit-3

Analytical techniques: Principles and applications of Centrifugation, Chromatography, Electrophoresis. 04 Hrs

References:

1. Lehinger – Principles of Biochemistry.
2. Palanichamy – Principles of Biochemistry and Bio-techniques.
3. Streyer – Biochemistry.
4. Voet and Voet – Biochemistry.
5. Biophysics – Volkeustein.
6. Biophysics – Casey.
7. Introduction to Biophysics-Tanford.

B.Sc II semester
Paper : Bt : 2 - Biochemistry and Biophysics

Practical

1. Qualitative analysis of carbohydrates.
2. Qualitative analysis of proteins.
3. Qualitative analysis of blood and urine components.
4. Qualitative analysis of lipids.
5. Preparation of buffers.
6. Study of spectrophotometer and colorimeter.
7. Instrumentation or demonstration of centrifuge, chromatography.
8. Demonstration Electrophoresis technique.
9. Study of radioisotopes and autoradiography
10. Quantitative estimation of carbohydrates by DNS method.
11. Quantitative estimation of protein by FCR method and Biuret method.
12. Separation of sugars by TLC.
13. Survey report to submitted

VSK University, Ballari
B. Sc. II Semester Degree Examination, Nov/Dec-2019

BIO-TECHNOLOGY

Bt-2 : Biochemistry and Biophysics

[Max. Marks: 70]

[Time: 3 Hours]

Instruction: 1.) Answer all the questions.
2.) Draw diagrams wherever necessary.

SECTION A

Answer **any FIVE** of the following :

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer **any SIX** of the following:

(6X5=30)

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

Answer **any THREE** of the following:

(3X10=30)

- 15.
- 16.
- 17.
- 18.

VIJAYANAGAR SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

B.Sc. II Semester Practical Examination In Biotechnology.

Bt: 2 –Lab: Biochemistry & Biophysics

Center : Veerashaiva College, Ballari.

Time: 3 Hrs

Max Marks: 40

I. Perform the qualitative test to find out the constituents present in the given sample 15

II. Perform the minor experiment 05

Analysis of spectrophotometer / calorimeter

III. Estimation of Protein by Biuret method. 05

OR

Estimation of Carbohydrate by DNS method.

IV. Identify and comment on spotters 5x2=10

1. -
2. -
3. -
4. -
5. -

V. Record Book. 05

EXAMINERS:

1.

2.

BIOTECHNOLOGY
B.Sc III semester
Paper : Bt :3 - Molecular Biology

52 hrs

Theory

Unit1

Molecular of life: An introduction experimental proof of DNA and RNA as genetic material. Forms of DNA (A and Z), palindromic sequences, structure of RNA (t-RNA, m-RNA and r-RNA), DNA denaturation and renaturation. 12 Hrs

Unit-2

DNA replication : - Prokaryotic and eukaryotic- Enzymes and proteins involved in replication. Mechanism of DNA replication. 08 Hrs

Unit-3

Transcription in prokaryotes and Eukaryotes – Mechanism, promoters and RNA polymerase, transcription factors, post transcriptional modification. Mechanism of translation in prokaryotes & Eukaryotes , Post-translational modifications. 15 Hrs

Unit-4

Regulation of Gene expression - Gene organization, Operon concept (Lac , Catabolic & tryp) Genetic code: Properties 08 Hrs

Unit-5

Transposable elements: IS elements, transposons. 09 Hrs
DNA repair: Causes and mechanism.

References:

1. Molecular Biology of the gene – J.D.Watson.
2. Molecular Cell Biology – Darnell.
3. The Gene – Levin.
4. Molecular Biology of the Cell – Albert's.
5. Genetic Engineering – Williamson.

BIOTECHNOLOGY
B.Sc III semester
Practical : Bt.P: 3 - Molecular Biology

1. Isolation of cells from buckle cavity.
2. Isolation of DNA from onion/coconut endosperm.
3. Agarose gel electrophoresis of DNA
4. Study of transformation, conjugation and transduction.
5. Study of PCR.
6. Estimation of DNA by Diphenylamine (DPA) method.
7. Estimation of RNA by Orcinol method.
8. Ampicillin selection of auxotrophs.

VSK University, Ballari
B. Sc. III Semester Degree Examination, Nov/Dec-2019

BIO-TECHNOLOGY

Bt-3 : Molecular Biology

[Max. Marks: 70]

[Time: 3 Hours]

Instruction: 1.) Answer all the questions.
2.) Draw diagrams wherever necessary.

SECTION A

Answer **any FIVE** of the following :

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer **any SIX** of the following:

(6X5=30)

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

Answer **any THREE** of the following:

(3X10=30)

- 15.
- 16.
- 17.
- 18.

VIJAYANAGAR SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

B.Sc. III Semester Practical Examination In Biotechnology Oct/Nov 2019

Bt.P: 3 –Lab: Molecular Biology

Center : Veerashaiva College, Ballari.

Time: 3 Hrs

Max Marks: 40

- | | |
|---|--------|
| I. Perform the Major experiment “A” and show the experiment to the examiner | 15 |
| II. Perform the Minor experiment “B” and show the experiment to the examiner | 05 |
| III. Perform the Minor experiment “C” and show the experiment to the examiner | 05 |
| IV. Identify and comment on spotters | 5x2=10 |
| D- | |
| E- | |
| F- | |
| G- | |
| H- | |
| V. Record Book | 05 |

EXAMINERS:

1.

2.

BIOTECHNOLOGY
B.Sc IV semester
Paper : Bt : 4 – Microbiology

52 hrs

Theory :

Unit-1

Introduction and Scope of Microbiology: History of microbiology, contributions of eminent Microbiologist in the development of Microbiology.(Leuwenhoek, Edward Jenner, Joseph Lister, Louis Pasteur, Robert Koch, Alexander Flemming and Iwanosky),
Branches of Microbiology.

Microscopy : Principles, Light microscope, Phase Contrast, Dark field, Bright field, Fluorescent, Interference microscope (Stereo microscope), Confocal, Inverted microscope, and Electron microscope (TEM and SEM).

13 Hrs

Unit-2

Microbiological techniques:

Sterilization- physical method, chemical methods and radiation methods.

Stains and staining techniques: principles of staining, nature of dyes, types of stain-Differential and structural staining.

13 Hrs.

Unit-3

Microbial growth: nutritional requirements of microorganisms, bacterial growth curve, factors affecting growth, counting of bacteria(Measurement of Microorganisms- Micrometry)

Control of microorganisms: antimicrobial agents and preservations, factors influencing antimicrobial activity, phenol Coefficient test.

13Hrs

Unit-4

Study of pathogenic microorganisms: Streptococcus pneumonia clostridium tetani, mycobacterium tuberculosis, Salmonella typhi, vibrio.

Bacterial diseases and viral diseases: poliomyelitis, measals, hepatitis A and B, AIDS.Protozoan diseases: Amoebiasis and Malaria. General diseasesyphilis and Gonorrohea.

13 Hrs.

References:

1. Pelzar, M.J., J.R. Chan, E.C.S. Noel and Krieg, N.R., 1988, Microbiology – 5 Ed. Mc. Graco-Hill Book Co., New York.
2. Boyd.R.R. 1988, General Microbiology. Times Mirror/Mosby College, Publishing Missouri.
3. Atlas.R.M. 1995, Principles of Microbiology, I Ed., Mosby Year Book Ine-Missouri.
4. Ivan M Roitt. Essentials of Immunology 6th Editon, Blackwell Scientific Publications.
5. Richard A. Goldsby, Thomas J, Kindt, Barban A. Osborne. KUBY Immunology,th Edition, W.H Freeman and Company New York.

BIOTECHNOLOGY
B.Sc IV Semester
Practical : Bt.P : 4 – Microbiology

1. Safety measures in microbiology laboratory.
2. Cleaning and sterilizing of glasswares.
3. Study of instruments : Compound microscope, Autoclave, hot air oven, pH meter, laminar air flow and centrifuge.
4. Staining of bacteria- gram stain, spore and capsule staining.
5. Preparation of agar culture media and broth
6. Isolation of bacteria and fungi from water, air, soil by serial dilution, streak plate and pour plate method.
7. Counting of bacteria by using Haemocytometer.
8. Study of Colony characters of bacteria.
9. Study of bacterial motility by hanging drop method.
10. Catalyse test.
11. Visit to dairy- Report to be submitted
12. Visit to soil conservation centre- Report to be submitted

VSK University, Ballari
B. Sc. IV Semester Degree Examination, Nov/Dec-2019
BIO-TECHNOLOGY
Bt -4 : Microbiology

[Max. Marks: 70]

[Time: 3 Hours]

Instruction: 1.) Answer all the questions.
2.) Draw diagrams wherever necessary.

SECTION A

Answer **any FIVE** of the following :

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer **any SIX** of the following:

(6X5=30)

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

Answer **any THREE** of the following:

(3X10=30)

- 15.
- 16.
- 17.
- 18.

VIJAYANAGAR SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

B.Sc. IV Semester Practical Examination In Biotechnology.

Bt.P: 4 –Lab: Microbiology

Center : Veerashaiva College, Ballari.

Time: 3 Hrs

Max Marks: 40

- | | |
|---|--------|
| I. Perform the Major Experiment | 15 |
| Gram staining of Given Bacterial Sample | |
| II. Perform the minor experiment | 05 |
| Motility of Bacteria by hanging drop method of given sample | |
| III. Perform the minor experiment | 05 |
| Catalase Test of the given sample | |
| IV. Identify and comment on spotters | 5x2=10 |
| 1. - | |
| 2. - | |
| 3. - | |
| 4. - | |
| 5. - | |
| V. Record Book. | 05 |

EXAMINERS:

1.

2.

BIOTECHNOLOGY
B.Sc V Semester
Paper : Bt :5.1 – Immunology

52 hrs

Theory

Unit-1

Basic principles of immunology.

Immunity: types of immunity- active, passive and acquired.

Antigens: definition and types, specificity, epitope, paratope and effector phase. 13 Hrs

Unit-2

Antibodies (immune globulins): types of immune globulins, structure and functions of Immune globulins.

Antigen: antibody reactions- definitions, mechanism and application of precipitation, agglutination, complement fixation toxin-antitoxin reactions, immune blotting, immune fluorescence, RIA and ELISA. 13 Hrs

Unit-3

Hypersensitivity: types of hypersensitivity- IgE mediated (Type 1), antibody mediated cytotoxic (type 2), immune complex mediated (type 3) and T-mediated (type 4) hypersensitivity reactions. 06 Hrs

Unit-4

Cells of the immune system: lymphoid cells, B-lymphocytes, T-lymphocytes and null cells. Mononuclear cells- phagocytosis, antimicrobial and cytotoxic activities, antigen processing Cells granulocytic cells, mast cells and dendritic cells. 07 Hrs

Unit-5

Organs of immune system: primary lymphoid organs- thymus, bone marrow, lymphatic system. secondary lymphoid organs- lymph nodes, spleen and mucosal associated lymphoid tissue. 08 Hrs

Unit-6

Blood groups: ABO blood group system- distribution and transitions of ABO blood Groups and vaccination. 05 Hrs

References:

1. Ivan M Roitt. Essentials of Immunology 6th Editon, Blackwell Scientific Publications.
2. Richard A. Goldsby, Thomas J, Kindt, Barban A. Osborne. KUBY Immunology,th Edition, W.H Freeman and Company New York.
3. Robert M. Coleman, Mary F. Lombard, Raymond E. Sicard. Fundamental Immunology 2nd Edition WCB Publishers.
4. Ananthanarayan S.A Text Book Of Microbiology.
5. Chandrakanth kelmani .A Text Book Of Microbiology Vol. 4th United Publishers.
6. Barret T.T.1986, A Text Book Of Immunology, 5th Edition. The C.V.Mosby Co, St. Louis.

BIOTECHNOLOGY
B.Sc V Semester
Practical : Bt. P :5.1 - Immunology

1. ABO blood grouping.
2. Rh factor typing.
3. Antigen preparation.
4. Demonstration of lymphoid organs.
5. Blood collection and serum preparation.
6. Total count of RBC.
5. Total count of WBC.
6. Differential WBC counts.
7. Estimation of haemoglobin content in blood.
8. Demonstration of Enzyme-linked immunosorbent assay (ELISA).
9. Diagnosis of infectious diseases by immunoassay-Widal test for typhoid and Wassermann reaction for syphilis.
10. Survey on diseases- Report to be submitted

V.S.K University, Ballari
B. Sc. V Semester Degree Examination, Nov/Dec-2019

BIO-TECHNOLOGY

Bt -5.1 : Immunology

[Max. Marks: 70]

[Time: 3 Hours]

Instruction: 1.) Answer all the questions.
2.) Draw diagrams wherever necessary.

SECTION A

Answer **any FIVE** of the following :

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer **any SIX** of the following:

(6X5=30)

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

Answer **any THREE** of the following:

(3X10=30)

- 15.
- 16.
- 17.
- 18.

VIJAYANAGAR SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

B.Sc. V Semester Practical Examination In Biotechnology Oct/Nov 2019

Bt.P: 5.1 –Lab: Immunology

Center : Veerashaiva College, Ballari.

Time: 3 Hrs

Max Marks: 40

I. Perform the Major experiment “A” and show the experiment to the examiner	10
II. Perform the Minor experiment “B” and show the experiment to the examiner	05
III. Perform the Minor experiment “C” and show the experiment to the examiner	05
IV. Identify and comment on spotters	5x2=10
D-	
E-	
F-	
G-	
H-	
V. Record Book	05
VI. Viva	05

EXAMINERS:

1.

2.

BIOTECHNOLOGY

B.Sc V Semester

Paper : Bt :5.2 - Recombinant DNA technology

52 hrs

Theory

Unit-1

Principles of Recombinant DNA technology:

Tools of genetic engineering: passenger of foreign DNA, isolation by shotgun method . Vehicle DNA cloning vectors plasmids and their features. Some common plasmid vector: PBR 322 PUC 18. Vector from bacteriophage Lambda- phage and phage M-13,cosmids Vector from animal viruses Sv-40 and retroviruses.Special vectors-Shuttle and expression vectors. Yeast vectors.

13 Hrs

Unit-2

Enzymes involved in gene cloning: restriction endonucleases- classifications, nomenclature, types and their applications in Recombinant DNA technology. Ligases: DNA ligases and their applications enzyme to modify ends of DNA molecules.

Gene cloning: methods of introducing gene.In prokaryotes and eukaryotes (E-coli and yeast cells as cloning host).

13 Hrs

Unit-3

Detection of the right clones: direct screening, direct selection, indirect screening techniques, nucleic acid probes, hybridization technique,immunodiagnostic probes.

Cells for cloning: *E-coli*, *Bacillbessubtilis*, *Saccharomyces cerevisiae*, and In mammalian fertilized egg cell.

Gene library: Genomic library of DNA library and phage Lambda vscosmid for gene libraries.

13Hrs

Unit-4

Mapping the DNA: Restriction mapping, DNA footprinting, chromosome walking and mapping by somantic cell hybridization.

DNA Sequencing: Maxam Gilbert's method,Sanger and Coulson's method- the primer, template, the dideoxynucleotides Terminators and deoxynucleotides and the polymerases, using computers for Sequencing and analysing DNA sequence.

13 Hrs

References:

1. Glick, B.R. and Pasternak (1994) molecular Biotechnology: principles and application of recombinant DNA, American society for Microbiology Washington.DC.
2. Watson J.D, Molecular Biology of the gene
3. Edward Alcoma (1990) DNA –Technology.
4. Sandhu, D.K. and Virid G.S.(1980) Gentic Engineering Techniques , Sciences reporter
5. SandyaMitra (1996)Gentic Engineering MacMillan India Ltd- New Delhi.

BIOTECHNOLOGY

B.Sc V Semester

Practical : Bt.P :5.2 - Recombinant DNA technology

1. Isolation of plasmid DNA by boiling method from bacteria.
2. Study of denaturation and renaturation of DNA.
3. Isolation of chromosomal DNA from bacteria plants and animal.
4. Study of transformation by kits.
5. Study of conjugation by kits.
6. Isolation of phages by using Sawage samples.
7. Restriction digestion.
8. Production of protoplast from bacteria and plants.
9. Separation of DNA fragments by using agarose gel electrophoresis.

VSK University, Ballari

B. Sc. V Semester Degree Examination, Nov/Dec-2019

BIO-TECHNOLOGY

Bt-5.2 : Recombinant DNA technology

[Max. Marks: 70]

[Time: 3 Hours]

Instruction: 1.) Answer all the questions.
2.) Draw diagrams wherever necessary.

SECTION A

Answer **any FIVE** of the following :

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer **any SIX** of the following:

(6X5=30)

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

Answer **any THREE** of the following:

(3X10=30)

- 15.
- 16.
- 17.
- 18.

VIJAYANAGAR SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

B.Sc. V Semester Practical Examination In Biotechnology Oct/Nov2019

Bt. P: 5.2 –Lab: Recombinant DNA Technology.

Center : Veerashaiva College, Ballari.

Time: 3 Hrs

Max Marks: 40

I. Perform the Major experiment “A” and show the experiment to the examiner	10
II. Perform the Minor experiment “B” and show the experiment to the examiner	05
III. Perform the Minor experiment “C” and show the experiment to the examiner	05
IV. Identify and comment on spotters	5x2=10
D-	
E-	
F-	
G-	
H-	
V. Record Book	05
VI. Viva	05

EXAMINERS:

1.

2.

BIOTECHNOLOGY

B.Sc VI Semester

Paper : Bt :6.1 - Agricultural and Environmental biotechnology.

52 hrs

Theory

Unit-1

Introduction to Agricultural biotechnology.

Crop improvement hybridization and plant breeding techniques.

Micropropagation and plant tissue culture technique and its application in agriculture.

Somatic hybridization, haploid production and cryopreservation.

Study of biopesticides used in agriculture (neem as example). integrated pest management. 13 Hrs

Unit-2

Mechanism of biological nitrogen fixation process. study of NIF, NOD and HUP genes in nitrogen fixation process.

Production of biofertilizers and applications of rhizobium, azotobacter, azolla and mycorrhiza.

Use of plant growth regulators in agriculture and horticulture. 13 Hrs

Unit-3

Introduction to Environmental studies

Ecosystem and ecological pyramids

Treatment of municipal water & industrial effluents

Environmental pollution 13 hrs

Unit-4

Biodegradation & Bioremediation

Environmental Impact Assessment

Case studies of Environmental pollutions. 13 hrs

References:

1. Environmental Biotechnology-W.D.Grant
2. Environmental Biotechnology –C.F. Foster
3. Soil Microbiology-N.S.SubbaRoa
4. Waste water treatment,engineering and Disposal Metcalf
5. Biofertilizers in agriculture- N.S.SubbaRoa .

V.S.K UNIVERSITY, BALLARI
BIOTECHNOLOGY
B.Sc VI Semester

Practical : Bt :6.1 - Agricultural biotechnology and Environmental biotechnology

1. Isolation of soil microorganisms- rhizobium, azotobacter and mycorrhiza.
2. Estimation of soil alkalinity.
3. Isolation of rhizobium from root nodules.
4. Biofuel and Biodiesel.
5. Vermicomposting.
6. Estimation of COD.
7. Estimation of the BOD.
8. Estimation of DO.
9. Estimation of alkalinity.
10. Estimation of total solids
11. Conduct MPN test for coliforms.
12. Preparation of synthetic seeds from plant material.
13. Preparation of MS media.
14. Callus induction using plant explants (carrot, nicotiana, sugarcane).
15. Demonstration of organ culture, micro propagation, organogenesis and anther culture.

VSK University, Ballari
B. Sc. VI Semester Degree Examination, Nov/Dec-2019

BIO-TECHNOLOGY

Bt-6.1: Agriculture and Environmental Biotechnology

[Max. Marks: 70]

[Time: 3 Hours]

Instruction: 1.) Answer all the questions.
2.) Draw diagrams wherever necessary.

SECTION A

Answer **any FIVE** of the following :

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer **any SIX** of the following:

(6X5=30)

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

Answer **any THREE** of the following:

(3X10=30)

- 15.
- 16.
- 17.
- 18.

VIJAYANAGAR SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

B.Sc. VI Semester Practical Examination In Biotechnology.
Bt: 6.1 –Lab: Agriculture And Environmental Bio-Technology
Center : Veerashaiva College, Ballari.

Time: 3 Hrs

Max Marks: 40

- I. Perform the MPN test for detection of coil form Bacteria 10
Or
Isolation of Protoplast from root nodules.
- Or
Preparation of synthetic seeds from plant material
- II. Estimation of COD of given water sample 05
Or
Estimation of DO of given water sample
- III. Estimation of total solids in given water sample 05
Or
Estimation of alkalinity in given water sample
- IV. Identify and comment on spotters 5x2=10
1. -
 2. -
 3. -
 4. -
 5. -
- V. Viva 05
- VI. Record Book 05

EXAMINERS:

1.

2.

BIOTECHNOLOGY

B.Sc VI semester

Paper : Bt :6.2 - Plant and Animal cell culture

52 Hrs

Theory

Unit -1

Introduction to in vitro culture methods and laboratory facilities.

History of plant tissue culture methods, terms and definitions of common words used in cell culture Technology.

Growth medium composition, use of growth regulators and their effect on cell growth differentiation and organogenesis, study of MS BS and HiTech media. 13 hrs

Unit -2

Callus, cell Suspension and embryo culture, regeneration of shoots and roots, ovary and endosperm culture.

Micro propagation, clonal propagation of Elite species, auxiliary bud, shoot tip and meristem culture, applications of micro propagation. 13 Hrs

Unit -3

in vitro haploids and their applications, somaclonal variations and applications.

Single cell suspension culture and their applications in selection of variants or mutants of agronomic importance (salt stress and disease resistant varieties).

Introduction to protoplast isolation, principles and applications, somatic hybridization. 13 Hrs

Unit -4

Basic techniques of animal cell culture and their applications

Animal cell culture growth media and its sterilization, balanced salt solution and its quality.

Applications of animal cell culture in regenerative medicine and vaccine preparation

Human Genome Project and its implications. 13 Hrs

References:

1. Chawala (2001) plant Biotechnology, oxford and IBH Publication co. New Delhi.
2. Razdan m.K. (1994)an Introduction to Plant Tissue culture .Oxford &IBH Publication, Co New Delhi
3. Soppier R.E and Griffit j.b.(1998)Animal Cell Biotechnology. Academic press.
4. Naraganswamy S. (1994) plant cell and tissue culture. Tata mcGiaw- II Publishing, Co New Delhi
5. Biotel (1994) in Vitro cultivation of animal cells.

V.S.K University, Ballari
BIOTECHNOLOGY
B.Sc VI semester
Practical : Bt :6.2 - PROJECT

V.S.K University, Ballari
B. Sc. VI Semester Degree Examination, Nov/Dec-2019
BIO-TECHNOLOGY
Bt-6.2: Plant and Animal cell culture

[Max. Marks: 70]

[Time: 3 Hours]

Instruction: 1.) Answer all the questions.
2.) Draw diagrams wherever necessary.

SECTION A

Answer **any FIVE** of the following :

(5X2=10)

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

SECTION-B

Answer **any SIX** of the following:

(6X5=30)

- 7.
- 8.
- 9.
- 10.
- 11.
- 12.
- 13.
- 14.

SECTION-C

Answer **any THREE** of the following:

(3X10=30)

- 15.
- 16.
- 17.
- 18.

VIJAYANAGAR SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

B.Sc. VI Semester Practical Examination in Biotechnology.

Bt.P: 6.2 –PROJECT

Center : Veerashaiva College, Ballari.

Time: 3 Hrs

Max Marks: 40

1. Project selection
2. Project presentation
3. Project report compilation and submission.
4. Viva voce.

EXAMINERS:

1.

2.

V.S.K UNIVERSITY, BALLARI

**OPEN ELECTIVE SUBJECT
BIOTECHNOLOGY**

2019- 20 Onwards

V.S.K UNIVERSITY, BALLARI
Open Elective Syllabus for II Semester
Biotechnology
Cytogenetics

52 hours
100 marks

UNIT -1

Introducing Life Sciences, The Importance of Interdisciplinary Biology

Themes in the Study of Life: Properties of life.

Transmission of Genetic Information: What is Gene Expression? Acquainting with the vocabulary- Gene, Allele, Genome, DNA, Chromosome, RNA(mRNA, tRNA, rRNA), Proteins, Transcription, Translation & Genetic Code.

13 hrs

UNIT- 2

Evolution as the foundation: Unity in Diversity, Natural Selection, Classification of Organisms, Tree of Life

Scientific Inquiry: Making Observations & Testing Hypotheses.

13 hrs

UNIT- 3

Fundamentals of Cell Theory, A bit of History

The Hidden Universe of the Cell, Cellular Organization and Metabolism

The Organelles: Nucleolus, Nucleus, Ribosomes, Endoplasmic Reticulum, Vesicles, Golgi Apparatus, Mitochondria, Chloroplast, Lysosome, Peroxisome & The Plasma Membrane. **13 hrs**

UNIT - 4

Transport of Proteins: Vesicular & Non-Vesicular System

Cell Culture Techniques: Culture Media, Cell-lines, 2D & 3D Cultures

13 hrs

References

1. Campbell Biology – 11th Edition(link is external) - Jane B. Reece et. al. - Boston: Benjamin Cummings / Pearson
2. The Cell, A Molecular Approach – 7th Edition(link is external) – Geoffrey M.Cooper/Robert E.Hausman-Sinauer Associates, Inc.

V.S.K UNIVERSITY, BALLARI
Open Elective Syllabus for III Semester
BIOTECH: Microbial-Biotechnology

4 credits, **52 hours**

100 marks

UNIT- I

Basic concepts– Spontaneous generation, Germ theory of diseases, Cell theory. Contributions of Antonie van leuwenhoek, Joseph Lister, Robert Koch, Louis Pasteur, Edward Jenner, John Tyndall, Sergei N. Winogradsky, Selman A waksman, Alexander Flemming, Paul Erlich, Fannie Hesse, Elie Metchnikoff, Kary Mullis. Development of pure culture methods. Cell structure: Peptidoglycan structure and synthesis. Cytoplasmic matrix and components: Inclusion bodies. **13 hrs**

UNIT- II

Sterilisation and disinfection- Definitions, Principles. Methods of sterilization- Physical methods (Heat, Filtration), Radiation and Chemical methods. Control of sterilization and Testing of sterility.

Microscopy – Principles, Light microscope, Phase Contrast, Dark field, Bright field, Fluorescent, Interference microscope (Stereo microscope), and Electron microscope (TEM and SEM).

Measurement of Microorganisms- Micrometry. Staining- Simple, Gram staining, Negative staining, Capsule staining, Spore staining **13 hrs**

UNIT- III

Microbiological media, composition and types: selective and differential media Growth curve and growth kinetics. Influence of environmental factors for microbial growth. Nutritional groups of bacteria: overview Estimation of Microbes- Direct Microscopic count, Turbidometric assay, TVC- Indirect Method- CO₂ liberation- Protein estimation-Maintenance and Preservation of cultures. **13 hrs**

UNIT – IV

Taxonomy– Principle and its types (Classical approach– Numerical, Chemical, Serological and Genetic). Bacterial taxonomy– Bergey's manual of Systematic Bacteriology (Eubacteria and Archaeobacterium). **13 hrs**

REFERENCES

- Prescott, L.M J.P. Harley and C.A. Klein 1995. Microbiology 2nd edition Wm, C. Brown publishers.
- Michael J. Pelczar, Jr. E.C.S. Chan, Moel : Microbiology McGraw Hill Book R. Krieg, 1986 Company
- Stainer R.Y. Ingraham J.L. Wheolis H.H and Painter P.R. 1986 The Microbial world, 5th edition. Eagle Works Cliffs N.J. Prentica Hall.

V.S.K UNIVERSITY, BALLARI
Open Elective Syllabus for IV Semester
GENETIC ENGINEERING

4 credits, **52 hours**

100 marks

Unit I-MOLECULAR TOOLS FOR GENE CLONING

Nucleases: Exonucleases and Endonucleases, Restriction Enzymes (Type I, Type II, Type III, Type IV & Type V), RNases

Polymerases: DNA Pol I, Klenow Fragments, Reverse Transcriptase, Taq & Pfu Polymerases
Ligases: T4 DNA Ligase, *E. coli* DNA Ligase, T4 RNA Ligase

Topoisomerases: Type I(A, B) & Type II(A,B)

End Modifying Enzymes: Terminal Transferase, T4 Polynucleotide Kinase, Alkaline Phosphatases .
13 Hrs

Unit II-VECTORS AND GENE CLONING

Introduction to cloning vectors -- Desirable properties of vectors -- Prokaryotic & Eukaryotic Expression Systems (Constitutive & Inducible)

Plasmid Vectors -- Phage Vectors -- Cosmids -- Phagemids -- BACs -- Yeast Vectors -- YACs -- Lent viral Vectors -- Adenoviral Vectors -- Plant Vectors).
13 hrs

Unit III-ADVANCED TECHNIQUES IN MOLECULAR BIOLOGY

Polymerase Chain Reaction -- Quantitative Real Time PCR -- Gel Electrophoresis: AGE & PAGE -- Blotting Techniques: Southern, Western & Northern.

Methods of gene transfer in Plants and Animals: Chemical, Physical & Viral mediated DNA transfer
Construction of Genomic & cDNA Libraries -- DNA Sequencing -- Protein Engineering: Site Directed Mutagenesis .
13 hrs

Unit IV-RECENT TRENDS IN MOLECULAR BIOLOGY RESEARCH

Targeted Genome Editing: ZFNs, TALENs, CRISPRs -- Gene Targeting: Knock-ins & Knock-outs -- DNA Finger Printing .
13 hrs

REFERENCES:

- Principles of Gene Manipulation and Genomics(link is external) – 7th Edition – Sandy B. Primrose, Richard Twyman – Blackwell Publishing
- Gene Cloning and DNA Analysis: An Introduction(link is external) - 6th Edition - T. A. Brown - John Wiley & Sons
- An Introduction to Genetic Engineering(link is external) - 3rd Edition - Desmond S. T. Nicholl - Cambridge University Press
- Molecular Biotechnology: Principles and Applications of Recombinant DNA (link is external)- 4th Edition - Bernard R. Glick, Jack J. Pasternak, Cheryl L. Patten - ASM Press

V.S.K UNIVERSITY, BALLARI
Open Elective Syllabus for V Semester
Industrial & Environmental Biotechnology

4 credits, **52 hours**

100 marks

SYLLABUS

Unit I - Industrial Biotechnology:

Introduction and history, Isolation and screening, Primary and Secondary screening, Production strains, Production media, Inoculum preparation and inoculum Development. **13 hrs**

Unit II-

Fermentation Technology: Introduction to Fermenter, Industrial sterilization, Scale up fermentations, Types of fermenters, Acetator and cavitator, product recovery, Industrial production of penicillin, production of streptomycin.

Industrial production of organic acids- introduction, production of citric acid, production of lactic acid, Industrial production of enzymes, introduction; general aspects, production of amylases & proteases, production of nucleotides & nucleotides, production of alcohols-acetone-butanol, production of ethanol, production of aminoacids-introduction, production of L- glutamic acid, production of vitamin B12, production of single cell proteins, production of yeast/ mushrooms, production of fermented foods, production of microbial insecticides, production of Biopolymers, Biofuels, biogas, production of Bioplastics, Biosurfactants, and Biofertilizers, General rules in patents and practices. **13 Hrs**

Unit III- Environmental Biotechnology –

Waste water treatment, Bioremediation, Genetically Engineered Microorganisms in Biotreatment of wastes. **13 hrs**

Unit IV- Biotechnological methods for pollution detection, Biosensors.

13 hrs

REFERENCE

1. Biotechnology-A textbook of Industrial Microbiology. II edition. Wulf Crueger and Anneliese Crueger.
2. Industrial Microbiology by L.E Casida, John Wiley and sons INC.
3. Industrial Microbiology by A.H.Patel, Macmillan India Ltd.
4. Principles of fermentation technology by P.Stanbury & Allan Whitekar, Pergamon.
5. Manual of Industrial Microbiology and Biotechnology, II edition. Arnold L.Demain and Julian E.Davis.

VSK UNIVERSITY,BALLARI.
B.Sc II Semester Degree Examination,
OPEN ELECTIVE SUBJECT (BIOTEHNOLOGY)

Paper- 1.

[Max.marks : 70

Time : 3 Hours]

Instructions: 1) Answer ALL questions.

2) Draw labeled diagrams wherever necessary.

SECTION-A

Answer any TEN of the following.

(10X2=20)

- 1.
- 2.
- 3.
- 4.
- 5..
- 6..
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

SECTION-B

A. Answer any FOUR of the following:

(4X5=20)

- 13..
- 14..
- 15.
- 16..
- 17..

SECTION-C

Answer any THREE of the following in detail :

(3X10=30)

- 18.
- 19.
- 20.
- .21.
