### Chhattisgarh Swami Vivekanand Technical University, Bhilai

#### Scheme of Teaching & Examination

#### BE Vth Semester Biotechnology

<table>
<thead>
<tr>
<th>S. No</th>
<th>Board of Study</th>
<th>Subject Code</th>
<th>Subject</th>
<th>Period per week</th>
<th>Scheme of Exam</th>
<th>Total Marks</th>
<th>Credit ( \frac{L+(T+P)}{2} )</th>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td>L</td>
<td>T</td>
<td>P</td>
<td>ESE</td>
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<tr>
<td>1</td>
<td>Biotechnology</td>
<td>318511(18)</td>
<td>Plant Biotechnology</td>
<td>4</td>
<td>-</td>
<td>-</td>
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<td>2</td>
<td>Pharmacy</td>
<td>318512(41)</td>
<td>Drugs And Pharmaceutical Biotechnology</td>
<td>3</td>
<td>1</td>
<td>-</td>
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<tr>
<td>3</td>
<td>Chemical Engg</td>
<td>318513(19)</td>
<td>Instrumentation Techniques</td>
<td>4</td>
<td>1</td>
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<td>4</td>
<td>Biotechnology</td>
<td>318514(18)</td>
<td>Enzyme Technology</td>
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<td>Animal Biotechnology</td>
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<td>6</td>
<td>Chemical Engg</td>
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<td>Process Economics And Management</td>
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<td>Biotechnology</td>
<td>318521(18)</td>
<td>Plant Biotechnology Lab</td>
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<td>318522(41)</td>
<td>Drug And Pharmaceutical Biotechnology Lab</td>
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<td>318523(19)</td>
<td>Instrumentation Techniques Lab</td>
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<td>318524(18)</td>
<td>Enzyme Technology Lab</td>
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<td>11</td>
<td>Humanities etc</td>
<td>300525(46)</td>
<td>Personality Development</td>
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<td>12</td>
<td>Biotechnology</td>
<td>318526(18)</td>
<td>Practical Training Evaluation/Library</td>
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<td><strong>Total</strong></td>
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<td>22</td>
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</tbody>
</table>

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
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– agrobacaterium 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. Trangenic Plants– Lindsey & Jones.

Name of Reference Books:
3. Plants, genes & crop improvement, Crispeels ASPB, 2002
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.


Name of Text Books:


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.
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:

Name of Reference Books:
1. Principles of Industrial Instrumentation Patranabis
2. Perry’s Chemical Engineer’s Handbook


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:

Name of Reference Books:
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

Name of Reference Books:
1. Molecular Biotechnology by Primrose
3. Biotechnology by B. D. Singh, Kalyani Publication
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 Timmerhauss- 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       Branch: Biotechnology
Subject: Plant Biotechnology Lab       Practical Code: 318521 (18)
Total Practical Periods: 40
Total Marks in End Semester Exam: 40

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  Branch: Biotechnology
Subject: Drugs and Pharmaceutical Biotechnology Lab  Practical Code: 318522 (41)
Total Practical Periods: 40  Total Marks in End Semester Exam: 40

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:

2. Introduction to Biopharmaceutics and Pharmacokinetics, Dr. H.P. Tipnis , Dr. M.S. Nagarsenker, Niral 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

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.
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.

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:
3. Principles of Industrial Instrumentation Patranabis
Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

Semester: V  Branch: Biotechnology
Subject: Enzyme Technology Lab  Practical Code: 318524 (18)
Total Practical Periods: 40
Total Marks in End Semester Exam: 40

**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.


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
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 winning: 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:**

4. The powerful Personality by Dr Ujjawal Patni & Dr Pratap Deshmukh, Medident Publisher, 2006.