

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Scheme of Teaching & Examination

BE VIIIth 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	318711(18)	Immunology-II	4	1	-	80	20	20	120	5
2	Biotechnology	318712(18)	Bioethics And Biosafety	3	1	-	80	20	20	120	4
3	Biotechnology	318713(18)	Genomics and Proteomics	4	1	-	80	20	20	120	5
4	Chemical Engg	318714(19)	Unit Operation	4	1	-	80	20	20	120	5
5	Refer Table 2		Professional Elective-II	3	1	-	80	20	20	120	4
6	Biotechnology	318721(18)	Immunology-II Lab	-	-	3	40	-	20	60	2
7	Biotechnology	318722(18)	Genomics and Proteomics Lab	-	-	3	40	-	20	60	2
8	Chemical Engg	318723(19)	Unit Operation Lab	-	-	3	40	-	20	60	2
9	Biotechnology	318724(18)	Minor Project	-	-	4	100	-	40	140	2
10	Management	300725(36)	Innovative and Entrepreneurial Skills	-	-	2	-	-	40	40	1
11	Biotechnology	318726(18)	Practical Training** Evaluation / Library	-	-	2	-	-	40	40	1
Total				18	5	17	620	100	280	1000	33

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

** To be completed after VI semester and Before the Commencement VII semester

Table 2
Professional Elective-II

S.No	Board of Study	Subject Code	Subject
1	Biotechnology	318751(18)	Cancer Biology
2	Biotechnology	318752(18)	Bioprocess Technology
3	Biotechnology	318753(18)	Molecular Pathogenesis

Note : (1)- 1/4th of total strength of students subject to minimum of 20 student is required to offer an elective in the college in a particular Academic session.

(2)- Choice of elective course once made for an examination can not be change in future examinations.

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

Semester: VII

Branch: Biotechnology

Subject: Immunology-II

Code: 318711(18)

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:-** Humoral Immune Response and Cell Mediated Immune Response.
- Unit 2:-** Genetics of Immunity- class switching among constant-region genes, expression of Ig-Genes, regulation of Ig-Gene transcription, antibody genes and antibody engineering
- Unit 3:-** Transplantation– role of immunity. Vaccination– principles involved and types of vaccines. Preparation of vaccines
- Unit 4:-** Immunodeficiency– primary and secondary, its diagnosis and treatment. Autoimmune diseases– factors contributing, mechanism of development, diagnosis and treatment.
- Unit 5:-** Immunotechnology– antibodies as research and diagnostic tools, immuno-precipitation, agglutination, immuno assay, affinity chromatography and Hybridoma technology, Immuno electrophoresis.

Name of Text Books:

1. Kubey – Immunology by R. A. Goldsby, T.J. Kindl, B.A. Osborne.
2. Essentials of Immunology by Iran Roit, Blanks Publications Oxford, 1988.

Name of Reference Books:

1. Fundamentals of Immunology by W.E. Paul – Raven Press, Newyork 1998.

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

Semester: VII

Subject: Bioethics & Biosafety

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of class test to be conducted: 2

Branch: Biotechnology

Code: 318712 (18)

Total Tut Periods: 12

- Unit 1:-** The legal and socioeconomic impacts of Biotechnology. Biosafety regulations and national and inter-national guideline regarding rDNA. Experimental protocol approval, environmental aspects of biotechnological application.
- Unit 2:-** Use of genetically modified organisms and their release in environment. Special procedures for rDNA based product production, Intellectual Property Rights, TRIPS, international convention, patents and methods for patent application. Biodiversity and farmers rights.
- Unit 3:-** Biotechnology and society– introduction to science, technology and society, biotechnology and social responsibilities. Public acceptance issues in biotechnology– issue of access, ownership, monopoly, traditional knowledge, biodiversity, benefit sharing , environmental sustainability and public verses private funding.
- Unit 4:-** Biosafety in laboratory- laboratory associated infections and other hazards, assessment of biological hazard and level of biosafety. Prudent biosafety practices in the laboratory.
- Unit 5:-** International dimensions in biosafety, Catagena Protocol in biosafety, bioterrorism and conventions of biological weapons.

Name of Text Books:

1. Thomas, J. A. fuch, R. L. (2002). Biotechnology & Safety Assessment (3rd Ed.) Academic Press.
2. Fleming, D. A. Hunt, D.L. (2000) Biological safety Principles & practices (3rd Ed.) ASM Press, Washington.

Name of Reference Books:

1. Biotchnology –A comprehensive treatise (Vol 12) Legal economic & dinonsions VCH.
2. Encylopedia of Bioethics.
3. Intellectual property rights on Biotechnology by K.Singh, BCIL, New Delhi.

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

Semester: VII

Branch: Biotechnology

Subject: Genomics & Proteomics

Code: 318713 (18)

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:-** Genomics– introduction, history, definition. Sequencing of genomes- Clone by clone sequencing, shotgun sequencing and genome sequence compilation. Genome sequencing project and its benefit.
- Unit 2:-** Comparative Genomics– exon-shuffling, horizontal gene transfer, genome similarity and SNPs. Conclusions from comparative genomics, gene order comparison, phylogenetic footprinting. Comparative genomics of mitochondria and chloroplast.
- Unit 3:-** Genome Evolution- genome reduction in disease causing bacteria, genome duplication and its impact on genetic diversity.
- Unit 4:-** Functional Genomics– expression profiling, transcriptome, DNA arrays, gene function, determination and protein interaction.
- Unit 5 :-** Proteomics– types of proteomics, basic techniques, proteome of mycoplasma genitalium. Architecture of the nuclear pore complex (matching Gene, structure and function).

Name of Text Books:

1. Biotechnology by B. D. Singh, Kalyani Publishers.
2. Discovering Genomics, Proteomics and Bioinformatics by Campbell *et al.*

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

Semester: VI

Subject: Unit Operation

Total Theory Periods: 50

Total Marks in End Semester Exam: 80

Minimum number of class test to be conducted: 2

Branch: Biotechnology

Code: 318714 (19)

Total Tut Periods: 12

- Unit 1:-** Solids, characteristics of solid particles, type of standard screen series. Screening and other separation methods: screen analysis, estimation of particle size, surface area and particle population based on screen analysis, ideal and actual screens, principles of elutriation, flotation, jigging, Cyclone separator, electrostatics, and magnetic separation processes.
- Unit 2:-** Size reduction and enlargement, crushers, grinders, disintegrates for coarse and intermediate & fine grinding, energy and power requirements, Rittinger's, Kick's and Bond's Law, work index.
- Unit 3:-** Mixing and agitation: Axial and radial flow impellers, prevention of vortex, Liquid- Liquid, Liquid-solid and Solid- Solid mixing operations and equipments, power consumption in agitated vessels mixing index.
- Unit 4:-** Sedimentation, settling velocity, flocculation, Thickener, Thickener Design, Classifier. Filtration, filter media, filter aids, batch & continuous filtration, filtration equipment, filter press, leaf, cartridge, vacuum filter, rotary drum filters.
- Unit 5:-** Conveyers: Belt conveyer, Bucket Elevator, Flight conveyer, Apron conveyer, Screw conveyer, pneumatic conveying.

Name of Text Books:

1. W. L. McCabe, J. C. Smith & Peter Harriott, 'Unit Operations of Chem. Engg.' 5th Ed. McGraw Hill Pub.
2. Hiramath, Kulkarni, Unit Operation I, Everest Publication, Pune

Name of Reference Books:

1. Badger & Banchero, 'Introduction to Chemical Engg.' McGraw Hill
2. Brown et al., 'Unit operations', John Wiley sons.
3. A.S. Froust ET. al. 'Principles of unit operations', John Wiley and Sons

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

Semester: VII

Subject: Cancer Biology

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of class test to be conducted: 2

Branch: Biotechnology

Code: 318751 (18)

Total Tut Periods: 12

- Unit 1:-** Introduction to Cancer Biology, phenotypic characteristic of cancer cell. Cell cycle and proliferation- cyclins, cdk's and detection of tumour cell growth. Cell cycle checkpoints.
- Unit2:-** Oncogenes and tumour suppressor genes. Genetic Basis of cancer– mutational incident. Cytogenesis abnormalities, BRCA genes. Introduction to retroviruses.
- Unit 3:-** Apoptosis and cancer– overview of cell death process, apoptosis signaling pathways, abnormalities and detection. Types of cancer.
- Unit 4:-** Tumour progression and metastasis– steps of metastasis, associated genes and organ specificity.
- Unit 5:-** Cancer therapeutics: surgical, chemotherapy, radiation and drug resistance. Cancer prevention– chemoprevention,, hormone therapy and antioxidant treatment.

Name of Text Books:

1. A. L. Lehninger, D.L. Nelson, M.M. Cox- “ Principles of werth publishers, 2000.
2. L. stryer, J.M. Berge, J.L. Tymoezko-“Biochemistry “ W.H. freeman & Co. 2002.

Name of Reference Books:

1. Cell & Molecular Biology “concepts & Experiments” Geratd Karp, John Wiley & Son's.
2. The Cell- A molecular approach, Gn Cooper Asm Prers.

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

Semester: VII

Subject: Bioprocess Technology

Total Theory Periods: 40

Total Marks in End Semester Exam: 80

Minimum number of class test to be conducted: 2

Branch: Biotechnology

Code: 318752 (18)

Total Tut Periods: 12

Unit 1:- FOOD INDUSTRY- Introduction to food industry, food storage, food processing, consumer food processing, dairy products, fruits and vegetable products, poultry and meat product

Unit 2:- BIOTECHNOLOGY- Genetic engineering, Introduction to biotechnology, Pharmaceutical industries, Agriculture application, petroleum products and role of biotechnology in field of pollution control

Unit 3:- PHARMACEUTICAL INDUSTRY AND POLYMER INDUSTRY- Growth of industry, Economy of industry, methods of production of penicillin
Polymerization :Chemistry of polymerization Engineering properties of polymers.
Technology : Plastic, rubber, polymer oils, fibers

Unit 4:- Paper and Pulp industry, Agents, principles, equipments, technology

Unit 5:- OIL AND WAX INDUSTRY, SOAP AND DITERGENT INDUSRY- Technology of oil, fats and waxes, soap and detergents industries

Name of Text Books:

1. Groggings, Unit Processes in Organic Synthesis
2. Shreve, Chemical Process Industries.

Name of Reference Books:

1. Dryden, Outlines of Chemical Technology

Chhattisgarh Swami Vivekanand Technical University,

Bhilai (C.G.)

Semester: VII

Branch: Biotechnology

Subject: Molecular Pathogenesis

Code: 318753 (18)

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:-** General clinical laboratory techniques and procedures– volumetric analysis, balancing and weighing, concept of solute and solvent, units of measurement. Specimen collection and processing from blood, urine, spinal fluid, saliva and synovial fluid. Sample preservation and transportation.
- Unit 2:-** Clinical enzymology– principle of diagnostic enzymology, liver, cardiac and skeleton enzymes, digestive enzymes, etc.
- Unit 3:-** General function test– liver function test, cardiac function test, renal function test, thyroid function test. Reproductive endocrine function test.
- Unit 4:-** Immunodiagnostic– immuno assay classification and commercial technologies. DNA based diagnostic – PCR, RFLP, ASSCP, Micro array, and FISH. Cell based diagnostic- Antibody markers, CD markers and bioassays.
- Unit 5:-** Biosensors– concept and applications, non invasive biosensors in clinical analysis. Introduction to biochips and their applications in modern science.

Name of Text Books:

1. Commercial Biosensors.- Graham Ramsay, John Wilay Son, INC. (1998).
2. Essentials of Diagnostic Microbiology . Lisa Anne shimeld.

Name of Reference Books:

1. Diagnostic Microbiology Balley & Scott's.
2. The Science of laboratory Diagnosis, Crocker Burnelt.

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

Semester: VII

Branch: Biotechnology

Subject: Immunology-II Lab

Practical Code: 318721(18)

Total Practical Periods: 40

Total Marks in End Semester Exam: 40

Experiments to be performed:

1. Biotechnology fermentation test for identification of Bacteria (general).
2. Study of Blood Clotting mechanism.
3. Rh Factor Determination
4. Slide Agglutination test for serotyping pathogens
5. VDRL test for syphilis by antigen – antibody reaction.
6. RPR card test for Syphilis
7. Sandwich Elisa.
8. Direct Elisa.
9. Separation of Blood proteins by electrophoresis technique.

List of Equipments/Machine Required:

1. Haemocytometer
2. Incubator
3. Refrigerator
4. Microscope
5. Micro-pipette

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: VII

Subject: Genomics and Proteomics Lab

Total Practical Periods: 40

Total Marks in End Semester Exam: 40

Branch: Biotechnology

Practical Code: 318722 (18)

Experiments to be performed:

1. DNA sequencing (Study).
2. Amplification of DNA.
3. DNA fingerprinting mechanism.
4. Mapping of genome mechanism.
5. Marker used in Genome Mapping.
6. Different Blotting technique.
7. Protein sequencing.
8. Study of relationship between structure and function of protein.

List of Equipments/Machine Required:

1. Same equipments as mentioned in other Experiments

Recommended Books:

1. Refer Books mentioned in theory syllabus

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

Semester: VII

Branch: Chemical Engg

Subject: Unit Operation Lab

Practical Code: 318723 (19)

Total Practical Periods: 40

Total Marks in End Semester Exam: 40

Experiments to be performed (Minimum 10)

1. To determine the size distribution of a sample of particulate solid by sieve analysis and to evaluate the average particle diameter.
2. To determine the size distribution of the product of laboratory rod mill.
3. To determine the size distribution of the product of laboratory ball mill.
4. To evaluate the overall effectiveness of given screen.
5. To determine the power required in size reduction and to evaluate the Rittinger's Constant in respect of Laboratory Rod Mill.
6. To determine the degree of mixing of a given binary solid system in Tumbler Mixer.
7. To determine the size distribution in a mass of fine solids by the method of decantation.
8. To study the settling characteristics of the given slurry.
9. To determine the power required for crushing in Roll Crusher.
10. Study of separation of two liquids in laboratory Centrifuge.
11. Study of Filter Press.
12. To determine the power required in size reduction and to evaluate the Rittinger's Constant in respect of Ball Mill

List of Equipments/Machine Required:

1. Sieve Shaker
2. Rod mill
3. Ball mill.
4. Tumbler Mixer
5. Roll Crusher
6. Filter Press
7. Centrifuge

Recommended Books:

1. W. L. McCabe, J. C. Smith & Peter Harriott, 'Unit Operations of Chem. Engg.' 5th Ed. McGraw Hill Pub.
2. Badger & Banchero, 'Introduction to Chemical Engg.' McGraw Hill
3. Brown et al., 'Unit operations', John Wiley sons.

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

Semester: VII

Subject : Innovative & Entrepreneurial Skill

Total Practical Periods: 28

Total Marks in End Semester Exam: ---

Minimum number of class test to be conducted: 2

Branch: Common to all branches

Code: 300725 (36)

Total Tut Periods: NIL

Unit I

Innovation: innovation- an abstract concept; creativity, innovation and imagination; types of innovation -classified according to products, processes or business organizations.

Unit II

Entrepreneurship: who is an entrepreneur? Entrepreneurship- A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors. Impact of Entrepreneurship for sustainable development.

Unit III

Difference between entrepreneur and entrepreneurship, Difference between entrepreneur and intra-preneur, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting Entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

Unit IV

Identification of Business Opportunities: Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

UNIT-V

Techno-Economic Feasibility of the project: Introduction, Techno- Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Proforma of Feasibility Report, Role of Institutions and entrepreneurship.

Text and Reference Books:

1. Competing through Innovation-Bellon & Whittington, Prentice Hall of India
2. A Guide to Entrepreneurship – David Oates- JAICO Publishing House.
3. Entrepreneurship- Rober D Hisrich, Peters, Shepherd- TMH
4. Entrepreneurship in Action- Coulter, Prentice Hall of India
5. Entrepreneurship Management and Development – Ajith Kumar, HPH
6. Fundamentals of entrepreneurship- Mohanty, PHI
7. Patterns of Entrepreneurship- Jack M Kaplan, Wiley, student Edition.