

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Scheme of Teaching & Examination

BE Vth Semester Biotechnology

S. No	Board of Study	Subject Code	Subject	Period per week			Scheme of Exam			Total Marks	Credit $L+(T+P)$ 2
				L	T	P	ESE	CT	TA		
1	Biotechnology	318511(18)	Plant Biotechnology	4	-	-	80	20	20	120	4
2	Pharmacy	318512(41)	Drugs And Pharmaceutical Bio-Technology	3	1	-	80	20	20	120	4
3	Chemical Engg	318513(19)	Instrumentation Techniques	4	1	-	80	20	20	120	5
4	Biotechnology	318514(18)	Enzyme Technology	3	1	-	80	20	20	120	4
5	Biotechnology	318515(18)	Animal Biotechnology	4	-	-	80	20	20	120	4
6	Chemical Engg	318516(19)	Process Economics And Management	4	-	-	80	20	20	120	4
7	Biotechnology	318521(18)	Plant Biotechnology Lab	-	-	3	40	-	20	60	2
8	Pharmacy	318522(41)	Drug And Pharmaceutical Bio-Technology Lab	-	-	3	40	-	20	60	2
9	Chemical Engg	318523(19)	Instrumentation Techniques Lab	-	-	3	40	-	20	60	2
10	Biotechnology	318524(18)	Enzyme Technology Lab	-	-	3	40	-	20	60	2
11	Humanities etc	300525(46)	Personality Development	-	-	2	-	-	20	20	1
12	Bio Technology	318526(18)	Practical Training * Evaluation/Library	-	-	1	-	-	20	20	1
Total				22	3	15	640	120	240	1000	35

L: Lecture, T: Tutorial, P: Practical, ESE: End Semester Exam, CT: Class Test, TA: Teachers Assessment

*** To be completed after IV semester and before the commencement of V semester**

Chhattisgarh Swami Vivekanand Technical University, Bilai (C.G.)

Semester: V

Branch: Biotechnology

Subject: Plant Biotechnology

Code: 318511 (18)

Total Theory Periods: 50

Total Tut Periods: Nil

Total Marks in End Semester Exam: 80

Minimum number of class test to be conducted: 2

- Unit 1:-** Introduction definition and comparison between classical & modern approaches. Large scale culture– Layer culture and suspension culture. Problems in large scale cell culture of plant.
- Unit 2:-** Micro propagation– proliferation of auxiliary bud, induction of adventitious buds, buds and protocorms, somatic embryogenesis, artificial seeds. Introduction to somaclonal variations advantages and limitations, its applications.
- Unit 3:-** Transformation Technique– physical methods, chemical methods, electroporation. Vector mediated Gene transfer– agrobacterium mediated transformation and plant virus vectors, binary vectors.
- Unit 4:-** Problems in gene transfer– Low level of transgene expression, gene silencing, associated undesirable features, low transformation frequency, random integration, contamination by agrobacterium. Safety Regulations for transgenic plants.
- Unit 5:-** Examples of useful Gene Transfer– insect resistant plants. Virus resistant plants, modification of seed protein quality, suppression of endogenous gene, male sterility plant derived vaccines.

Name of Text Books:

1. Biotechnology by B.D. Singh, Kalyani Publishers
2. Transgenic Plants– Lindsey & Jones.

Name of Reference Books:

1. Plant tissue Culture– Application & limitations S.S. Bhojwane (1990), Elsevier, Amsterdam.
2. Micro propagation : P.C. Degergh & R. H. Zommeronom (1990) Kluwer Academic Publ. Dordrecht.
3. Plants, genes & crop improvement, Crispeels ASPB, 2002

**Chhattisgarh Swami Vivekanand Technical University,
Bhilai (C.G.)**

Semester: V

Branch: Biotechnology

Subject: Drugs and Pharmaceutical Bio Technology

Code: 318512 (41)

Total Theory Periods: 40

Total Tut Periods: 12

Total Marks in End Semester Exam: 80

Minimum number of class test to be conducted: 2

Unit- 1: Introduction to different dosage forms and formulation, Historical prospective of Pharmaceutical biotechnology, biotechnology and industry, GMP Compliance and Biopharmaceutical facilities.

Unit- 2: Pharmaceuticals through fermentation: tetracycline, streptomycin ,Penicillin , Clavulanic acid, L-Lysine, L-Glutamic acid, Riboflavin, Vitamin C, Ethanol

Unit- 3: Pharmaceutical Applications of Recombinant technology: Novel protein generation, novel route to small molecules, cloning of human artificial receptor for drug design , cloning of hemoglobin in E.coli, Vaccine production

Unit- 4: Biopharmaceutics : Introduction, routes of administration, factors affecting drug absorption, distribution of drugs, protein binding of drugs, distribution of drugs, termination of drugs action.

Unit -5: Principles of drug targeting and liposome. Delivery consideration of biotechnological Products: stability profile, barriers to peptide and protein delivery, delivery of protein and peptide drugs, site specific protein modification, toxicity profile characterization , Drug delivery system in Gene therapy.

Name of Text Books:

1. Pharmaceutical Biotechnology – S.P. Vyas, V.K. Dixit, CBS publication and Distributors.
2. Pharmaceutical microbiology – Hugo Russel’s Black well Publication 7th Edition

Name of Reference Books:

1. Industrial microbiology – L.E. Casida JR, New age International (P) Limited Publication
2. Introduction to Biopharmaceutics and Pharmacokinetics , Dr. H.P.Tipnis , Dr. M.S.Nagarsenker , Nirali Prakasan Publications.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester : V

Branch: Biotechnology

Subject: Instrumentation Techniques

Code: 318513(19)

Total Theory Periods: 50

Total Tut Periods: 12

Total Marks in End Semester Exam: 80

Minimum number of class test to be conducted: 2

Unit 1:- Principles of Measurement- Error analysis, Static and Dynamic characteristics of measurement.
Dynamic response of I & II order instruments

Temperature and Pressure Measurement- Expansion Thermometers, Thermocouples, Resistance Temperature Detectors, Thermistors, Pyrometers, Manometer and Gauges

Unit 2:- Introduction to Process Control- First order and Second order systems, controllers, PLC's

Unit 3:- Flow Measurement:-Head flow meters, Area flow meters, Open channel meters, Positive Displacement meters, Control valves – linear and non-linear characteristics.

Unit 4:- Liquid Level Measurement- Direct level measurement, interface measurement, Hydrostatic head level measurement in pressure vessels, Ultrasonic level devices, Point and Continuous level measurement using radioactive devices, Capacitance type devices, resistance sensors, Nuclear radiation type level gages and level switches.

Unit 5:- Analytical Instrumentation- Gas chromatography, operating principles, type, components and applications. High performance liquid chromatography;
Refractive index, pH, viscosity and conductivity measurement;
Gas Analyzers.

Name of Text Books:

1. Applied Instrumentation in the Process Industries, Vol - I, Andrew W.G. & William H.B.
2. Industrial Instrumentation Eckman D.P. McGraw Hill Publications (1975)

Name of Reference Books:

1. Principles of Industrial Instrumentation Patranabis
2. Perry's Chemical Engineer's Handbook .

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester : V

Branch: Biotechnology

Subject: Enzyme Technology

Code: 318514 (18)

Total Theory Periods: 40

Total Tut Periods: 12

Total Marks in End Semester Exam: 80

Minimum no of class test to be conducted: 2

- Unit 1:-** Structural and functional Analysis– introduction, classification and structure of enzymes. Coenzymes or Cofactors. Kinetics of enzyme action– Michaelis Menten equation. Mechanism of enzyme action. Allosteric Enzymes. Inhibition of Enzyme action. Zymogene and enzyme activation. Ribozymes, abzymes.
- Unit 2:-** Specificity of enzymes. Development of enzyme assays, purification of enzymes. Effect of temperature and pH on enzyme activity. Kinetics of Inhibition.
- Unit 3:-** Enzyme immobilization techniques– physical and chemical techniques for enzyme immobilization (adsorption, matrix entrapment, encapsulation, cross linking, covalent binding, etc). Limitations of immobilization, application of immobilized enzymes.
- Unit 4:-** Industrial production of enzymes, bioreactors using immobilized enzymes, application of enzymes in leather industry, wool industry, dairy industry, detergents industry, fruit juices industry, textile industry, Beverage industry, syrup industry.
- Unit 5:-** Enzyme Engineering– introduction, aim, steps, technique of enzyme engineering– physical, chemical computational, biochemical or biological. Achievement of enzyme engineering. Relationship between structure and function of enzyme. Bifunctional and polyfunctional enzymes.

Name of Text Books:

1. Biotechnology by B.D. Singh Kalyani Publishers.
2. Enzymes by Paloney (2001): Horwood Publishing series.

Name of Reference Books:

1. Enzyme technology by Helmut Jhling (1998): Jahn wiley.
2. A. L. Lehninger, D.L. Nelson, M.M. Cox- “Principles of Biochemistry by Werth Publishers, 2000.
3. L. Stryer, J.M. Berge, J.L. Tymoezko-“Biochemistry “ W.H. freeman & Co. 2002.

**Chhattisgarh Swami Vivekanand Technical University,
Bhilai (C.G.)**

Semester: V

Subject: Animal Biotechnology

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum no of class test to be conducted: 2

Branch: Biotechnology

Code: 318515 (18)

Total Tut Periods: Nil

- Unit 1:-** History and Scope of animal cell and tissue culture, structure and organization of animal cell, advantage and disadvantage of tissue culture, laboratory facilities for tissue culture, growth of animal cell in culture media.
- Unit 2:-** Culture Media for cell and tissue culture- Natural Media (Coagula, serum, tissue extracts) Defined Media (Media with serum, without serum media), Substrates on which cell grows (Glass, Disposables plastics, palladium and metallic surface), Gas phase for tissue (O₂, CO₂) culture, preparation of animal materials.
- Unit 3:-** Primary Culture, disaggregation of tissue- enzymatic and mechanical disaggregation, separation of viable and non viable cells, types of cell lines, maintenance of cell lines in suspension and in layered culture, cloning of cell lines, large scale cell culture, cell banking.
- Unit 4:-** Somatic cell fusion, somatic cell genetics, genetic analysis of cultured cell, properties of cultured somatic cell, intra and inter specific somatic cell genetics, tissue culture, slide culture, flask culture and test tube culture.
- Unit 5:-** Organ culture, whale embryo culture, In vitro fertilization in human, embryo transfer in human and cattle, tissue engineering, transgenic animal, apoptosis.

Name of Text Books:

1. Animal Cell Culture by John R.W. Masters, Oxford University Press
2. Introduction to Cell and Tissue Culture by Jennie P. Mather and Penelope E. Robert, Plenum Press, New York & London

Name of Reference Books:

1. Molecular Biotechnology by Primrose
2. Animal Cell Biotechnology: R.E. Spier & J.B. Griffiths (1998), Academic Press
3. Biotechnology by B. D. Singh, Kalyani Publication

**Chhattisgarh Swami Vivekanand Technical University,
Bhilai (C.G.)**

Semester: V

Branch: Biotechnology

Subject: Process Economics And Management

Code: 318516 (19)

Total Theory Periods: 50

Total Tut Periods: Nil

Total Marks in End Semester Exam: 80

Minimum no of class test to be conducted: 2

- Unit 1:-** Small and large scale industries, public sector private sector and joint sector undertaking, Industrial Finance institutions
- Unit 2:-** Industrial administration– Relationship and scientific management, nature of management, functions of managements, control, organizations and structure, out line of time and motion study and work study
- Unit 3:-** Management of production, plant locations Factory locations, production and cost control, personal management– job evaluations and wages payment plans
Factory act, minimum wages act, Trade union act, workman compensation acts
- Unit 4:-** Factory involved in project cost estimation , methods employed for the estimation of the capital investments and cost estimation in chemical plants Depreciation and methods of its calculations, effects of taxes on depreciations
- Unit 5:-** Evaluation of profitability, return on investments, Studies on alternative investments , Replacement cost and asset accounting , Book keeping Factory records and Balance sheet.

Name of Text Books:

1. Peter and Timmerhaus- Plant Design and Economics for Chemical Engineers
2. Tarachand- Engineering Economics

Name of Reference Books:

1. O P Kharbanda- Proces Plant and Equipment Costing

**Chhattisgarh Swami Vivekanand Technical University,
Bhilai (C.G.)**

Semester: V

Subject: Plant Biotechnology Lab

Total Practical Periods: 40

Total Marks in End Semester Exam: 40

Branch: Biotechnology

Practical Code: 318521 (18)

Experiments to be performed: (Minimum 10)

1. Transformation Techniques.
2. Transgenic Plants.
3. Protoplast Isolation techniques.
4. Protoplast fusion and Regeneration.
5. Micro propagation.
6. Germplasm preservation (Study).
7. Production for suspension Culture of Plant Cell.
8. Isolation of plant pathogens (Fungi)
9. Isolation of plant pathogens (Bacteria)
10. Extraction of cellulose from diseased plants(in vivo)
11. Extraction of pectolytic enzymes from diseased plants (in vivo)

List of Equipments/Machine Required:

1. As mentioned in microbiology, Cellular and Molecular Biology and Genetic Engineering

Recommended Books:

1. Experiments in Microbiology, Plant Pathology and Biotechnology by K R Aneja
2. Refer books mentioned in theory syllabus

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: V

Subject: Drugs and Pharmaceutical Biotechnology Lab

Total Practical Periods: 40

Total Marks in End Semester Exam: 40

Branch: Biotechnology

Practical Code: 318522 (41)

Experiment to be performed (Minimum 10)

1. Preparation of cold cream, Preparation of vanishing cream
2. Preparation of non staining iodine ointment
3. Preparation of gargles
4. Preparation of Mouth washes
5. Preparation of different pastes
6. Preparation of tooth pastes
7. Preparation syrups
8. Preparation of lotions
9. Preparation of liposome
10. Production of antibiotics through fermentation
11. Production of vitamins through fermentation

Name of Reference Books:

1. Industrial microbiology – L.E. Casida JR , New age International(P) Limited Publication.
2. Introduction to Biopharmaceutics and Pharmacokinetics, Dr. H.P. Tipnis , Dr. M.S. Nagarsenker, Nirali Prakasan Publication.

Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester : V

Subject: Instrumentation Techniques Lab

Total Practical Periods: 40

Total Marks in End Semester Exam: 40

Branch: Biotechnology

Practical Code: 318523 (19)

Experiments to be performed: (minimum 10)

1. To determine the concentration of unknown liquid from Refractometer on the basis of its refractive index.
2. To determine the TDS value of the solution by TDS Meter.
3. To determine the conductivity of unknown solution by Conductivity meter.
4. Determination of TDS, Temperature, Conductivity, ORP, D.O. of water sample by portable water analysis kit.
5. Study of Digital pH Meter.
6. To determine the concentration of given solution by Photoelectric Colorimeter.
7. To determine the concentration of given solution by UV-VIS. Spectrophotometer.
8. To detect the presence of alkali metals in the given solution using Flame Photometer.
9. Determination of turbidity of unknown solution using Nephelo-Turbidity meter.
10. Measurement of temperature of red hot surface using thermocouple.

List of Equipments/Machine Required:

1. Abbe Refractometer
2. TDS Meter
3. Conductivity meter
4. water analysis kit.
5. pH Meter.
6. Photoelectric Colorimeter
7. UV-VIS. Spectrophotometer
8. Flame Photometer
9. Nephelo-Turbidity meter
10. thermocouple

Recommended Books:

1. Applied Instrumentation in the Process Industries, Vol - I, Andrew W.G. & William H.B.
2. Industrial Instrumentation Eckman D.P. McGraw Hill Publications (1975)
3. Principles of Industrial Instrumentation Patranabis
4. Perry's Chemical Engineer's Handbook .

***Chhattisgarh Swami Vivekanand Technical University,
Bhilai (C.G.)***

Semester: V

Subject: Enzyme Technology Lab

Total Practical Periods: 40

Total Marks in End Semester Exam: 40

Branch: Biotechnology

Practical Code: 318524 (18)

Experiments to be performed: (Minimum 10)

1. Production of Amylase by *A. Niger*.
2. Effect of temperature/pH/concentration on salivary amylase activity.
3. Production of catalase enzyme by microorganisms.
4. Production of lactase by yeast cell.
5. Various Techniques of enzyme immobilization.
6. Study of various enzyme reactors.
7. Various techniques for enzyme engineering.
8. Preparation of poly/bifunctional enzymes.
9. Test for urease activity.
10. Test for oxidase activity.
11. Test for coagulase activity.
12. Test for Gelatin Hydrolysis. (proteolytic Activity)
13. Indole production test
14. Methyl Red test
15. Citrate utilization test

List of Equipments/Machine Required:

1. Same equipments as mentioned in microbiology lab

Recommended Books:

1. Experiments in Microbiology, Plant Pathology and Biotechnology by K R Aneja
2. Refer Text books mentioned in theory syllabus

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester : B.E. V

Branch : **Common to All Branches**

Subject : **Personality Development**

Code : **300525 (46)**

No. of Periods : 2 pds/week

Tutorial Periods : NIL

Total Marks in End Semester Exam. : NIL

Teacher's Assessment: 20Mks

Minimum number of class tests to be conducted: Two

Objective: The course is introduced to develop one's outer and inner personality tremendously and enrich the abilities to enable one to meet the challenges associated with different job levels. Personality Development is essential for overall development of an individual apart from gaining technical knowledge in the subject.

Unit – I

Personality concepts:

- What is Personality – **its physical and psychic aspects. How to develop a positive self-image. How to aim at Excellence. How to apply the cosmic laws that govern life and personality.**
- How to improve Memory. **How to develop successful learning skills. How to develop and effectively use one's creative power.**
- **How to apply the individual MOTIVATORS that make you a self-power personality.**

Unit – II

Interpersonal Skills:

- **Leadership:** Leaders who make a difference, Leadership: your idea, What do we know about leadership? If you are serious about Excellence. Concepts of leadership, Two important keys to effective leadership, Principles of leadership, Factors of leadership, Attributes.
- **Listening:** Listening skills, How to listen, Saying a lot- just by listening, The words and the music, How to talk to a disturbed person, Listening and sometimes challenging.
- **How to win friends** and influence people, How to get along with others. How to develop art of convincing others. How can one make the difference. How to deal with others particularly elders. Conflicts and cooperation.

Unit – III

Attitudinal Changes:

- **Meaning of attitude**, benefits of positive attitudes, how to develop the habit of positive thinking.
- **Negative attitude and wining:** What is FEAR and how to win it. How to win Loneliness. How to win over FAILURE. How to win over PAIN. How to win over one's ANGER and others anger. How to overcome CRITICISM. What is stress and how to cope up with it? What is crisis and how to manage it.
- How to apply the **character MOTIVATORS** that elevate you and your personality to the top, the art of self motivation.
- How to acquire **mental well-being.**
- How to acquire **physical well-being.**
- How to formulate effective **success philosophy.**

Unit –IV

Decision Making:

How to make your own LUCK. How to plan goals/objectives and action plan to achieve them. How to make RIGHT DECISION and overcome problems. How to make a Decision. Decision making : A question of style. Which style, when ? People decisions : The key decisions. What do we know about group decision making ? General aids towards improving group decision making. More tips for decisions of importance.

Unit – V

Communication Skills:

- **Public Speaking:** Importance of Public speaking for professionals. The art of Speaking - Forget the fear of presentation, Symptoms of stage fear, Main reason for speech failure, Stop failures by acquiring Information; Preparation & designing of speech, Skills to impress in public speaking & Conversation, Use of presentation aids & media.
- **Study & Examination:** How to tackle examination, How to develop successful study skills.
- **Group discussions:** Purpose of GD, What factors contribute to group worthiness, Roles to be played in GD.

Reference Books:

1. How to develop a pleasing personality by Atul John Rego, Better yourself books, Mumbai, 2000.
2. How to Succeed by Brain Adams, Better Yourself books, Mumbai, 1969.
3. Basic Managerial skills for all by E. H McGrawth, Prentice Hall India Pvt Ltd, 2006.
4. The powerful Personality by Dr Ujjwal Patni & Dr Pratap Deshmukh, Medident Publisher, 2006.
5. Great Words win Hearts by Dr Ujjwal Patni, Fusion Books, 2006.
6. Personality : Classic Theories & Modern Research; Friedman ; Pearson Education 2006.
7. How to win friends and influence people by Dale Carnigie, A.H. Wheeler 2006.