

**Solapur University,  
Solapur**

**B.Sc. II Entrepreneurship Science**

**(Semester III&IV)  
Syllabus w.e.f. 2011-2012**

**Solapur University ,Solapur**  
**B.Sc. II (Entrepreneurship Science)**  
**Semester III**

<b>Course code</b>	<b>Title of the course</b>	<b>Theory/ practice</b>	<b>Marks</b>	<b>Lectures / practical period</b>
<b>Ent. 204</b>	<b>Entrepreneurship</b> (Paper V) Principles of Business Management (Paper VI) Marketing and International Marketing	Theory	50	40
			50	40
<b>Ent. 205</b>	<b>INDUSTRIAL CHEMISTRY</b> (Paper – V) Industrial chemistry (Paper VI) Industrial Techniques	Theory	50	40
			50	40
<b>Ent. 206</b>	<b>MICROBIOLOGY &amp; BIOTECHNOLOGY</b> (Paper V) Genetics (Paper VI) Fermentation Technology		50	40
		Theory	50	40
	<b>Lab course III</b>	<b>Practical</b>		

**B.Sc.II (Entrepreneurship Science)**  
**Semester: III**  
**Course code: 204. Entrepreneurship**  
**Paper V. Principles of Business Management**  
**(Total 40 periods, 3 periods / week) 50marks.**

**Unit. I.**

- 1 . **Management:** Definition, nature and importance ,function and Management process, planning ,organizing, staffing, directing and Controlling. Roles of Manager. 8
2. **Management Thinkers:** Study of following Management Thinkers& their contribution F.W. Taylor, Henry Fayol, Elton Mayo, Mary Parker, Follett, Peter F. ducker.

**Unit. II**

- 1.**Planning:** Definition, characteristics, benefits of planning, types of planning, steps in planning, process. 8
2. **Decision Making:** Meaning, nature types, decision making process. Why decision making is important

**UnitIII**

1. **Organizing:** Definition, characteristic, importance, Types of organization. 8 structure organization. 8
2. **Staffing:** Meaning and Purpose, selection, training and performance appraisal.

**UnitIV**

- 1 **Motivation:** Definition, Importance, financial and non financial intensives, theories of motivation, Maslow's need theory, Mc.Gregor's X and Y theory. 8
2. **Leadership :** Definition, importance, function, qualities of **leaders**, types of leaders.

**Unit V**

1. **Communication :** Meaning and types, Barriers to communication, communication process 8
2. **Controlling:** Definition, types, steps in control process, need for control.

**Reference Books**

1. Management - Stephen P. Robbins and Marry Cowler, Pearsons Pub.
2. Management - L.M. Prasad
3. Business Organization and Management - B.P.Singh & T.N. Chhabra
4. Principles and Practices of Management - W. Haynes
5. Principles and Practices of Management - Amruta Singh

**B.Sc.II (Entrepreneurship Science) Semester: III**

**Course code: 204. Entrepreneurship**

**Paper VI Marketing and International Marketing**

**(Total 40 periods, 3 periods / week) 50marks.**

**Unit I. (8)**

1. **Buyer Behavior:** Determinants of Buyer Behavior, Economic model, Psychological model, social and cultural influence on buying process and Need of Buyer

**Unit II. (8)**

1. **Marketing Research:** Definition and Scope, Marketing Research begins and with customers, importance of marketing research, procedure and limitations methods, source of collecting marketing data, sampling and it's types. Importance of Advertisement & displays

**Unit III. . (8)**

1. **Product :** What is Product ? Product plan, importance of sound product, product life cycle, product planning and development, new product idea and it's process.

2. **Price :** Definition, price decision and it's objectives, factors affecting decisions, types of pricing, information needed for pricing. Important of barcode system

**Unit IV. (8)**

1. **Managing Distribution Channels:** Wholesales - their types and functions, of retailers - Retailer meaning and forms - supermarket and hyper markets. Appointment Of distributors

2. **Introduction to Global Marketing :** market selection entry, emergence of global marketing. Use of web site marketing.( E Marketing)

**Unit V. (8)**

1. **International Marketing Environment** - Economic, social, political and Government environment, technological, demographic, international trading environment.

2. **Foreign Trade:** Difficulties in foreign trade, important steps in export procedure.

**Reference Books**

1. Marketing Management (Analysis, Planning Implementation and Control) - Philip Kotler
2. Marketing Management - Raian Saxena
3. Marketing Management - S.A. Sherlekar
4. International Marketing - Francis Cherunitarn
5. Export Marketing - B.S. Rathor & J.S. Rathor
6. Global Marketing Management - S.A. Sherlekar & V.S. Sherleka

**B.Sc. II (Entrepreneurship Science) Semester: III**  
**Course code: 205. INDUSTRIAL CHEMISTRY**  
**Paper - V (INDUSTRIAL CHEMISTRY)**  
**(Total 40 periods, 3 periods / week) 50marks.**

**Unit I.****9****Fuel Cells, Solar Energy & Silicate Technology**

**1. Fuel Cells** :Definition, examples of fuel cell a) Hydrogen - oxygen fuel cell

b) Methyl alcohol fuel cell. Efficiency of fuel cell, advantage of fuel cell

**2. Solar Energy** Introduction, Solar Energy, Utilization of Conversion, Photovoltaic Cells, Silicon

**3. Silicate Technology** What are silicates, Structure of Silicates, Some important silicates & their applications, water glass

**Unit II****6**

**Synthetic Perfumes** Introduction, Important Essential Oils, Esters, Anthranilates, Salicylates, Esters of Cinnamic Acid, Alcohols, Aliphatic Primary Alcohols, Citronellor, Phenyl Ethyl Alcohol by Friedel, Craft Reaction, Nerol, Production of Natural Perfumes, Flower Perfumes, Fruit Flavors, Artificial Flavors

**Unit III.****7****Corrosion and Passivity****1. Corrosion**

Introduction, Electrochemical theory of corrosion, factors affecting the corrosion.

(i) Position of metal in emf series

(ii) Purity of metal

(iii) Effect of moisture

(iv) Effect of oxygen

(v) Hydrogen over voltage.

Methods of protection of metals from corrosion.

**2. Passivity**

Definition, Types of passivity, oxide film theory, application of passivity

**Unit IV.**

6

**Alloys**

Purpose of making alloys, theory of alloys, types of alloys

- a) Ferrous alloys
- b) Alloys steels
- c) Cu, Ni, Pb, Zn-alloys
- d) Super alloys
- e) Preparation of alloys

**Unit V**

12

**1. Some Small Scale Units**

Safety matches, Agarbatties, Napthalene balls, Wax candles, Shoe Polish, Gum paste, Writing / Fountain pen ink, Chalk crayons, Plaster of Paris, Silicon Carbide Crucibles, How to remove stains

**2. Pulp & Paper Industry**

Introduction, Manufacturer of Pulp, Sulfate of kraft pulp, soda pulp, sulfite pulp, beating, refining, sizing & coloring manufacture of paper, calendaring, clean technologies in agro based industries, ecological problems of Indian Pulp & Paper Industry

**3. Tanning of Leather** (3 Periods)

Introduction, Animal Skins, Manufacture of Leather, preparation of hides for tanning, vegetable tanning, chrome tanning, finishing, oil tanning, By products gelatin.

**B.Sc. II (Entrepreneurship Science) Semester III****Course code: 205. INDUSTRIAL CHEMISTRY****PAPER VI (INDUSTRIAL TECHNIQUES)****(Total 40 periods, 3 periods / week) 50marks.**

<b>Unit I.</b>	<b>8</b>
<b>Extraction</b>	
Principles of Extraction, liquid extraction, extraction equipment, mixersettlers, spray & packed extraction towers, agitated tower extractors, centrifugal extractors.	
<b>Unit II.</b>	<b>8</b>
<b>Gas Absorption</b>	
Introduction, principles of absorption, design of packed towers, contact between liquid & gas, material balances, limiting gas - liquid ratio, rate of absorption.	
<b>Unit III.</b>	<b>8</b>
<b>Distillation</b>	
Steam Distillation, Continuous distillation with rectification.	
<b>Drying</b>	
Drying dryers, tower dryers, rotary dryers, spray dryers, drum dryers	
<b>Unit IV</b>	<b>8</b>
<b>Evaporation</b>	
Introduction, Single & Multiple effect Evaporation, Types of Evaporators.	
I) Long-tube Vertical Evaporators	
a) Upward Flow (Climbing Film)	
b) Downward Flow (Falling Film)	
c) Forced Circulation	
II) Agitated Film Evaporation	
<b>Unit V.</b>	<b>8</b>
<b>1 Cell Disruption Methods</b>	
a) Cell lysis using chemical agents like chloroform, Toluene, S.D.S.E.D.T.A.	
b) Cell lysis using enzymes, ex-Lozozymes	
c) Sonication	
<b>2. Dialysis &amp; Ultra filtration</b>	
Filtration under pressure - e.g. Amicon filtration.	
<b>Reference Books</b>	
1) Industrial Chemistry - B.K. Sharma	
2) Unit Process of Chemical Engineering - McCabe- Smith, Harrot.	
3) Introduction to Chemical Engineering - Walter, Badger &- Juliust Banchemo	
4) Analytical & Industrial Chemistry - Naik, Vithalkar, Bajaga, Bidkar, Ghatage, Mulik	

**B.Sc. II (Entrepreneurship Science) Semester: III**  
**Course code: 206. MICROBIOLOGY & BIOTECHNOLOGY**  
**(Paper V) Genetics**  
**(Total 40 periods, 3 periods / week) 50marks.**

**Genetics**

**Unit I** **8**

**Cell division** General Introduction, Mitosis, Meiosis, and its Significance

**Chromosomes Structure and Functions.** Chromosome morphology, Heterochromatin and Euchromatin, Histone and Non Histone proteins, Karyotypes, Translocations, inversions, deletions and duplications Aneuploidy and polyploidy structure. **8**

**Unit II**

**Genetic Foundations** :Mendelian and non-Mendelian inheritance, Recombination: Transformation, Transduction, and Conjugation. Genetic Complementation

**Unit III** **6**

**Linkage and Crossing Over** :Introduction, Linkage, Detection of Linkage, Crossing over, Factors affecting recombination frequency.

**Unit IV** **12**

**Genomics:** Genome structure, physical mapping, repeated DNA and gene families, Gene identification, Transposable elements.

**Gene Interaction and epistasis:**

Types of gene interactions, Molecular basis of gene interaction.

**Unit V** **6**

**Biostatistics** :Introduction, Mean, Mode, Median, Probability, Null hypothesis, Chi-Square test, T test X<sup>2</sup> test, degree of freedom, Probability level and problems.



**B.Sc. II (Entrepreneurship Science) Semester: III**  
**Course code: 206. MICROBIOLOGY & BIOTECHNOLOGY**  
**(Paper VI) Fermentation Technology**  
**(Total 40 periods, 3 periods / week) 50marks.**

<b>Unit I</b>	<b>8</b>
Food Fermentations	
Fermented foods, Pickle manufacturing: fermentation & storage.	
<b>Unit II</b>	<b>7</b>
Fermentation of Signal Cell Protein (SCP): Microorganisms & substrates used, Technology of production, Nutritive Merits & Demerits.	
<b>Unit III</b>	<b>8</b>
Fermentation of Alcoholic Beverages. General Process, Beer Production.	
<b>Unit IV</b>	<b>8</b>
Vinegar fermentation: Microorganisms & substrates used, Technology of production & its industrial significance	
<b>Unit V</b>	<b>9</b>
<b>1. Production of Microbial Insecticides</b>	
Introduction: Useful Microorganism, production formulation, advantages & disadvantages.	
<b>2. Production of vaccines:</b> Introduction: production, formulation process for Rabies & Hepatitis B	
<b>3. Production of Toxides &amp; Antisira:</b> Introduction: production, formulation process for Diptheria & Pertusis.	

**SOLAPUR UNIVERSITY, SOLAPUR**  
**B.Sc. Part II (Entrepreneurship Science)**  
**Semester IV**

Course code	Title of the course	Theory/ practicle	Marks	Lectures / practical peirod
<b>Ent 204</b>	<b>Entrepreneurship (Paper VII)</b> Production & materials Management <b>(Paper VIII)</b> Computer science	Theory	50	40
			50	40
	<b>Lab course I</b>	<b>Practical</b>	<b>100</b>	
<b>Ent 205</b>	<b>INDUSTRIAL CHEMISTRY (Paper – VII)</b> Techniques in Industrial Chemistry <b>(Paper VIII)</b> Biosensors & Techniques in Enzyme purification	Theory	50	40
			50	40
	<b>Lab course II</b>	<b>Practical</b>	<b>100</b>	
<b>Ent 206</b>	<b>MICROBIOLOGY &amp; BIOTECHNOLOGY Paper VII</b> Molecular biology <b>Paper VIII</b> Food & Dairy Technology	Theory	50	40
			50	40
	<b>Lab course III</b>	<b>Practical</b>	<b>100</b>	

**Practical course of one hundred marks for each subject in for annual pattern.**

**B.Sc.II (Entrepreneurship Science)**  
**Semester: IV**  
**Course code: 204. Entrepreneurship**  
**Paper VII. Production and Materials Management**  
**(Total 40 periods, 3 periods / week) 50marks.**

<b>Unit I:</b>	<b>8</b>
<b>The Production Function:</b>	
Nature, scope, activities, interlink	
with other functional areas such as marketing, purchasing, finance, personnel maintenance, R & D concept of Production.	
<b>Unit II:</b>	<b>9</b>
<b>1 Production System :</b> Job, batch, mass and flow production (features, advantages and disadvantages of each)	
<b>2. Plant Layout :</b> Product, process, fixed and combination layout.	
<b>3. Production Planning and Control :</b> Definition, objectives, functions of PP and C.	
<b>Unit III:</b>	<b>6</b>
<b>1. Materials Management :</b> Definition, objectives, importance	
<b>Unit IV :</b>	
<b>Industrial Purchasing :</b> Function and steps, procedure.	
<b>Unit V:</b>	<b>8</b>
<b>1. Quality Control :</b> Importance, inspection, introduction to TQM	
<b>2.. Maintenance :</b> Objectives, Type - breakdown and proactive.	
<b>3. Inventory Control :</b> Types of inventories, objectives, activities of inventory control. Inventory control Techniques, ROL, EOQ, ABC Analysis, Value Analysis.	

**B.Sc.II (Entrepreneurship Science)**  
**Semester: IV**  
**Course code: 204. Entrepreneurship**  
**Paper VIII Introduction to Computer Science**  
**(Total 40 periods, 3 periods / week) 50marks.**

<b>Unit I:</b>	<b>8</b>
<p><b>1. Introduction to Computer:</b> Computer characteristics of computer, concepts of hardware, software, firmware, evolution of computer and generations, classification and types of computers, Limitation of computer, applications of computer in various fields</p> <p><b>2. Operating System :</b> What is operating system ? Main functions of an operating system.</p>	
<b>Unit II:</b>	<b>8</b>
<p><b>Structure of Computer:</b> Block diagram of computer, input unit, CPU-ALU, Memory unit and control unit, output unit, introduction of motherboard, SMPS, math co-processor, expansion slots, serial and parallel ports.</p>	
<b>Unit III:</b>	<b>8</b>
<p><b>Computer Memory:</b> Memory concepts, semiconductor memory, magnetic memory - RAM, ROM, EPROM. EEPROM, Secondary Storage devices - Magnetic Tape, Magnetic disk (Floppy disk and Hard Disk) Compact Dist.</p>	
<b>Unit IV:</b>	<b>10</b>
<p><b>Computer Software &amp; Computer Language:</b></p> <p><b>Computer Software:</b> What is software, relationship between hardware and software, types of software - system software and application software .</p> <p><b>Computer Language:</b> Analogy with natural languages, machine language, assembly language, high level language, compiler, interpreter, characteristics of good languages..</p>	

**Unit V:****6**

**The Internet:** Definition of internet, brief history, it's basic services, electronic mail, file transfer protocol, telnet, usenet news, the World Wide Web - WWW browsers, use of the Internet.

**Reference Books**

1. Production and Operations Management - B.S. Goel.
2. Production and Operations Management - Chunawala and Patel
3. Production and Operations Management - Evertte, Adam Jr., Roland, J.Ebert
4. Computer Today - S Basundara
5. E - business - Kittel Amer
6. E - Commerce - David Whiteley.
7. Computer Fundamental - P.K. Sinha

**B.Sc.II (Entrepreneurship Science)**  
**Semester: IV**  
**Course code: 205. INDUSTRIAL CHEMISTRY**  
**Paper VII. Techniques in Industrial Chemistry**  
**(Total 40 periods, 3 periods / week) 50marks**

<b>Unit I:</b>		<b>8</b>
	<b>1. Spectroscopy</b> Basic principles of Spectroscopy and applications	
	<b>2. Atomic Absorption Spectroscopy</b> Introduction, dissolution, vaporisation, atomization background correction methods molecular emission, zeeman effect, A deuterium lamp.	
<b>Unit II:</b>		<b>6</b>
	<b>Flame Photometry</b>	
	General Principles, Instrumentation, Block Diagram, Burners, Total Consumption, burner premix or laminar flow burner, mirrors, slits, monochromators, filters & detectors	
<b>Unit III:</b>		<b>8</b>
	<b>Xray diffraction Technique</b>	
	Scattering technique, elastic scattering, SAXS, WAXS	
	Inelastic scattering Compton, RIXS, X-ray Raman.	
	X-ray diffraction pattern, High Resolution X-ray diffraction	
<b>Unit IV:</b>		<b>8</b>
	<b>1. Chromatography</b> Basic principle of Chromatography and applications	
	<b>2. Gel Chromatography</b>	
	Theory of gel Chromatography, properties of gels, selection of gels, operation gel columns, application of gel chromatography.	
<b>Unit V.</b>		<b>10</b>
	<b>1. Electrophoresis</b> Theory of Electrophoresis, Types of Electrophoresis	
	Agarose gel electrophoresis, Immunoelectrophoresis	
	a) PAGE b) SDS – PAGE e) 2-D PAGE	

**B.Sc.II (Entrepreneurship Science)**  
**Semester: IV**  
**Course code: 205. INDUSTRIAL CHEMISTRY**  
**Paper VIII. Biosensors & Techniques in Enzyme purification**  
**(Total 40 periods, 3 periods / week) 50marks**

<b>Unit I:</b>	<b>8</b>
<b>Biosensors</b>	
Introduction, Biological reaction, Electro chemical methods, general outline, optical biosensors, whole cell biosensors.	
<b>UnitII: Nucleic Acid Sequencing</b>	<b>8</b>
General Outline and different methods for Nucleic Acid Sequencing	
<b>UnitIII.</b>	<b>8</b>
<b>Enzyme purification techniques-I</b>	
<b>1.Precipitation</b>	
a) Precipitation of enzymes using inorganic salts e.g. Ammonium sulphate,	
b) Precipitation of enzymes using organic solvents e.g. Acitone.	
<b>2. Sedimentation</b>	
<b>Unit IV. Enzyme purification techniques-II</b>	<b>8</b>
<b>1.Centrifugation</b>	
Basic principles of Centrifugation, Density gradient centrifugation,& zonal centrifugation	
<b>Unit V. Enzyme purification techniques-III</b>	<b>8</b>
<b>1. Electrophoresis</b> Theory of Electrophoresis, Types of Electrophoresis	
Agarose gel electrophoresis, Immunoelectrophoresis	
a) PAGE	
b) SDS - PAGE	
e) 2-D PAGE	
<b>Reference Books</b>	
1) Industrial Chemistry : B.K. Sharma	
2) Analytical Chemistry : Skoot & West	
3) Analytical & Industrial Chemistry - Naik, Vithalkar, Bajaga, Bidkar, Ghatage, Mulik	
4) Analytical and Industrial Chemistry - Dr.N.g. Zunjurwad,	

**B.Sc. II (Entrepreneurship Science) Semester: IV**  
**Course code: 206. MICROBIOLOGY & BIOTECHNOLOGY**  
**(Paper VII) Molecular Biology**  
**(Total 40 periods, 3 periods / week) 50marks**

<b>Unit I</b>	<b>7</b>
<b>Genome Maintenance:</b>	
DNA replication, DNA damage and repair, DNA modification, DNA recombination and gene conversion.	
<b>Unit II</b>	<b>7</b>
<b>Gene Structure Function and Expression</b>	
Gene structure, the genetic code, Transcription, RNA processing, Translation	
<b>Unit III</b>	<b>7</b>
<b>Gene Regulation in Prokaryotes:</b>	
Positive and negative control of the operon, promoter recognition by RNA polymerases, Attenuation and anti termination.	
<b>Unit IV</b>	<b>10</b>
<b>Gene Regulation in Eukaryotes</b>	
Cis-acting regulatory elements, Trans-acting regulatory factors, Gene rearrangement and amplifications, Bacteriophages and Animal and Plant Viruses, Genome replication and regulation, Virus assembly, Virus-host interactions.	
<b>Unit V.</b>	<b>9</b>
<b>Methodology</b>	
Restriction maps, nucleic acid and hybridization, DNA cloning in prokaryotes and eukaryotes, sequencing and analysis, protein nucleic acid interaction.	



**B.Sc. II (Entrepreneurship Science) Semester: IV**  
**Course code: 206. MICROBIOLOGY & BIOTECHNOLOGY**  
**(Paper VIII) Food & Dairy Technology**  
**(Total 40 periods, 3 periods / week) 50marks**

**Unit I: Food & Dairy Microbiology**

8

Microbiology of Food and milk, Examination of milk & food, determination of bendrow, sorbet food, determination of number Thermophilic and sachrophilic bacteria, determination of efficiency - food, sugar, protein, grading of milk.

**Unit II Dairy Technology**

8

Introduction dairy technology, definition of milk, composition factor affecting of milk, food & nutritive value of milk. manufacturing, packaging and storage of pasteurized milk, flavor defect of milk their cases & manufacturer of sterilized milk. Homogenised milk, flavored milk, tanned milk.

**Unit III**

6

**Cream** : Definition, composition food & nutritive value, production and uses.

**Butter** : Introduction, definition, classification, composition, defect of butter uses.

**Unit IV**

8

**Cheese** : Introduction, definition, history, composition and types, manufacturer of cheese & its uses.

**Ice Cream** : Introduction, definition, composition, method of manufacture, packing, hardening storage, uses.

**Unit V Food Technology**

10

Food as substrate for microorganism, general principles of food, different method, preservation of food, microbiology & meat production, fish & poultry foods & vegetable, canned food, process of canning of food, microbial food poisoning, preservation and control.

**SYLABUS FOR LAB COURSES**  
**Course code 204. B.Sc.II Entrepreneurship Science**  
**Sem.III & IV B.Sc.II (Entrepreneurship) Lab course**  
**(8 periods, per week / batch)Total marks 100**

1. Practical Related to UNIT I
2. Collection of Newspaper / Magazine cuttings related to Management.
3. Prepare a Study Plan for academic year.
4. A study of Organization Structure of any Organization.
5. Preparation of a organization chart.
6. Study of selection process of any organization.
7. A study of buying behavior for any organization.
8. Design marketing research plan.
9. A study of product life cycle of any product.
10. A study of marketing channel of any company.
11. A visit to export unit and prepare a report.

**Practical (Related to visits)**

- 12) Plant and machineries in organization.
- 13) Working efficiency of organization.
- 14) Quality control & management.
- 15) Maintenance and up gradation of organization.
- 16) Inventory control of store management.

**Practical (Related to Visits)**

1. Prepare a note on plant layout.
2. A study of purchasing procedure of an organization.
3. Prepare a note on quality control.
4. A study schedule of maintenance of organization.
5. A study of inventory control.
6. Actual practical of computer (Starting of computer, desktop application,note)
7. MS-Word
8. MS-Powerpoint
9. Internet study and web site analysis of any organization.
10. Prepare website address directory (minimum 20 addresses)

**Course code 205. INDUSTRIAL CHEMISTRY**  
**LAB COURSE II Sem.III & IV**  
**(90 Hours - 8 Periods Per Week)**

1. Performance of a Continuous Stirred Tank Reader (C.S.T.R)
2. Battery of C.S.R.T.S
3. Tracer Studies in condition flow Reactor.
4. Performance of a plug flow reactor.
5. Alkaline hydrolysis of phenolphthalein.
6. To determine the reaction constant and activation energy using a Batch reactor.
7. Coiled Tube Reactor.
8. Hydramalis of fluidized Bed.
9. Axia mixing in packed columns.
10. Mass transfer with Chemical reaction in a Stirred Cell.
11. Analysis of Coal, Proximate and Ultimate analysis.
12. Gravimetric Estimation of Sio-Cement.
13. Fertilizer Analysis.
14. Drug Analysis.
15. Alloy Analysis.
16. BOD of Water.
17. COD of Water.
18. Flame Photometry(Na & K)
19. Soil Analysis pH meter.
20. The adsorption of aq. Acetic acid by activated charcoal.
21. Study of adsorption isotherm

**Reference Books**

- 1) Chemical Reaction Engineering - O.Levenspial.
- 2) Bio-Technology - Tryvan and Others.
- 3) Bio-Chemical Engineering - Biley.
- 4) Environmental Chemistry - A.K. De.

**B.Sc.II (Entrepreneurship Science)**  
**Course code: 206. MICROBIOLOGY & BIOTECHNOLOGY**  
**LAB COURSE III Sem.III & IV**  
**(8 periods, per week / batch) Total marks 100**

- 1) Study of various stages of mitosis.
- 2) Study of the various Meiotic stages of onion flower bud.
- 3) Karyotype analysis
- 4) Isolation of plasmid DNA
- 5) Isolation of Genomic DNA
- 6) Isolation of Plant DNA
- 7) Construction of linkage maps.
- 8) Analysis for chi square test.
- 9) Study of bacterial conjugation.
- 10) Calculate mean, mode and median of the any sample.
- 11) Study of multiple translocation in Rho.
- 12) Isolation and separation of plasmid DNA
- 13) Southern blotting.
- 14) Determination of fat from the given sample of milk.
- 15) Determination of the casein proteins from the milk sample.
- 16) Determination of sugar from the milk sample.
- 17) Determination of benzoate or sorbate content of food.
- 18) MBRT Test. & Phosphates test
- 19) MPN of milk.
- 20) Isolation and identification of salmonella group of microorganism from milk/food.
- 21) Total viable count of milk sample.
- 22) Determination of protein content in Spirulina tablets.
- 23) Production of beer from fruits.
- 24) Isolation of halophilic microbes from pickle sample.