

## TYBSc

### ANNEXURE - II

- 1) **Title of the Course:** Biotechnology (Vocational)
- 2) **Introduction: Pattern-** Semester
- 3) **Eligibility:** Should have offered Biotechnology (Vocational) at F.Y.B.Sc & S.Y.B.Sc and passed as per University rules
- 4) **Examination**
  - A) **Pattern of examination:**
    - i) 40-10 University semester examination of 40 marks & Internal assessment of 10 marks. Details as per syllabus
    - ii) Pattern of the question paper- As per specimen given
  - B) **Standard of Passing** : As per University norms
  - C) **ATKT Rules** : As per University norms
  - D) **Award of Class** : As per University norms
  - E) **External Students** : Not allowed
  - F) **Setting of Question paper/ Pattern of Question paper:** As per University norms
  - G) **Verification of Revaluation:** As per University norms
- 5) **Structure of the Course** :
  - i) **Optional**
  - ii) **Medium of instruction** : English
- 6) **Equivalence subject/ papers & Transitory Provision:** Biotechnology (Vocational)
- 7) **University terms** : As per University norms
- 8) **Subject wise Detail Syllabus:** Attached
- 9) **Recommended books** : Mentioned in the syllabus

## T.Y.B.Sc- Vocational Biotechnology

### Paper V: Semester III Plant Biotechnology (Voc-BIOTECH-335)

|              |  |           |
|--------------|--|-----------|
|              |  | <b>48</b> |
| Chapter I    | : Introduction to plant tissue culture   | 02        |
| Chapter II   | : Somaclonal variation   |           |
|              | -Advantages and disadvantages, Causes of somaclonal variation.   | 04        |
| Chapter III  | : Somatic embryogenesis, Artificial seed production  | 04        |
| Chapter IV   | : Secondary metabolites- production, advantages and limitation   | 06        |
| Chapter V    | : Production of haploids - Anther culture, ovule culture, detection of haploids, uses of haploid in plant breeding and other uses of haploids.       | 12        |
| Chapter VI   | : Gene transfer methods in plants  | 06        |
|              | i) Physical methods  |           |
|              | ii) Biological methods   |           |
| Chapter VII  | : Cryopreservation and <i>ex situ</i> conservation of germplasm  | 04        |
| Chapter VIII | : Selection of superior phenotypes, Micro propagation of endangered species, medicinal plants, oil seeds and forest trees<br>( With any one example) | 05        |
| Chapter IX   | : Transgenic plants (GM food, biofarming, vegetable vaccines)  | 05        |

#### References:

- 1) Plant tissue culture: M.K.Razdan
- 2) Plant tissue culture: H.D.Kumar
- 3) Plant biotechnology-K.G. Ramawat
- 4) Elements of Biotechnology- P.K.Gupta

## **T.Y.B.Sc- Vocational Biotechnology**

### **Paper VI: Semester III Environmental Biotechnology (Voc-BIOTECH-336)**

|              |   |           |
|--------------|---|-----------|
|              |   | <b>48</b> |
| Chapter I    | : Role of biotechnology in environment protection.  | 02        |
| Chapter II   | : Waste water treatment –Microorganisms in waste water treatment, bioaugmentation,biostimulation,bioreactors for waste water treatment.   | 06        |
| Chapter III  | : Biotreatment of wastes,pollutants,biosorption   | 08        |
| Chapter IV   | : Bioremediation-Bioremediation of surface soil, sludges, subsurface material, applications and case histories.   | 06        |
| Chapter V    | : Hazardous waste management:<br>Introduction, Xenobiotic compounds, recalcitrance, Hazardous wastes, Biotechnology applications to Hazardous waste management, Biotechnological applications to pesticide, tannery, paper, food and related industries | 10        |
| Chapter VI   | : Composting & biogas production  | 05        |
| Chapter VII  | : Bio-fuels & ethanol production  | 05        |
| Chapter VIII | : Biopesticides and biofertilisers  | 06        |

#### **References:**

- 1) Environmental biotechnology – Dr.P.R.Yadav2006.  
Discover publishing House
- 2) Environmental biotechnology-S.N. Jogdand -Himalaya publishing house
- 3) Environmental biotechnology and cleaner processes.  
Edited by Eugenia Olegin ,Gloria Sanchez,Elizabeth Hernandez,
- 4) A textbook of biotechnology –H.D.Kumar.

**T.Y.B.Sc Vocational Biotechnology**  
**Paper V: Semester IV: Entrepreneurship Development**

Entrepreneurship is a tremendous force that can have a big impact in growth, recovery, and societal progress by fuelling innovation, employment generation and social empowerment.

Through entrepreneurship education, young people, including those with disabilities, learn organizational skills, including time management, leadership development and interpersonal skills, all of which are highly transferable skills sought by employers.

**The syllabus for T.Y.B.Sc., Vocational students** thus is aimed at creating an awareness amongst the students about the benefits of becoming an entrepreneur and at the same time equip them with information about a good and a viable opportunity; making a business plan by assessing the techno-economic feasibility, seeking financial assistance, variety of procedures and formalities for setting up an enterprise, taking decisions in such a manner so that entrepreneurship becomes a life time career goal.

❖ **OBJECTIVES:**

- To create awareness about self-employment and motivate the students to go for self-employment.
- To study entrepreneurship concepts and their applicability.
- To expose the students to the practical world of business.

1. **INTRODUCTION:** Concept of entrepreneurship, Historical background, need and scope of entrepreneurship in modern society, Entrepreneurial behavior, attributes and skills.

Key elements of entrepreneur, Entrepreneurial process, Entrepreneurial culture, Environment of Entrepreneurship, Socio economic origins of Entrepreneurship, Barriers of Entrepreneurship and means to reduce them, types of Entrepreneurs, Characteristics of Entrepreneur. 8 Lectures

2. **BUSINESS ORGANIZATIONS:** Forms of business organizations such as sole proprietorship, partnership, Joint Stock Company, cooperative organization etc. Relative merits and demerits of each form, Meaning and definition, types of Small Scale Industry. 3 Lectures

Sources of Information: Where to go for what?

- a. District Industry Centre (DIC)
- b. Maharashtra Industrial Development Corporation (MIDC)
- c. Maharashtra State Small Industries Development Corporation (MSSI DC)

- d. Small Industries Services Institute (SISI)
- e. National Institutes of Entrepreneurship and Small business Development (NIESBUD)
- f. National Entrepreneurship Development Board(12) (NEDB)
- g. Entrepreneurship Development Institute of India
- h. Commercial and Co-operative Banks
- i. State Industrial Development Bank (SIDBI)
- j. Maharashtra State Electricity Board
- k. Pollution Control Board

3 Lectures

Legal Aspects of Small Business: Elementary knowledge of Income Tax, Sales Tax, VAT, Service Tax, Patent Rules, Excise Rules, Factory Act and Payment of Wages Act, Procedures for registration of SSI. 4 Lectures

3. **ENTREPRENEURSHIP DEVELOPMENT:** Identification of opportunities for entrepreneurship, ideas to start new business, criteria for selection of new product or service, Market Survey as a tool, Technical and economic feasibility of a project, Role of consultancy organizations. 8 Lectures

Project formulation and project report 4 Lectures

4. **FINANCIAL ASPECTS:** Sources of finance, Role of various funding agencies , government and commercial Role of various funding corporations and funding institutes such as chamber of commerce, MSFC, MCED, NSSIDC, Banks, special institutes such as IDBI,MIDC,SICOM etc, Working capital, cash flow, fund flow, preparations of basic financial statements, costing and pricing, breakeven point, SWOT analysis. 6 Lectures

5. **MARKETING ASPECTS:** Meaning, scope and importance, Marketing strategy, Market segmentation, marketing channels. Marketing mix and its effect. 6 Lectures

6. **HUMAN RESOURCE ASPECTS :** Concept and scope in modern industry, Different modes of employment, Placement of proper person for a job, Interpersonal relations and communication skills, training of personnel, guidance for stress management, soft skills. 6 Lectures

## Practicals/ Assignments

The practicals to be conducted are with an objective to transform the knowledge gained by the students in their classes to real life experience. These practicals will be based on the vocational subject and the Principal subject a student has offered

Internal assessment should be carried out on the practicals/ assignments done by a student

| Sr. No. | Title of Practical               | Objective  | Mode                        |
|---------|----------------------------------|--|-----------------------------|
| 1       | Role of District industry centre | Understand the working of District industry centre   | Visit and report submission |
| 2       | Visit to a small scale Industry  | To understand plant location and plant layout and to submit a report   | Visit and report submission |
| 3       | Visit to a service unit          | To study the legal aspects of a service unit and to submit a report  | Visit and report submission |
| 4       | Entrepreneurial ideas            | Describe in brief two entrepreneurial ideas of yours   | Home assignment             |
| 5       | Project formulation              | Prepare a preliminary document about an enterprise you want to start<br>It should contain executive summary, customer/target market analysis and strategy      | Home Assignment             |
| 6       | Review business plans            | Submit a review of a business plan of other team. It should include critical and constructive comments   | Home assignment             |
| 7       | Drafting a business plan         | It should contain executive summary, customer/target market analysis and strategy , marketing and operations, risks, management team and financial projections | Power Point Presentation    |

## **RECOMMENDED BOOKS:**

### **Text book**

1. Dynamics of Entrepreneurial Development and Management – Shri. Vasant Desai.

### **Reference books**

2. Environment & Entrepreneur: Mr.B.C.Tondon
3. Business Environment: Dr.G.V.Kayande Patil
4. Udyogvardhini –MCED
5. Basic Communication Skills: By P. Kiranmai Dutt & Geetha Rajeevan, 2000
6. Fundamentals of Office Management: By J.P. Mahajan , Office Management – By S. P. Arrora, latest edition
7. A guide to small Scale Entrepreneurs, Director of Industries, Govt. of Tamil Nadu  
Chennai, latest edition
8. Entrepreneurship and small Business Management- Dr. C. B. Gupta & Dr. Khanna
9. Project Management- K. Nagarajan
10. 100 project Reports Yashwantrao Chavan Open University (YCMOU) Edition
11. Entrepreneurship Ideas in Action Cynthia L. Greene (YCMOU) Edition

## **T.Y.B.Sc- Vocational Biotechnology**

### **Paper VI: Semester IV Section A- Microbial Biotechnology (Voc-BIOTECH-346)**

|             |   | <b>48</b> |
|-------------|---|-----------|
| Chapter I   | : Principles of microbial technology –Definition and scope, historical development.   | 02        |
| Chapter II  | : Development of industrial fermentation processes-screening,detection and assay of fermentation products,increasing of product yields, fermentation media and stock cultures,inoculam preparation,scale up of fermentation, different types of fermentations | 02        |
| Chapter III | : Fermentation equipments and it's uses   | 02        |
| Chapter IV  | : Downstream processing-Introduction, general processing, solid removal, primary separation, purification operations, product isolation, ancillary operations.  | 04        |
| Chapter V   | : Production processes for industrially important products  | 11        |
|             | i) Antibiotics –penicillin and streptomycin   |           |
|             | ii) Food- Cheese, vinegar, soy sauce, sufu  |           |
|             | iii) Enzymes, vitamins and organic acids  |           |
|             | iv) Alternative energy  |           |
|             | v) Waste treatment –municipal waste, industrial waste water treatment, solid waste treatment.   |           |
| Chapter VI  | : Use of immobilized cell system in fermentation  | 02        |
| Chapter VII | : Patenting microbial biotechnology   | 01        |

#### **References:**

- 1) Microbial biotechnology –principles and applications  
Second Ed Editor Lee yuan kun 2006
- 2) Industrial microbiology L.E.Casida 1968
- 3) Microbial Technology: Fermentation technology second Ed Pepler  
2004

## **Section B - Animal Biotechnology**

|             |   |    |
|-------------|---|----|
| Chapter I   | : Introduction to Animal Tissue Culture   | 02 |
| Chapter II  | : Mass production of biologically important compounds-<br>Vaccines, tPA, TGF- $\beta$ , EGF, PDGF, FGF, Interferon, Factor-VIII,<br>IL-2,3, Factor-IX | 10 |
| Chapter III | : Harvesting of products, purification and assays.  | 05 |
| Chapter IV  | : Cell hybridization, and production of monoclonal antibodies.  | 02 |
| Chapter V   | : Stem cells, ES cell technologies, Transgenics and knock outs<br>Gene therapy  | 05 |

### **References:**

- 1) Animal cell biotechnology-edited by R.E.Spier and J.B.Griffith
- 2) Principles and practice of Animal Tissue Culture –Sudha Gangal  
University press
- 3) Animal cell culture –Ian Freshney

## **T.Y.BSc- Vocational Biotechnology**

### **Vocational Biotechnology- PRACTICAL COURSE: ANNUAL PATTERN (Voc-BIOTECH-347)**

#### **Practicals based on theory paper-Plant biotechnology : 30**

- 1) a) Methods of dry and wet sterilization of apparatus and glasswares for plant tissue culture and  
b) Working and principles of different instruments like autoclave, laminar air flow, pH meter, Water distillation unit. (1x3)
- 2) Preparation of nutrient media for plant tissue culture with emphasis on composition and calculation of concentration of ingredients (1x3)
- 3) Study of effects of growth hormones on explants (1x3)
- 4) Initiation of meristem culture for micropropagation
  - i) Selection of explant
  - ii) Surface sterilization of explants
  - iii) Inoculation and culturing (1x3)
- 5) Initiation of embryo culture (1x3)
- 6) Initiation of callus culture /somatic embryogenesis/organogenesis culturing and hardening of PTC raised plantlets (1x3)

#### **Practicals based on theory paper- Environmental biotechnology:**

- 1) Qualitative analysis of water samples for pH, turbidity, microbial contamination (1x3)
- 2) Study of biological control pest (1x3)
- 3) Biodegradation of pollutant (pesticide or insecticide ) (1x3)
- 4) Isolation and cultivation of *Rhizobium* (1x3)
- 5) Ethanol production from biological waste (1x3)

**Practicals based on theory paper Microbial Biotechnology and Animal Biotechnology:**

- 1) Screening of antibiotic producer from soil sample. (2x3)
- 2) Standardization of different solvents for purification of antibiotics from fermented broth. (1x3)
- 3) Determination of potency of antibiotics (2x3)
- 4) Laboratory design and equipments in animal tissue culture facility (1x3)
- 5) Sterilisation processes of apparatus required for animal cell culture (1x3)
- 6) Preparation of reagents and media for culture (2x3)
- 7) Sterilisation and storage of media and reagents for cell culture (2x3)
- 8) Monitoring of contamination in media /reagents for cell culture. (1x3)
- 9) Culture of lymphocytes from blood/tissue sample (3x3)
- 10) Initiation of primary animal cell culture (3x3)

## TYBSc

### ANNEXURE – II

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- 2) **Introduction: Pattern-** Semester
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- 6) **Equivalence subject/ papers & Transitory Provision:** Industrial Microbiology (Vocational)
- 7) **University terms** : As per University norms
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- 9) **Recommended books** : Mentioned in the syllabus

## **T.Y.B.Sc- Vocational Industrial Microbiology**

### **Paper-V SEMESTER III- Pollution Control Technology (Voc-IND-MICRO-335)**

|  |           |
|--|-----------|
|  | <b>48</b> |
| Chapter I : Waste water composition                                      | 01        |
| Chapter II : Waste water characterization studies                        | 03        |
| Chapter III : Types of wastes : Solids, Liquids, Gases, Mixtures         | 02        |
| Chapter IV : Waste water treatment objectives and regulations            | 04        |
| Chapter V : Waste water treatment plant design                           | 05        |
| Chapter VI : Physical unit operations                                    | 05        |
| a) Flow measurement  |           |
| b) Screening   |           |
| c) Flow equalization   |           |
| d) Mixing  |           |
| e) Sedimentation   |           |
| f) Accelerated gravity separation  |           |
| g) Flotation   |           |
| h) Granular medium filtration  |           |
| i) Gas transfer  |           |
| j) Volatilization and gas stripping of Volatile Organic Compounds (VOCs) |           |
| Chapter VII : Chemical unit processes                                    | 05        |
| a) Chemical precipitation  |           |
| b) Adsorption (including biosorption)                                    |           |
| c) Disinfection ( Chlorine, ozone and ultraviolet)                       |           |
| d) Dechlorination  |           |
| Chapter VIII : Biological unit processes                                 | 05        |
| a) Aerobic   |           |
| b) Anaerobic   |           |
| c) Denitrification   |           |
| d) Biosorption   |           |

|              |   |    |
|--------------|---|----|
| Chapter IX   | : Removal of phosphorus (biological and chemical)     | 02 |
| Chapter X    | : Removal of toxic compounds and refractory organics. | 01 |
| Chapter XI   | : Removal of dissolved inorganic substances           | 01 |
| Chapter XII  | : Sludge treatment and disposal                       | 02 |
| Chapter XIII | : In-situ bioremediation                              | 02 |
| Chapter XIV  | : Principle and designing of ETPs                     | 04 |
| Chapter XV   | : Troubleshooting                                     | 02 |
| Chapter XVI  | : Environmental impact assessment                     | 02 |
| Chapter XVII | : Problems with solved examples.                      | 02 |

**References :**

1. APHA. Standard methods for Water and Waste water analysis. Latest Edition.
2. Metcalf and Eddy. Wastewater Engineering : Treatment, Disposal and Reuse. 3<sup>rd</sup> Edition. Tata McGraw Hill Pub. Co. , New Delhi.

## **T.Y.B.Sc- Vocational Industrial Microbiology**

### **Paper-VI SEMESTER- III Plant & Animal Tissue Culture (Voc-IND-MICRO-336)**

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#### **Section – A Animal Tissue Culture:**

|             |  |    |
|-------------|--|----|
| Chapter I   | : Introduction -<br>Definition of terms – Tissue culture, Organ culture,<br>Primary, Secondary, Continuous and Established cell lines  | 02 |
| Chapter II  | : Organ culture<br>a) Scope and techniques e.g. plasma clot, agar gel. Grid method etc.<br>b) Advantages<br>c) Limitations<br>d) Applications  | 04 |
| Chapter III | : Cell culture<br>a) Monolayers-anchorage dependency, types of substrate.<br>b) Suspension culture- types<br>c) Nutrient requirements, growth media, sterilization, growth conditions.<br>d) Culture techniques- explants disaggregation, subculture, primary and continuous cell lines, maintenance of cell lines<br>e) Large scale culture of animal cells – types of reactors, immobilization, hollow fibre reactor | 06 |
| Chapter IV  | : Use of cell line in<br>a) in cytotoxicity testing<br>b) in screening of drugs<br>c) in cytokine and growth factor assays.  | 02 |
| Chapter V   | : Somatic cell fusion and hybridoma technology   | 02 |
| Chapter VI  | : Cell culture products-<br>viral vaccines, recombination proteins, growth factors, cytokines,<br>interferons, monoclonal and hybrid antibodies  | 04 |
| Chapter VII | : Advances in animal tissue culture<br>a) in vitro fertilization and embryo transfer – test tube babies, animal cloning.<br>b) transgenic animals and their economic importance.   | 04 |

### **Section – B Plant tissue culture:**

|              |  |    |
|--------------|--|----|
| Chapter I    | : Introduction-<br>Pleuripotency of plant calls, growth factor requirements, nutrient media,<br>propogation and preservation of plant tissues.                       | 02 |
| Chapter II   | : Callus culture –<br>isolation and culturing techniques.  | 02 |
| Chapter III: | Regeneration :<br>a) shoot regeneration<br>b) somatic embryogenesis  | 04 |
| Chapter IV   | : Types of plant tissue culture<br>a) anther culture<br>b) ovary culture<br>c) meristem culture<br>d) embryo culture   | 04 |
| Chapter V    | : Somatic hybridization  | 02 |
| Chapter VI   | : Large scale culture of plant cells<br>a) suspension cultures and types of bioreactors.<br>b) biochemical production<br>c) virus free plants<br>d) artificial seeds | 05 |
| Chapter VII  | : Transgenic plants<br>a) gene constructs<br>b) vectors<br>c) transfection techniques<br>d) integration and inheritance of transgene                                 | 05 |

### **References:**

1. Adams,R.L.P., 1980, Cell culture for Biochemists, Laboratory techniques in Biochemistyr and Molecular Biology, Elsevier, Amsterdam
2. Freshney, R. I. (ed), 1992, Animal cell culture : a Practical approach (2<sup>nd</sup> ed.) Oxford University Press, New York
3. Freshney R. I., 1987, Culture of animal cells : A Manual of basic techniques(2<sup>nd</sup> ed.) Alan R. Lisss, New York.

4. Golub, E. S., 1987, Immunology: a synthesis, Sinauer Associates, Inc. Publishers, Sunderland, Massachusetts.
5. Paul J., 1975, Cell and Tissue culture (5<sup>th</sup> ed.), Livingstone, Edinburgh.
6. Goding, J.W., 1993, Monoclonal antibodies: Principles and practice (3<sup>rd</sup> ed.), Academic Press, New York.
7. Trounson, A. and Conti, A. 1982, Research in human in vitro fertilization and embryo transfer , Brit. Med. J. 285:244-248.
8. Willadsen, S. M. , 1989, Cloning of sheep and cow embryos, Genome, 31:956-962.
9. Hogan, B., Constantini, F., and Lacy, E., 1994, Manipulating the mouse embryo: A Laboratory Manual, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York.
10. Satyanarayana U., (2007). Biotechnology. Books and Allied (P) Limited

## **T.Y.B.Sc Industrial Microbiology**

### **Paper V: Semester IV: Entrepreneurship Development**

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| <b>Sr. No.</b> | <b>Title of Practical</b>        | <b>Objective</b>   | <b>Mode</b>                 |
|----------------|----------------------------------|--|-----------------------------|
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14. Business Environment: Dr.G.V.Kayande Patil
15. Udyogvardhini –MCED
16. Basic Communication Skills: By P. Kiranmai Dutt & Geetha Rajeevan, 2000
17. Fundamentals of Office Management: By J.P. Mahajan , Office Management – By S. P. Arrora, latest edition
18. A guide to small Scale Entrepreneurs, Director of Industries, Govt. of Tamil Nadu  
Chennai, latest edition
19. Entrepreneurship and small Business Management- Dr. C. B. Gupta & Dr. Khanna
20. Project Management- K. Nagarajan
21. 100 project Reports Yashwantrao Chavan Open University (YCMOU) Edition
22. Entrepreneurship Ideas in Action Cynthia L. Greene (YCMOU) Edition

## **T.Y.B.Sc- Vocational Industrial Microbiology**

### **Paper-VI SEMESTER- IV MOLECULAR BIOLOGY & RECOMBINANT DNA TECHNOLOGY (Voc-IND-MICRO-345)**

|  |    |
|--|----|
|  | 48 |
| Chapter I : Cloning strategies   | 10 |
| a) Cloning vehicles-Plasmids, Bacteriophages, Cosmid, Artificial chromosomes- Shotgun cloning, PAC, BAC, YAC & other recent developed vectors. |    |
| b) Genomic DNA libraries and cDNA cloning, chromosome walking  |    |
| c) Recombination selection and screening methods – Nucleic acid hybridization methods, Use of different probes.                                |    |
| Chapter II : Gene Manipulation and Expression  | 12 |
| a) Expression of cloned DNA fragments in bacteria- <i>E. coli</i> , Yeaste – <i>S. cerevisiae</i> and oteher eukaryotes.                       |    |
| b) Gene transfer to plant and animal cells.  |    |
| Chapter III : Interactions with DNA  | 12 |
| a) DNA sequencing- Maxam and Gibert method, Dideoxy method, automated sequencing.  |    |
| b) Polymerase chain reaction – primers, cloning, PCR products, RT-PCR and other modifications, Types of heat resistant enzymes used.           |    |
| c) Site directed mutagenesis and its applications  |    |
| Chapter IV : Impact of recombinant DNA technology  | 10 |
| a) Medicine- New diagnostics, Detection of pathogens, genetic disorders, fetal DNA analysis, Novel routes to vaccines.                         |    |
| b) DNA fingerprinting – forensic applications.   |    |
| c) Industrial applications – generation of novel proteins, protein engineering, production of cells , proteins, small molecules.               |    |
| d) Agricultural applications – Role of Ti plasmid  |    |
| e) Transgenesis – generation of novel plants and animals.  |    |
| Chapter V : Human genome project & its applications.   | 04 |

**References:**

1. Old, S. B. Primrose (1994) Principles of gene Manipulations., Blackwell Scientific Publications.
2. Technique in genetic engineering- Maniatis and Sambrook (3 volumes)
3. Brown T. A. gene cloning- An Introduction, Chapman and Hall India.
4. Alan E. H, Emery (1987). An introduction to recombinant DNA technology, ELBS.
5. Brown(1991) Essential Molecular Biology – A practical approach Vol I & II, Oxford University Press.

**Practical paper (Voc-IND-MICRO-347) Annual Pattern**  
**Based on theory papers and Entrepreneurship Development**

**Practicals on Paper- Pollution Control Technology**

1. Estimation of solids (TS, TSS, TVS, TDS)
2. Estimation of BOD, COD (correlation with each other for different wastewater)
3. Operation and monitoring of laboratory level activated sludge system
4. Measurement of anaerobic sludge activity by gas displacement method.
5. Visit to a nearby industrial effluent treatment plant.

**Practicals on Paper : Plant & Animal Tissue Culture**

1. Lymphocyte culture and cell fusion
2. Fibroblast cell culture and effect of environment (e.g. pH, temperature, chemicals and drugs) stress on culture
3. Preparation and evaluation of bacterial vaccines and antisera.
4. Callus culture
5. Plant regeneration from callus culture.

**Practicals on Paper- : Molecular Biology & Genetic Engineering**

1. Isolation of genomic DNA, plasmid DNA, amplification and curing of plasmid
2. Electrophoresis – Agarose gel, polyacrylamide gel, etc.
3. Use of restriction endonuclease, DNA ligase for cutting joining
4. DNA (demonstration)
5. Transformation in *E. coli*
6. Induction of mutation using mutagenic agents like UV radiation and isolation of Lac negative mutants.
7. Induction of mutation using chemical mutagens and isolation of :
  - i) antibiotic resistance and
  - ii) auxotroph mutants
8. Protoplast fusion
9. PCR (demonstration)

## TYBSc

### ANNEXURE – II

- 1) **Title of the Course:** Seed Technology (Vocational)
- 2) **Introduction: Pattern-** Semester
- 3) **Eligibility:** Should have offered Seed Technology (Vocational at F.Y.B.Sc & S.Y.B.Sc and passed as per University rules)
- 4) **Examination**
  - A) **Pattern of examination**
    - i) 40-10 University semester examination of 40 marks & Internal assessment of 10 marks. Details as per syllabus
    - ii) Pattern of the question paper- As per specimen given
  - B) **Standard of Passing** : As per University norms
  - C) **ATKT Rules** : As per University norms
  - D) **Award of Class** : As per University norms
  - E) **External Students** : Not allowed
  - F) **Setting of Question paper/ Pattern of Question paper:** As per University norms
  - G) **Verification of Revaluation:** As per University norms
- 5) **Structure of the Course** :
  - i) **Optional**
  - ii) **Medium of instruction** : English
- 6) **Equivalence subject/ papers & Transitory Provision:** Seed Technology (Vocational)
- 7) **University terms** : As per University norms
- 8) **Subject wise Detail Syllabus:** Attached
- 9) **Recommended books** : Mentioned in the syllabus

**T.Y.B.Sc- Vocational Seed Technology**  
**Paper-V SEMESTER - III**  
**SEED PATHOLOGY AND ENTOMOLOGY**

|  |    |
|--|----|
| Chapter-I: Introduction and History of Seed Pathology                                | 48 |
| 1) Definition  | 03 |
| 2) History of seed pathology   |    |
| 3) Influence of seed borne diseases  |    |
| Chapter-II: Seed Borne and Storage Fungi   | 08 |
| 1) Definition of seed borne and storage fungi  |    |
| 2) Differences between seed borne and storage fungi                                  |    |
| 3) Mechanism of seed transmission and entry point of seed infection                  |    |
| 4) Common seed borne fungi with examples   |    |
| 5) Common storage fungi with examples  |    |
| Chapter-III: Seed Borne Bacteria and Viruses   | 06 |
| 1) Definition  |    |
| 2) Impact of seed borne bacteria and viruses on seeds or crop with suitable examples |    |
| Chapter-IV: Introduction of Seed Entomology  | 02 |
| 1) History of insect pest  |    |
| Chapter-V Classification of insect pest  | 06 |
| 1) Method of insect classification   |    |
| 2) Orders of insects of economic importance  |    |
| Chapter-VI: Life Cycle of Insect Pest  | 08 |
| Chapter-7: Storage entomology  | 06 |
| 1) Pest problem in seed storage  |    |
| Chapter-8: Seed Storage Management   | 09 |
| 1) Methods of Seed health testing  |    |
| 2) Seed treatment  |    |
| 3) Management of seed storage structures   |    |

**References:**

Ano . 1999. Manual of Seed Certification Procedures. Directorate of Seed Certification, Tamil Nadu , Coimbatore - 641 003 , India .

Copeland, L .O and McDonald. 1995 . Principles of Seed Science and Technology, Chapman and Hall, New York, USA.

ISTA . 1999 . Seed Science and Technology , Vol. 27 , Supplement , Rules , International Seed Testing Association , Zurich , Switzerland .

Khare , D and M. S. Bhale 2000 . Seed Technology Scientific Publishers (INDIA) , Jodhpur .

McDonald , M.B. and L.O. Copland . 1999. Seed Science and Technology Laboratory Manual. Scientific Publishers, Jodhpur ,

K.Vanangamudi , N. Natarajan , A, Bhatathi , R. Umarani and T. Saravanan . Advances in Seed Science and Technology , Vol I .

Sam Kugbei . Seed economics. International Center For Agricultural in the dry areas . Scientific publishers (INDIA ) Jodhpur.

**T.Y.B.Sc- Vocational Seed Technology**  
**Paper-VI SEMESTER III**  
**SEED FARM MANAGEMENT, PROCESSING AND STORAGE**

|   |    |
|---|----|
| Chapter-I: Introduction   | 48 |
| 1) Scope and objectives   | 03 |
| Chapter-II: Farm Management   | 06 |
| 1) Introduction and Definition  |    |
| 2) Objectives and scope of Farm management  |    |
| 3) Farm management vs Agricultural economics  |    |
| 4) Graphic presentation of the Place of Farm management   |    |
| 5) Use of farm management as personal matter  |    |
| 6) Use of farm management in actual farming   |    |
| 7) Fundamentals of farm management  |    |
| Chapter-III: Farm Business  | 06 |
| 1) Introduction   |    |
| 2) Factors involved in the selection of a business (Locality limitations, Capital limitations, Income limitations and personal inclination) |    |
| 3) Extensive farming more stable  |    |
| 4) Factors determining desirability of a farm enterprise  |    |
| 5) Comparison of general and specialized farming  |    |
| 6) General farming for beginners  |    |
| Chapter-IV: Management of Seed Processing   | 04 |
| 1) Layout of seed processing plant  |    |
| 2) Basic flow pattern in seed processing plant  |    |
| 3) Types of layouts   |    |
| 4) Maintenance and management of the plant  |    |
| Chapter-V: Seed Processing  | 12 |
| 1) Various steps in seed processing   |    |
| 2) Receiving the seed in seed processing unit   |    |
| 3) Conditioning   |    |
| 4) Seed drying  |    |
| 5) Seed cleaning  |    |
| 6) Separation and grading   |    |
| Chapter-VI: Seed Treatment  | 05 |
| 1) Need of seed treatment   |    |
| 2) Kinds and methods of seed treatment  |    |
| a. Mechanical   b. Physical   c. Chemical   |    |
| 3) Seed treating equipments   |    |

|   |    |
|---|----|
| Chapter-VII: Seed Storage                                 | 08 |
| 1) Bagging and its methods                                |    |
| 2) Methods of seed storage                                |    |
| 3) Storage containers                                     |    |
| 4) Factors affecting storability of seeds                 |    |
| 5) Changes during seed storage                            |    |
| 6) Basic requirements of seed storage                     |    |
| Chapter-VIII: Seed Marketing                              | 04 |
| 1) Introduction   |    |
| 2) Major components of seed marketing                     |    |
| 3) Role of different seed organizations in seed marketing |    |

### **References:**

Ponnuswamy , A.S. 2001 , Quality Seed Production in Hybrids Rice In Recent Techniques and Participatory Approaches on Quality Seed Production ICAR Winter School Training Manual , Dept . of Seed Science and Technology , Tamil Nadu Agricultural University , Coimbatore 641 003, India .

R. Umarani , R.Jerlin , N. Natrajan , P.Masilamani and A.S. Ponnuswamy , Experimental Seed Science and Technology Dept . of Seed Science and Technology , Tamil Nadu Agricultural University , Coimbatore 641 003, India .

L.E. Everson . Hand Book Of Pure Seed Definitions . The International Seed Testing Association Zurich , Switzerland .

L.M. Jeswani , B. Baldev . Pulse Production Technology . Publication and Information Division , Indian Council of Agricultural Research Krishi Anusandhan Bhavan , Pusa New Delhi .

## **T.Y.B.Sc Vocational Seed Technology**

### **Paper V: Semester IV: Entrepreneurship Development**

Entrepreneurship is a tremendous force that can have a big impact in growth, recovery, and societal progress by fuelling innovation, employment generation and social empowerment.

Through entrepreneurship education, young people, including those with disabilities, learn organizational skills, including time management, leadership development and interpersonal skills, all of which are highly transferable skills sought by employers.

**The syllabus for T.Y.B.Sc., Vocational students** thus is aimed at creating an awareness amongst the students about the benefits of becoming an entrepreneur and at the same time equip them with information about a good and a viable opportunity; making a business plan by assessing the techno-economic feasibility, seeking financial assistance, variety of procedures and formalities for setting up an enterprise, taking decisions in such a manner so that entrepreneurship becomes a life time career goal.

#### **❖ OBJECTIVES:**

- To create awareness about self-employment and motivate the students to go for self-employment.
- To study entrepreneurship concepts and their applicability.
- To expose the students to the practical world of business.

13. **INTRODUCTION:** Concept of entrepreneurship, Historical background, need and scope of entrepreneurship in modern society, Entrepreneurial behavior, attributes and skills.

Key elements of entrepreneur, Entrepreneurial process, Entrepreneurial culture, Environment of Entrepreneurship, Socio economic origins of Entrepreneurship, Barriers of Entrepreneurship and means to reduce them, types of Entrepreneurs, Characteristics of Entrepreneur. 8 Lectures

14. **BUSINESS ORGANIZATIONS:** Forms of business organizations such as sole proprietorship, partnership, Joint Stock Company, cooperative organization etc. Relative merits and demerits of each form, Meaning and definition, types of Small Scale Industry. 3 Lectures

Sources of Information: Where to go for what?

- a. District Industry Centre (DIC)
- b. Maharashtra Industrial Development Corporation (MIDC)
- c. Maharashtra State Small Industries Development Corporation (MSSI DC)

- d. Small Industries Services Institute (SISI)
- e. National Institutes of Entrepreneurship and Small business Development (NIESBUD)
- f. National Entrepreneurship Development Board(12) (NEDB)
- g. Entrepreneurship Development Institute of India
- h. Commercial and Co-operative Banks
- i. State Industrial Development Bank (SIDBI)
- j. Maharashtra State Electricity Board
- k. Pollution Control Board

3 Lectures

Legal Aspects of Small Business: Elementary knowledge of Income Tax, Sales Tax, VAT, Service Tax, Patent Rules, Excise Rules, Factory Act and Payment of Wages Act, Procedures for registration of SSI. 4 Lectures

15. **ENTREPRENEURSHIP DEVELOPMENT:** Identification of opportunities for entrepreneurship, ideas to start new business, criteria for selection of new product or service, Market Survey as a tool, Technical and economic feasibility of a project, Role of consultancy organizations. 8 Lectures

Project formulation and project report 4 Lectures

16. **FINANCIAL ASPECTS:** Sources of finance, Role of various funding agencies , government and commercial Role of various funding corporations and funding institutes such as chamber of commerce, MSFC, MCED, NSSIDC, Banks, special institutes such as IDBI,MIDC,SICOM etc, Working capital, cash flow, fund flow, preparations of basic financial statements, costing and pricing, breakeven point, SWOT analysis. 6 Lectures

17. **MARKETING ASPECTS:** Meaning, scope and importance, Marketing strategy, Market segmentation, marketing channels. Marketing mix and its effect. 6 Lectures

18. **HUMAN RESOURCE ASPECTS :** Concept and scope in modern industry, Different modes of employment, Placement of proper person for a job, Interpersonal relations and communication skills, training of personnel, guidance for stress management, soft skills. 6 Lectures

## Practicals/ Assignments

The practicals to be conducted are with an objective to transform the knowledge gained by the students in their classes to real life experience. These practicals will be based on the vocational subject and the Principal subject a student has offered

Internal assessment should carried out on the practicals/ assignments done by a student

| Sr. No. | Title of Practical               | Objective  | Mode                        |
|---------|----------------------------------|--|-----------------------------|
| 1       | Role of District industry centre | Understand the working of District industry centre   | Visit and report submission |
| 2       | Visit to a small scale Industry  | To understand plant location and plant layout and to submit a report   | Visit and report submission |
| 3       | Visit to a service unit          | To study the legal aspects of a service unit and to submit a report  | Visit and report submission |
| 4       | Entrepreneurial ideas            | Describe in brief two entrepreneurial ideas of yours   | Home assignment             |
| 5       | Project formulation              | Prepare a preliminary document about an enterprise you want to start<br>It should contain executive summary, customer/target market analysis and strategy      | Home Assignment             |
| 6       | Review business plans            | Submit a review of a business plan of other team. It should include critical and constructive comments   | Home assignment             |
| 7       | Drafting a business plan         | It should contain executive summary, customer/target market analysis and strategy , marketing and operations, risks, management team and financial projections | Power Point Presentation    |

## **RECOMMENDED BOOKS:**

### **Text book**

- 1 Dynamics of Entrepreneurial Development and Management – Shri. Vasant Desai.

### **Reference books**

- 2 Environment & Entrepreneur: Mr.B.C.Tondon
- 3 Business Environment: Dr.G.V.Kayande Patil
- 4 Udyogvardhini –MCED
- 5 Basic Communication Skills: By P. Kiranmai Dutt & Geetha Rajeevan, 2000
- 6 Fundamentals of Office Management: By J.P. Mahajan , Office Management – By S. P. Arrora, latest edition
- 7 A guide to small Scale Entrepreneurs, Director of Industries, Govt. of Tamil Nadu  
Chennai, latest edition
- 8 Entrepreneurship and small Business Management- Dr. C. B. Gupta & Dr. Khanna
- 9 Project Management- K. Nagarajan
- 10 100 project Reports Yashwantrao Chavan Open University (YCMOU) Edition
- 11 Entrepreneurship Ideas in Action Cynthia L. Greene (YCMOU) Edition

## **T.Y.B. Sc- Vocational Seed Technology**

### **Paper-VI- SEMESTER IV BIOTECHNOLOGY AND INTELLECTUAL PROPERTY RIGHTS**

|  |    |
|--|----|
| Chapter-1: Introduction to Biotechnology                                       | 48 |
| 1) Definition, Branches, scope and applications                                | 02 |
| Chapter-2: Aids to variety identification                                      | 10 |
| a. PCR   |    |
| b. Isozyme markers   |    |
| c. RFLP  |    |
| d. RAPDs   |    |
| e. AFLP  |    |
| f. DNA finger printing   |    |
| g. ELISA   |    |
| Chapter-3: Seed storage proteins   | 06 |
| 1) Isolation of albumins, globulins, prolamines and glutanins                  |    |
| 2) Protein profiling using SDS-page.   |    |
| Chapter-3: Technique of Micro propagation in development of crop plants        | 16 |
| a. Tissue culture in Banana  |    |
| b. Anther culture  |    |
| c. Embryo culture  |    |
| d. Synthetic seeds   |    |
| Chapter-4: Transgenics e.g. Bt cotton, Golden rice, technique and applications | 06 |
| Chapter-5: Introduction to Intellectual property rights                        | 01 |
| Chapter-6: Patents and plant breeder's rights                                  | 03 |
| Chapetr-7: Intellectual property rights in India                               | 02 |
| Chapter-8: World trade organization  | 02 |

**References:**

Sam Kugbei . Seed economics. International Center For Agricultural in the dry areas . Scientific publishers (INDIA ) Jodhpur.

John Milton Poehlman . The Mungbean . Oxford and IBH Publishing Co. PVT .

K. Ranamoorthy , K. Sivasubramaniam and Th. A. Kannan .Seed Legislation In India . Agribios

W.V. Cruess . Commercial Fruit and Vegetable Products . Agribios .

R. L. Agarwal . Seed Technology.

A.K. Joshi and B.D.Singh . Seed Science and Technology . Kalyani Publishers .

Subir Sen and Nabinananda Ghosh . Seed Science and Technology Kalyani Publishers .

Dr. Har Pal Singh Tomar . Seed Technology . Aman Publishing House .

B.B. Desai , P.M. Kotecha and D.K. Salunkhe . Seeds Handbook . Marcel Dekker , Inc.

N. C. Singhal . Hybrid Seed Production in Field Crops . Kalyani Publishers

**T.Y.B.Sc- Vocational Seed Technology**  
**Practical Paper Based on theory papers and Entrepreneurship**  
**Development**

**Practicals based on theory paper - Seed Pathology and Entomology**

- 1) Demonstration and handling of stereo binocular and research microscope.
- 2) Symptoms and identification of important seed borne pathogens (Fungi and bacteria).
- 3) Visual examination of dry seeds for disease symptoms.
- 4) Examination of suspensions obtained from washing of seeds.
- 5) Infection sites studied by planting seed components.
- 6) Detection of important seed borne fungi with the help of various detection methods (Agar and blotter paper method).
- 7) Detection of important seed borne bacteria with the help of various detection methods.
- 8) Visual examination for dry infested seeds.
- 9) Study of life history of important insect pest.

**Practicals based on theory paper - Seed Farm Management, Processing and Storage**

- 1) Study of seed treatment equipments and application of various chemicals.
- 2) Visit to a seed processing and storage complex.
- 3) Study of air screen cleaner cum grader.
- 4) Study of different types of elevator and conveyors.
- 5) Study of seed packaging equipments.
- 6) Study of specific gravity separator.
- 7) Soil sampling for fertility and moisture content.
- 8) Demonstration of some important farm machines.
- 9) One day visit with seed marketing executive.

**Practicals based on theory paper -- Biotechnology and Intellectual Property Rights**

1. Demonstration of PCR facility and DNA fingerprints (Photographs)
2. Peroxidase isozyme profiling for varietal identification.
3. Isolation of seed storage proteins.
4. SDS-PAGE of globulins.
5. Preparation of culture media.
6. Sterilization of media and glassware.
7. Inoculation and culture of explants.
8. Micropropagation of Banana.
9. Documentation of rules and regulations of intellectual property rights

10. Collection and filling of application forms for patent filing.

The student has to perform practicals/ assignments of Entrepreneurship Development as given in the syllabus

**TYBSc**  
**ANNEXURE – II**

- 1) **Title of the Course:** Industrial Chemistry (Vocational)
- 2) **Introduction: Pattern-** Semester
- 3) **Eligibility:** Should have offered Industrial Chemistry (Vocational) at F.Y.B.Sc & S.Y.B.Sc and passed as per University rules.
- 4) **Examination**
  - A) **Pattern of examination**
    - i) 40-10 University semester examination of 40 marks & Internal assessment of 10 marks. Details as per syllabus
    - ii) Pattern of the question paper- As per specimen given
  - B) **Standard of Passing** : As per University norms
  - C) **ATKT Rules** : As per University norms
  - D) **Award of Class** : As per University norms
  - E) **External Students** : Not allowed
  - F) **Setting of Question paper/ Pattern of Question paper:** As per University norms
  - G) **Verification of Revaluation:** As per University norms
- 5) **Structure of the Course** :
  - i) **Optional**
  - ii) **Medium of instruction** : English
- 6) **Equivalence subject/ papers & Transitory Provision: Industrial Chemistry (Vocational)**
- 7) **University terms** : As per University norms
- 8) **Subject wise Detail Syllabus:** Attached
- 9) **Recommended books** : Mentioned in the syllabus

## **T.Y.B.Sc- Industrial Chemistry (Vocational)**

### **Paper-V SEMESTER III- Industrial Methods of Chemical Analysis**

**48L**

1. Polarography : Voltametry and polarographic principles, pulse polarography, differential polarography, square wave polarography, hydrodynamic voltametry, qualitative and quantitative analysis, applications and numerical problems.

10L

2. X-ray analysis: Diffraction –principle, methods of analysis, single crystal diffraction, powder analysis, X-ray fluorescence and X-ray absorption, applications and numerical problems.
3. Atomic absorption spectroscopy: principle, instrumentation and applications.
4. Flame photometry: principle, instrumentation and applications.
5. Mass spectroscopy: principle, ionisation methods, types of mass analyser and detectors.
6. Ion selective electrodes: principle, types and applications.
7. Neutron diffraction analysis: principle and applications.

#### **Reference books:**

1. Instrumentation methods of analysis by Willard Merrit, Dean and Settle.
2. Introduction to instrumental analysis by Robert Braun,
3. Instrumental methods of chemical analysis by Chatwal and Anand.
4. Analytical Chemistry by Skoog and Holler
5. Physical chemistry by Barrow.

## **T.Y.B.Sc Vocational Electronic Equipment Maintenance Paper V: Semester IV: Entrepreneurship Development**

Entrepreneurship is a tremendous force that can have a big impact in growth, recovery, and societal progress by fuelling innovation, employment generation and social empowerment.

Through entrepreneurship education, young people, including those with disabilities, learn organizational skills, including time management, leadership development and interpersonal skills, all of which are highly transferable skills sought by employers.

**The syllabus for T.Y.B.Sc., Vocational students** thus is aimed at creating an awareness amongst the students about the benefits of becoming an entrepreneur and at the same time equip them with information about a good and a viable opportunity; making a business plan by assessing the techno-economic feasibility, seeking financial assistance, variety of procedures and formalities for setting up an enterprise, taking decisions in such a manner so that entrepreneurship becomes a life time career goal.

### **❖ OBJECTIVES:**

- To create awareness about self-employment and motivate the students to go for self-employment.
- To study entrepreneurship concepts and their applicability.
- To expose the students to the practical world of business.

1 INTRODUCTION: Concept of entrepreneurship, Historical background, need and scope of entrepreneurship in modern society, Entrepreneurial behavior, attributes and skills.

Key elements of entrepreneur, Entrepreneurial process, Entrepreneurial culture, Environment of Entrepreneurship, Socio economic origins of Entrepreneurship, Barriers of Entrepreneurship and means to reduce them, types of Entrepreneurs, Characteristics of Entrepreneur. 8 Lectures

2 BUSINESS ORGANIZATIONS: Forms of business organizations such as sole proprietorship, partnership, Joint Stock Company, cooperative organization etc. Relative merits and demerits of each form, Meaning and definition, types of Small Scale Industry. 3 Lectures



## Practicals/ Assignments

The practicals to be conducted are with an objective to transform the knowledge gained by the students in their classes to real life experience. These practicals will be based on the vocational subject and the Principal subject a student has offered

Internal assessment should be carried out on the practicals/ assignments done by a student

| Sr. No.  | Title of Practical               | Objective   | Mode                        |
|----------|----------------------------------|---|-----------------------------|
| <b>1</b> | Role of District industry centre | Understand the working of District industry centre  | Visit and report submission |
| <b>2</b> | Visit to a small scale Industry  | To understand plant location and plant layout and to submit a report  | Visit and report submission |
| <b>3</b> | Visit to a service unit          | To study the legal aspects of a service unit and to submit a report   | Visit and report submission |
| <b>4</b> | Entrepreneurial ideas            | Describe in brief two entrepreneurial ideas of yours  | Home assignment             |
| <b>5</b> | Project formulation              | Prepare a preliminary document about an enterprise you want to start. It should contain executive summary, customer/target market analysis and strategy       | Home Assignment             |
| <b>6</b> | Review business plans            | Submit a review of a business plan of other team. It should include critical and constructive comments  | Home assignment             |
| <b>7</b> | Drafting a business plan         | It should contain executive summary, customer/target market analysis and strategy, marketing and operations, risks, management team and financial projections | Power Point Presentation    |

## **RECOMMENDED BOOKS:**

### **Text book**

- 7 Dynamics of Entrepreneurial Development and Management – Shri. Vasant Desai.

### **Reference books**

- 8 Environment & Entrepreneur: Mr.B.C.Tondon
- 9 Business Environment: Dr.G.V.Kayande Patil
- 10 Udyogvardhini –MCED
- 11 Basic Communication Skills: By P. Kiranmai Dutt & Geetha Rajeevan, 2000
- 12 Fundamentals of Office Management: By J.P. Mahajan , Office Management – By S. P. Arora, latest edition
- 13 A guide to small Scale Entrepreneurs, Director of Industries, Govt. of Tamil Nadu  
Chennai, latest edition
- 14 Entrepreneurship and small Business Management- Dr. C. B. Gupta & Dr. Khanna
- 15 Project Management- K. Nagarajan
- 16 100 project Reports Yashwantrao Chavan Open Universiy (YCMOU) Edition
- 17 .Entrepreneurship Ideas in Action Cynthia L. Greene (YCMOU) Edition

## **T.Y.B.Sc- Industrial Chemistry (Vocational)**

### **Paper-VI SEMESTER III- Inorganic and Organic Based Industries - I**

**48L**

#### **1. MANUFACTURE OF AMMONIA, NITRIC ACID, SULPHURIC ACID & FERTILISERS 17L**

##### **A. MANUFACTURE OF AMMONIA, NITRIC ACID, SULPHURIC ACID**

- Physico chemical principles regarding the manufacture of ammonia, nitric acid and sulphuric acid.
- Manufacture of ammonia by modified Bosch and Haber process with flow sheet use of ammonia.
- Manufacture of nitric acid by Ostwald's process, concentration of nitric acid and use of nitric acid.
- Manufacture of sulphuric acid by contact process, uses of sulphuric acid.

##### **B. FERTILISERS**

- Plants nutrients, need for fertilizers, qualities of fertilizers, NPK ratio, classification of fertilizers, straight and mixed fertilizers.
- Nitrogenous fertilizers, manufacture of ammonium nitrate, urea, ammonium sulphate, phosphate fertilizers manufacture of triple phosphate and super phosphate, potassium fertilizers.

Ref 1:-pages- 518-523, 530-538, 564-570

Ref 2:- pages- 303-310, 310-318, 327-340

#### **2. SUGAR AND FERMENTATION INDUSTRIES**

##### **A. SUGAR**

- Importance of sugar industry, manufacture of raw and refined sugar with flow sheet, estimation of sugar ( physical and chemical methods)

##### **B. FERMENTATION**

- Definition of fermentation, importance of various fermentation industries, basic requirements for fermentation, steps in fermentation process.
- Manufacture of alcohol from molasses, distillation, coffee still, preparation of absolute alcohol, various useful fractions and their uses, proof spirit, denatured spirit.

Ref1:- pages- 893-898

Ref 2:- pages – 681-685, 689-690.

### 3. EXPLOSIVES AND TOXIC CHEMICAL WEAPONS

#### A. EXPLOSIVE

- Introduction, classification, characteristic of explosives.
- Study of cellulose nitrate, trinitro benzene, trinitro toluene, dynamite, gunpowder, RDX, HMX, tetryl, pentyl, hexyle, lead azide, with respect to their structure, properties and uses

#### B. TOXIC CHEMICAL WEAPONS

- Introduction, importance requirement of toxic chemicals
- Study of the following:- mustard gas, phosgene, nerve gas adamsite, chloro acetophenone, chloropicrin, screening smokes.

Ref 1:- pages- 919-933

### 4. PESTICIDES

- Introduction, classification,
- Study of the following types: - Organo chlorine pesticides like DDT, BHC & Aldrin.
- Organo phosphorous pesticides, malathion & parathion.
- Rodenticides, fungicides, herbicides, fumigants and repellants (one example each).

Ref 1:- pages – 952-970

Ref 2:- pages – 462-463, 468-471.

### 5. PAINTS

- Introduction, classification of paints, constituents of paints in brief.
- Manufacture of paints, qualities of good paint, emulsion paints, paint removers, varnishes enamels, lacquers, thinners in brief.

Ref 1:- pages 738-752.

## T.Y.B.Sc- Industrial Chemistry (Vocational)

### Paper-VI SEMESTER IV- Inorganic and Organic Based Industries - II

48L

#### 1. SYNTHETIC POLYMERS

- Introduction, classification based on – types of reaction used, structure, origin, effect of heat and use of pattern.
- Molecular weight  $M_n$  and  $M_w$  (only definition) significance of molecular weight with respect to polymer properties.
- Study of important plastics, fibres, rubbers and adhesives with respects to  
a) Structure, b) reaction used to prepare, c) properties d) uses.

Ref 3:- pages relevant pages

#### A. PLASTICS

- Introduction, classification, properties of plastics, effects of structure on properties
- Configuration of plastics – atactic, syndiotactic & isotactic
- Study of following plastics with respect to their structure, properties and uses
  - Phenol formaldehyde resins, resols, novolaks.
  - Polyester resins.
  - Poly ethylene, poly propylene, poly styrene, cellulose acetate.
  - Malamine formaldehyde resins.
  - Poly vinyl acetate, poly vinyl chlorides and polyvinyl alcohols
  - Epoxy resins
  - Silicone resins

Ref 1:- pages- m796-845

Ref 3:- relevant pages

#### B. ELASTOMERS

- Rubbers: origin, importance, types of rubber, natural rubber, gutta percha guayle rubber, balata.
- Refining of crude rubber, drawbacks of natural rubber, vulcanization, technique of vulcanization.
- Synthetic rubber, poly butadiene, buna –S or SBR rubber, neoprene, nitrile rubber, butyl rubber, silicone rubber, & poly urethane.

Ref 1:- pages – 848-871

Ref 3:- relevant pages

#### C. SYNTHETIC FIBRES

- Introduction, natural and artificial fibres characteristics and limitations.

- Study of following synthetic fibres :-
  - Rayon (nitro cellulose) cupra ammonium rayon, acetate rayon, nylon 66, nylon-6, terylene (Dacron) Teflon & saron.

Ref 1:- pages770-788.

Ref 3:- relevant pages

#### D. ADHESIVES

- Introduction process of bonding, classification, preparation, properties and uses of protein, adhesives, animal glue and starch adhesives.
- Synthetic resins adhesives, rubber based adhesives, celluloic and silicate adhesives.

Ref 1:- pages- 672-680.

## 2. DRUGS AND PHARMACEUTICAL INDUSTRIES

- Definition of drug, qualities of drugs, classification of drugs (functional and chemotherapeutic drugs).
- Meaning of following terms with one example: - analgesic, antipyretic, diuretics, sulpha drugs, anaesthetics, antibiotics, antacid, anti inflammatory, tranquilisers.
- Synthesis and use of following drugs :- paracetamol, sulphanilamide, benzocaine, synthetic penicillin
- Manufacture of aspirin with flow sheet.

Ref 2:- pages -803-804, 818-822.

Ref 5:-page relevant pages

## 3. DYES

- Definition of dye, Ottowitt's theory of colours, nomenclature and classification as per their chemical constitution and mode of dyeing
- Synthesis and use of following dyes: - methyl orange, rosaniline, crystal violet, phenolphthalein, fluorescein and alizarin.
- Manufacture of indigo with flow sheet.

Ref 1:- pages- 784-792.

Ref 4&5 relevant pages

## 4. SOAPS AND DETERGENTS

- Definition of terms like soaps, surfactants, detergents, classification of surfactants.
- Manufacture of soap by continuous process with flow sheet.
- Special soaps
- Raw materials for detergents with flow sheet.
- Cleaning action of soaps and detergents, household detergents.

Ref 1:- pages – 713-716, and relevant pages

Ref 2:- pages -529-549

#### 5. PERFUMES AND FLAVOURS

- Introduction, definition of term: - perfumes, vehicles, fixatives, types of fixatives.
- Isolation of essential vegetable oils (various methods).
- Classification of odorous compounds: - alcohols, esters, carbonyl compounds, diphenyl compounds. Examples—citronellol, muscone, nitro muscone, vanillin, piperonal and cinnamaldehyde
- Natural perfumes from flowers, fruit flavours

Ref 1:-pages -934-951

Ref 2: pages -484-487 and relevant pages

#### REFERENCE BOOKS

1. Industrial chemistry by B. K. Sharma 10<sup>th</sup> edition (Goel Publishing House Meerut, India).
2. Shreeve's Chemical Process Industries fifth edition by G. T. Austin ( Mc Graw Hill)
3. Polymer Science by V. R. Gowarikar 1986.
4. Organic Chemistry by I. L. Finar Vol I.
5. Organic Chemistry by I. L. Finar Vol II.

**TYBSc**  
**ANNEXURE – II**

- 1) **Title of the Course:** Photography and Audio Visual Production (Vocational)
- 2) **Introduction: Pattern-** Semester
- 3) **Eligibility:** Should have offered Photography and Audio Visual Production (Vocational) at  
F.Y.B.Sc & S.Y.B.Sc and passed as per University rules.
- 4) **Examination**
  - A) **Pattern of examination**
    - i) 40-10 University semester examination of 40 marks & Internal assessment of 10 marks. Details as per syllabus
    - ii) Pattern of the question paper- As per specimen given
  - B) **Standard of Passing** : As per University norms
  - C) **ATKT Rules** : As per University norms
  - D) **Award of Class** : As per University norms
  - E) **External Students** : Not allowed
  - F) **Setting of Question paper/ Pattern of Question paper:** As per University norms
  - G) **Verification of Revaluation:** As per University norms
- 5) **Structure of the Course** :
  - i) **Optional**
  - ii) **Medium of instruction** : English
- 6) **Equivalence subject/ papers & Transitory Provision: Still Photography and Audio**

**Visual Production**

(Vocational)
- 7) **University terms** : As per University norms
- 8) **Subject wise Detail Syllabus:** Attached
- 9) **Recommended books** : Mentioned in the syllabus

## **T.Y.B.Sc.: Photography and Audio Visual Production (Vocational)**

### **Paper-V SEMESTER III- Video Recording and Playback Systems**

**Objective:** 1. To make the student familiar with the Video Recording and Playback Systems.

#### **Unit I: Introduction (6)**

Lensing difference between audio and video signals. Difficulties in recording and replay of video signal. Generation of video signal. Vidicon camera tube. Charged Coupled Device. B/W and colour TV camera. Camera adjustments and related terms. Comparison between film and video tape recording. Transmission, O.B. Van

#### **Unit II: Black and White and Colour TV (16)**

Principles of scanning and synchronization. Composite video signal. B/W and colour picture tubes. Principles of colour. PAL colour signal. Vestigial sideband transmission. Block diagram of B/W TV (explanation of each stage in block diagram format) and its working. Block diagram of colour TV. Modern trends in TV display (LCD, Flat panel display etc.)

#### **Unit III: Recording of Video Signal (6)**

Recording of video signal on video tape. Transverse and helical scan. Need for rotating head mechanism. Frequency modulation of video signal before recording. Tape transport mechanism and track survey. Block diagram of record / playback electronics in a VCR, VHS, and VCR.

#### **Unit IV: Optical Video Disc (14)**

Principle of recording and replay on ACD, VCD etc. Eight-to-fourteen modulation Digitization error detection and correction. CLV for disc rotation. Optical pick up system, focusing and tracking systems. Block diagram for VCD player. Principles, capacity for DVD. Block diagram for DVD player. Principle of data compression techniques.

#### **Unit V: Other Video Recording Media (6)**

Magnetic video disc machine (slow motion disc). Digital TV. Principles of HDTV and block diagram of HDTV. H.D. Camera.

N. B. Latest technology should be incorporated wherever necessary and available.

## **T.Y.B.Sc.: Photography and Audio Visual Production (Vocational)**

### **Paper-VI SEMESTER III- Video Production**

**Objective:** 1. To make students familiar with the visual media and the video production process.

(Total number of lectures:

48)

#### **Preproduction**

##### **I. Planning for video production**

Choosing subjects, formats, resource persons, locations etc.

Slotting the programme at the right place and time.

Scheduling production work

Administration and management of resources and manpower.

Rehearsals, visits to locations, coordination and financial management.

Advance publicity.

Different programme formats

##### **II. Script writing**

Script writing for different programme formats (feature, documentaries, news reports, fiction/nonfiction)

Writing for TV plays, serials etc.

##### **III. Proposals**

Outline and treatment, news and current affairs programme,

Budgeting

#### **Production**

##### **IV. Production personnel and facilities**

a) Equipment: Camera, recorders

Camera lenses, framing, white balance, camera movements (pan, tilt, and dolly), and camera angles

Types of shots, Composition and planning of shots, Continuity

Support between the produced and the camera crew

b) Personnel: Production team, Production personnel (Producer, Director)

Production assistant, Cameraman, Floor manager, Floor assistant, Researchers, Performers or talent.

Technical personnel: Technical director, Sound recorder, Vision mixer, Lighting assistants, Ser/property and wardrobe assistants

Make-up artist

Editors, effects and post production personnel

**V. Lighting indoors and outdoors:**

Different light sources, Indoor lighting (Key, Fill and Back lighting, Lighting for characters), Use of filters. Outdoor lighting (Natural light, use of reflectors, scrims)

**Post Production****VI. Video Editing**

Video editing basics, Line of action, Continuity, Transitions (Fades, Dissolves, Wipes, Cuts), Graphics/Animations, Sound mixing, Dubbing, Voice over, Music, Background music.

**VII. Publicity**

Promos, Publicity and Marketing

**T.Y.B.Sc: Photography and Audio Visual Production (Vocational)**  
**Paper V: Semester IV: Entrepreneurship Development**

Entrepreneurship is a tremendous force that can have a big impact in growth, recovery, and societal progress by fuelling innovation, employment generation and social empowerment.

Through entrepreneurship education, young people, including those with disabilities, learn organizational skills, including time management, leadership development and interpersonal skills, all of which are highly transferable skills sought by employers.

**The syllabus for T.Y.B.Sc., Vocational students** thus is aimed at creating an awareness amongst the students about the benefits of becoming an entrepreneur and at the same time equip them with information about a good and a viable opportunity; making a business plan by assessing the techno-economic feasibility, seeking financial assistance, variety of procedures and formalities for setting up an enterprise, taking decisions in such a manner so that entrepreneurship becomes a life time career goal.

❖ **OBJECTIVES:**

- To create awareness about self-employment and motivate the students to go for self-employment.
- To study entrepreneurship concepts and their applicability.
- To expose the students to the practical world of business.

**18 INTRODUCTION:** Concept of entrepreneurship, Historical background, need and scope of entrepreneurship in modern society, Entrepreneurial behavior, attributes and skills.

Key elements of entrepreneur, Entrepreneurial process, Entrepreneurial culture, Environment of Entrepreneurship, Socio economic origins of Entrepreneurship, Barriers of Entrepreneurship and means to reduce them, types of Entrepreneurs, Characteristics of Entrepreneur. 8

Lectures

**19 BUSINESS ORGANIZATIONS:** Forms of business organizations such as sole proprietorship, partnership, Joint Stock Company, cooperative organization etc. Relative merits and demerits of each form, Meaning and definition, types of Small Scale Industry. 3

Lectures

Sources of Information: Where to go for what?

- a. District Industry Centre (DIC)
- b. Maharashtra Industrial Development Corporation (MIDC)
- c. Maharashtra State Small Industries Development Corporation (MSSI DC)
- d. Small Industries Services Institute (SISI)
- e. National Institutes of Entrepreneurship and Small business Development (NIESBUD)
- f. National Entrepreneurship Development Board(12) (NEDB)
- g. Entrepreneurship Development Institute of India

- h. Commercial and Co-operative Banks
- i. State Industrial Development Bank (SIDBI)
- j. Maharashtra State Electricity Board
- k. Pollution Control Board

3 Lectures

Legal Aspects of Small Business: Elementary knowledge of Income Tax, Sales Tax, VAT, Service Tax, Patent Rules, Excise Rules, Factory Act and Payment of Wages Act, Procedures for registration of SSI. 4

Lectures

**20 ENTREPRENEURSHIP DEVELOPMENT:** Identification of opportunities for entrepreneurship, ideas to start new business, criteria for selection of new product or service, Market Survey as a tool, Technical and economic feasibility of a project, Role of consultancy organizations. 8 Lectures

Project formulation and project report 4  
Lectures

**21 FINANCIAL ASPECTS:** Sources of finance, Role of various funding agencies , government and commercial Role of various funding corporations and funding institutes such as chamber of commerce, MSFC, MCED, NSSIDC, Banks, special institutes such as IDBI,MIDC,SICOM etc, Working capital, cash flow, fund flow, preparations of basic financial statements, costing and pricing, breakeven point, SWOT analysis.  
6 Lectures

**22 MARKETING ASPECTS:** Meaning, scope and importance, Marketing strategy, Market segmentation, marketing channels. Marketing mix and its effect. 6  
Lectures

**23 HUMAN RESOURCE ASPECTS :** Concept and scope in modern industry, Different modes of employment, Placement of proper person for a job, Interpersonal relations and communication skills, training of personnel, guidance for stress management, soft skills.

6

Lectures

## Practicals/ Assignments

The practicals to be conducted are with an objective to transform the knowledge gained by the students in their classes to real life experience. These practicals will be based on the vocational subject and the Principal subject a student has offered

Internal assessment should be carried out on the practicals/ assignments done by a student

| Sr. No. | Title of Practical               | Objective   | Mode                        |
|---------|----------------------------------|---|-----------------------------|
| 1       | Role of District industry centre | Understand the working of District industry centre  | Visit and report submission |
| 2       | Visit to a small scale Industry  | To understand plant location and plant layout and to submit a report  | Visit and report submission |
| 3       | Visit to a service unit          | To study the legal aspects of a service unit and to submit a report   | Visit and report submission |
| 4       | Entrepreneurial ideas            | Describe in brief two entrepreneurial ideas of yours  | Home assignment             |
| 5       | Project formulation              | Prepare a preliminary document about an enterprise you want to start. It should contain executive summary, customer/target market analysis and strategy       | Home Assignment             |
| 6       | Review business plans            | Submit a review of a business plan of other team. It should include critical and constructive comments  | Home assignment             |
| 7       | Drafting a business plan         | It should contain executive summary, customer/target market analysis and strategy, marketing and operations, risks, management team and financial projections | Power Point Presentation    |

## **RECOMMENDED BOOKS:**

### **Text book**

- 24 Dynamics of Entrepreneurial Development and Management – Shri. Vasant Desai.

### **Reference books**

- 25 Environment & Entrepreneur: Mr.B.C.Tondon
- 26 Business Environment: Dr.G.V.Kayande Patil
- 27 Udyogvardhini –MCED
- 28 Basic Communication Skills: By P. Kiranmai Dutt & Geetha Rajeevan, 2000
- 29 Fundamentals of Office Management: By J.P. Mahajan , Office Management – By S. P. Arora, latest edition
- 30 A guide to small Scale Entrepreneurs, Director of Industries, Govt. of Tamil Nadu  
Chennai, latest edition
- 31 Entrepreneurship and small Business Management- Dr. C. B. Gupta & Dr. Khanna
- 32 Project Management- K. Nagarajan
- 33 100 project Reports Yashwantrao Chavan Open University (YCMOU) Edition
- 34 .Entrepreneurship Ideas in Action Cynthia L. Greene (YCMOU) Edition

**T.Y.B.Sc- Photography and Audio Visual Production (Vocational)**  
**Paper-VI SEMESTER IV- Radio Production**

**Objective:** 1. To make students familiar with the visual media and the radio production process.

(Total number of lectures:

48)

**I Radio:**

1. Media Introduction and Functions
2. Radio: Characteristics and Advantages

**II Structure of Radio:**

1. Music: Role of music in A.V. production. Folk, Classical, Semi-classical, Instrumental, film
2. Writing for radio: its importance and difference from the print media
3. Talks and talklets over radio and their varieties
4. Interviews: A fascinating art of radio / T.V. Programming
5. Feature programs over radio and characteristics
6. Educational programs over radio

**III Radio Programmes**

1. Outdoor broadcast programs over Radio and linking communications.
2. Special audience programs such as programs for children, youth and workers
3. Present conditions of Radio and Government policy of Broadcasting
4. Efforts in making Radio free from Government

**IV Radio as a medium of communication**

1. Introduction to Radio as a medium of mass communication and its characteristics.
2. Organization and management of AIR audience Research Units.
3. International Radio Broadcasting (BBC, VOA etc)
4. Writing Radio Reviews

**V Radio News:**

1. Gathering processing and production of news for Radio
2. Broadcasting Code

**VI F.M. Stations:** Role, significance and limitations

**VII Commercial Radio:** Copy writing for 'ad' & production  
Ethics of commercial radio. Anchoring.

## **List of Assignments/ Experiments**

### **List of Experiments/Assignments: Video Production**

1. Story Writing for given condition
2. Script writing for various formats (Documentary, Drama, Magazine etc.)
3. Screen play writing for the above formats
4. Story boarding for any one scene from the above
5. Proposal writing
6. Three shot exercise, Individual, ( Scripting, Story boarding, Shooting and Editing)
7. Nine shot exercise, Team work, ( Scripting, Story boarding, Shooting and Editing)

### **List of Experiments/Assignments: Radio Production**

1. Script writing for various programmes (Documentary, Drama, Magazine etc.)
2. Recording various programmes in studio. (Panel discussion, Interviews, Musical programmes- Vocal/ Instrumental, Storytelling etc.)
3. Outdoor Broadcast recording using portable digital recorder
4. Writing, Reading and Recording assignments.

### **List of Experiments/Assignments: Photography**

1. Lighting for form and shape
2. Lighting for texture
3. Lighting for still life: Earthen ware, Metal ware, Fruits, Glass ware (Front lit & Back lit), Crockery, Jewellery, Flowers, Food
4. Lighting for a product
5. High Key lighting
6. Low Key lighting
7. Silhouette
8. News Photography
9. Linear Perspective
10. Night Photography

### **List of Experiments/Assignments: Photoshop**

1. Image Mixing
2. Image Cutting
3. Text Building Effect
4. Blurr Effect
5. Transformation Tools
6. Clip Mask
7. Photo Filter
8. Bucket Tool
9. Stamping Tool

**Project:**

Students offering Photography and Audio Visual Production (Vocational) are expected to undertake production of a video film. This could be a group activity or an individual effort.

## TYBSc

### Annexure-II

**Structure/ Pattern of Syllabus must be as follows:**

- 1) Title of the Course: **Electronic Equipment Maintenance (Vocational)**
- 2) Introduction: **Pattern Semester**
- 3) Eligibility: **Should have offered Electronic Equipment Maintenance (Vocational) at S.Y.B.Sc. and passed as per Pune University Rules**
- 4) Examination
  - A) Pattern of examination: **Semester**
    - i) **40:10** (University Semester examination of 40 Marks & Internal assessment of 10 Marks) Details as per the syllabus
    - ii) Pattern of the question paper: **As per the specimen given**
  - B) Standard of Passing : **As per Pune University norms**
  - C) ATKT Rules : **As per Pune University norms**
  - D) Award of Class : **As per Pune University norms**
  - E) External Students : **Not permitted**
  - F) Setting of Question paper/ Pattern of Question paper: **As per Pune University norms**
  - G) Verification of Revaluation : **As per Pune University norms**
- 5) Structure of the Course :
  - i) Optional
  - ii) Medium of instruction : **English**
- 6) Equivalence subject/ papers & Transitory Provision: **Electronic Equipment Maintenance (Vocational)**
- 7) University terms : **As per Pune University Norms.**
- 8) Subject wise Detail Syllabus : **Attached**
- 9) Recommended books : **Mentioned in syllabus**

**T.Y.B.Sc Vocational Electronic Equipment Maintenance**  
**Paper V: Semester III: Electronic equipment troubleshooting and repairs**

- Objectives:**
1. To make the student aware of troubleshooting techniques
  2. To impart knowledge about faults in electronic components
  3. To develop competence in repair of electronic systems

**Module 1      General principles**

Troubleshooting and repair: Reading drawings and diagrams of electronic systems, causes of equipment failure and nature of faults. Steps in troubleshooting, physical inspection, users complaint and report. Testing of power supply unit. Troubleshooting methods, systematic troubleshooting. Identification of faults by functional area approach. Intermittent faults. Servicing and specification checking.

**[8 lectures]**

**Module 2      Faults in components and circuit modules**

Common faults in resistors, capacitors, inductors and transformers. Faults in rectifiers, zener diodes and transistors. Faults in op-amps and fault diagnosis in op-amp circuits.

**[12 lectures]**

**Module 3      Troubleshooting digital circuits**

Faults in digital circuits and fault model of digital circuits. Test equipment for digital circuits such as logic clip, logic probe, logic pulser, logic current tracer and logic comparator. Troubleshooting of microprocessor /microcontroller based systems. Testing of RAM, ROM and data acquisition system. Problem of troubleshooting LSI based systems.

**[12 lectures]**

**Module 4      Troubleshooting of power supply systems**

Troubleshooting of power supply units, series and shunt regulators, SMPS. Protection techniques like overvoltage and over current protection.

**[8 lectures]**

**Module 5      Troubleshooting common test and measurement instruments**

Typical faults and remedies in CRO, RF and AF signal generators function generators. Troubleshooting of analogue and digital multimeters.

**[8 lectures]**

**Reference books**

- 1] Electronic instruments and systems: Principles, maintenance and troubleshooting  
R.G.Gupta Tata McGraw Hill
- 2] Modern electronic equipment: Troubleshooting, repair and maintenance by  
Khandpur TMH
- 3] Electronic fault diagnosis by G.C.Loveday A.H.Wheeler publishing

**T.Y.B.Sc Vocational Electronic Equipment Maintenance  
Paper VI: Semester III: Electronic instrumentation**

**Objectives:**

- 1] To make the students aware of characteristics and elements of instrumentation systems.
- 2] To impart thorough understanding of working and use of modern electronic instruments.

**Module 1      Characteristics and functional elements of instruments**

Functional elements of an instrument system and its typical applications. Classification of instruments, standards and calibration, traceability. Static and dynamic performance characteristics of instruments. Transducers, sensors and actuators, signal amplification and attenuation, digitization and digital signal processing. **[24 lectures]**

**Module 2      Measuring instruments and systems**

Impedance measurement: Digital LCR bridge, Q meter, vector impedance meter. Voltage and power measurement: DVM, vector voltmeter, digital storage oscilloscope, CRO probes. Digital phase meter. Basic spectrum analyzer, real time spectrum analyser, logic analyzer, distortion analyzer. Power measurement at audio and radio frequencies. Automatic test systems, microprocessor/microcontroller based instruments (block diagram), multichannel data acquisition system. Motion measurement: Absolute, relative. Calibration of motion measuring devices. Force measurement: Balance, hydraulic load cell, pneumatic load cell, elastic force devices. Dynamometers: Transmission, driving and absorption type dynamometers. **[24 lectures]**

**Reference books:**

- 1] Electronic measurements by U.A.Bakshi and V.U.Bakshi Technical publications Pune.
- 2] Instrumentation, measurement and analysis by Nakra , Choudhari Tata McGraw Hill

## **T.Y.B.Sc Vocational Electronic Equipment Maintenance Paper V: Semester IV: Entrepreneurship Development**

Entrepreneurship is a tremendous force that can have a big impact in growth, recovery, and societal progress by fuelling innovation, employment generation and social empowerment.

Through entrepreneurship education, young people, including those with disabilities, learn organizational skills, including time management, leadership development and interpersonal skills, all of which are highly transferable skills sought by employers.

**The syllabus for T.Y.B.Sc., Vocational students** thus is aimed at creating an awareness amongst the students about the benefits of becoming an entrepreneur and at the same time equip them with information about a good and a viable opportunity; making a business plan by assessing the techno-economic feasibility, seeking financial assistance, variety of procedures and formalities for setting up an enterprise, taking decisions in such a manner so that entrepreneurship becomes a life time career goal.

### **❖ OBJECTIVES:**

- To create awareness about self-employment and motivate the students to go for self-employment.
- To study entrepreneurship concepts and their applicability.
- To expose the students to the practical world of business.

**35 INTRODUCTION:** Concept of entrepreneurship, Historical background, need and scope of entrepreneurship in modern society, Entrepreneurial behavior, attributes and skills.

Key elements of entrepreneur, Entrepreneurial process, Entrepreneurial culture, Environment of Entrepreneurship, Socio economic origins of Entrepreneurship, Barriers of Entrepreneurship and means to reduce them, types of Entrepreneurs, Characteristics of Entrepreneur. 8 Lectures

**36 BUSINESS ORGANIZATIONS:** Forms of business organizations such as sole proprietorship, partnership, Joint Stock Company, cooperative organization etc. Relative merits and demerits of each form, Meaning and definition, types of Small Scale Industry. 3 Lectures

Sources of Information: Where to go for what?

- a. District Industry Centre (DIC)
- b. Maharashtra Industrial Development Corporation (MIDC)
- c. Maharashtra State Small Industries Development Corporation (MSSI DC)

- d. Small Industries Services Institute (SISI)
- e. National Institutes of Entrepreneurship and Small business Development (NIESBUD)
- f. National Entrepreneurship Development Board(12) (NEDB)
- g. Entrepreneurship Development Institute of India
- h. Commercial and Co-operative Banks
- i. State Industrial Development Bank (SIDBI)
- j. Maharashtra State Electricity Board
- k. Pollution Control Board

3 Lectures

Legal Aspects of Small Business: Elementary knowledge of Income Tax, Sales Tax, VAT, Service Tax, Patent Rules, Excise Rules, Factory Act and Payment of Wages Act, Procedures for registration of SSI. 4 Lectures

**37 ENTREPRENEURSHIP DEVELOPMENT:** Identification of opportunities for entrepreneurship, ideas to start new business, criteria for selection of new product or service, Market Survey as a tool, Technical and economic feasibility of a project, Role of consultancy organizations. 8 Lectures

Project formulation and project report 4 Lectures

**38 FINANCIAL ASPECTS:** Sources of finance, Role of various funding agencies , government and commercial Role of various funding corporations and funding institutes such as chamber of commerce, MSFC, MCED, NSSIDC, Banks, special institutes such as IDBI,MIDC,SICOM etc, Working capital, cash flow, fund flow, preparations of basic financial statements, costing and pricing, breakeven point, SWOT analysis. 6 Lectures

**39 MARKETING ASPECTS:** Meaning, scope and importance, Marketing strategy, Market segmentation, marketing channels. Marketing mix and its effect. 6 Lectures

**40 HUMAN RESOURCE ASPECTS :** Concept and scope in modern industry, Different modes of employment, Placement of proper person for a job, Interpersonal relations and communication skills, training of personnel, guidance for stress management, soft skills. 6 Lectures

## Practicals/ Assignments

The practicals to be conducted are with an objective to transform the knowledge gained by the students in their classes to real life experience. These practicals will be based on the vocational subject and the Principal subject a student has offered

Internal assessment should carried out on the practicals/ assignments done by a student

| Sr. No. | Title of Practical               | Objective  | Mode                        |
|---------|----------------------------------|--|-----------------------------|
| 1       | Role of District industry centre | Understand the working of District industry centre   | Visit and report submission |
| 2       | Visit to a small scale Industry  | To understand plant location and plant layout and to submit a report   | Visit and report submission |
| 3       | Visit to a service unit          | To study the legal aspects of a service unit and to submit a report  | Visit and report submission |
| 4       | Entrepreneurial ideas            | Describe in brief two entrepreneurial ideas of yours   | Home assignment             |
| 5       | Project formulation              | Prepare a preliminary document about an enterprise you want to start<br>It should contain executive summary, customer/target market analysis and strategy      | Home Assignment             |
| 6       | Review business plans            | Submit a review of a business plan of other team. It should include critical and constructive comments   | Home assignment             |
| 7       | Drafting a business plan         | It should contain executive summary, customer/target market analysis and strategy , marketing and operations, risks, management team and financial projections | Power Point Presentation    |

## **RECOMMENDED BOOKS:**

### **Text book**

- 41 Dynamics of Entrepreneurial Development and Management – Shri. Vasant Desai.

### **Reference books**

- 42 Environment & Entrepreneur: Mr.B.C.Tondon
- 43 Business Environment: Dr.G.V.Kayande Patil
- 44 Udyogvardhini –MCED
- 45 Basic Communication Skills: By P. Kiranmai Dutt & Geetha Rajeevan, 2000
- 46 Fundamentals of Office Management: By J.P. Mahajan , Office Management – By S. P. Arora, latest edition
- 47 A guide to small Scale Entrepreneurs, Director of Industries, Govt. of Tamil Nadu  
Chennai, latest edition
- 48 Entrepreneurship and small Business Management- Dr. C. B. Gupta & Dr. Khanna
- 49 Project Management- K. Nagarajan
- 50 100 project Reports Yashwantrao Chavan Open University (YCMOU) Edition
- 51 .Entrepreneurship Ideas in Action Cynthia L. Greene (YCMOU) Edition

**T.Y.B.Sc Vocational Electronic Equipment Maintenance  
Paper VI: Semester IV: Medical Instrumentation**

**Objectives:**

- 1] To make the students conversant with biopotentials and their significance
- 2] To impart knowledge of medical instrumentation and its use

|                 |   |                      |
|-----------------|---|----------------------|
| <b>Module 1</b> | <b>Biopotentials</b><br>Electrical activity of excitable cells<br>-Central nervous system<br>-Functional organization of peripheral nervous system<br>-ENG, EMG, ECG, EEG   | <b>[14 lectures]</b> |
| <b>Module 2</b> | <b>Biopotential electrodes</b><br>-Body surface recording electrodes<br>-Internal electrodes<br>-Electrode arrays, microelectrodes<br>-Electrodes for electric stimulation of tissue<br>-Ion selective electrodes<br>Practical hints in the use of electrodes   | <b>[6 lectures]</b>  |
| <b>Module 3</b> | <b>Recording systems</b><br>Basic recording system. General considerations for bioelectric recorder amplifier. Sources of external noise in low level recording circuits. Amplifiers used with recording systems. Writing systems.  | <b>[8 lectures]</b>  |
| <b>Module 4</b> | <b>Instrumentation for clinical laboratory</b><br>Blood: Introduction, Tests: Blood cell counter (conducting method)<br>Chemical tests: Colorimeter (filter-photometer), flame photometer, spectrophotometer. Automation of chemical tests.   | <b>[10 lectures]</b> |
| <b>Module 5</b> | <b>Electrical safety</b><br>Physiological effects of electric current. Electric power distribution system. Macroshock and microshock hazards. Prevention of accidents and grounding of equipment. Double insulation, protection by low voltage, ground fault circuit interrupter. Isolation of patient connected parts. Isolated power distribution system. | <b>[10 lectures]</b> |

**Reference books:**

- 1] Medical instrumentation: Application and design by J.G.Webster John Wiley and sons 2003
- 2] Handbook of biomedical instrumentation by R.S.Khandpur Tata McGraw Hill
- 3] Bioinstrumentation by J.G.Webster John Wiley and sons 2004

## **List of experiments: T.Y.B.Sc EEM**

**Note: Three experiments from each group or other equivalent experiments should be conducted**

### **Group 1**

- 1] Fault diagnosis in op-amp inverting and non-inverting amplifiers.
- 2] Troubleshooting of rectifier circuits.
- 3] Troubleshooting series regulator circuit.
- 4] Testing passive components
- 5] Fault finding in SMPS

### **Group 2**

- 1] Temperature measurement using thermocouple
- 2] Study of digital LCR meter
- 3] Study of storage oscilloscope
- 4] Instrumentation amplifier using 1 and 2 op-amps
- 5] Phase measurement

### **Group 3**

- 1] Interview a successful entrepreneur
- 2] Market survey
- 3] Identification of business opportunities
- 4] Preparation of a project report for a small business
- 5] Visit a small business

### **Group 4**

- 1] ECG calibrator
- 2] ECG amplifier
- 3] Electronic stethoscope
- 4] Measurement of blood sugar level
- 5] Study of EEG/ECG

## **TYBSc**

### **Annexure-II**

**Structure/ Pattern of Syllabus must be as follows:**

- 1) Title of the Course: **Computer Hardware and Network Administration (Vocational)**
- 2) Introduction: **Pattern Semester**
- 3) Eligibility: **Should have offered Computer Hardware and Network Administration (Vocational) at S.Y.B.Sc. and passed as per Pune University Rules**
- 4) Examination
  - A) Pattern of examination: **Semester**
    - i) **40:10** (University Semester examination of 40 Marks & Internal assessment of 10 Marks) Details as per the syllabus
    - ii) Pattern of the question paper: **As per the specimen given**
  - B) Standard of Passing : **As per Pune University norms**
  - C) ATKT Rules : **As per Pune University norms**
  - D) Award of Class : **As per Pune University norms**
  - E) External Students : **Not permitted**
  - F) Setting of Question paper/ Pattern of Question paper: **As per Pune University norms**
  - G) Verification of Revaluation : **As per Pune University norms**
- 5) Structure of the Course :
  - i) Optional
  - ii) Medium of instruction : **English**
- 6) Equivalence subject/ papers & Transitory Provision: **Computer Hardware Maintenance (Vocational)**
- 7) University terms : **As per Pune University Norms.**
- 8) Subject wise Detail Syllabus : **Attached**
- 9) Recommended books : **Mentioned in syllabus**

## **T.Y.B.Sc Vocational Computer Hardware & Network Administration**

### **Paper-V: Computer/IT Service Management & Entrepreneurship Development Semester -III: Computer Service Management**

**Objective:** This course shall build a platform for students to get prepared to either start their own enterprise, Seek Jobs in emerging BPO/IT Support Sector. It imparts Functional IT knowledge to the students.

#### **Unit 1: Information Security Management**

- Information System Organizational Structure
- Roles and Responsibilities
- Segregation of Duties and Control Matrix.
- Access Controls
- Social Engineering Concepts
- Study of Different ISO Standards & COBIT Frame Work
- IS Audit Functions

#### **Unit2: IT Service Delivery & Support**

- Hardware & Software Acquisition
  - o Study of Requirements
  - o Cost Based Analysis & Planning
  - o Request for Proposal (RFP)/Invitation to Tender (ITT)
  - o Testing & Implementation
- Implementation of Support / Help Desk
  - o Define the Help Desk Functionality
  - o Help Desk Resource Allocation
  - o Problem Escalation

#### **Unit3: Computer /Information Systems Maintenance Practices**

- Service Level Agreement
- Incidence /Problem Management
- Change Management Process
- Hardware Monitoring Procedures
- Software Licensing Issues

#### **Reference Books and Websites:**

1. <http://www.itil.org>
2. <http://www.isaca.org/cisa>

## **T.Y.B.Sc Vocational Computer Hardware & Network Administration Paper V: Semester IV: Entrepreneurship Development**

Entrepreneurship is a tremendous force that can have a big impact in growth, recovery, and societal progress by fuelling innovation, employment generation and social empowerment.

Through entrepreneurship education, young people, including those with disabilities, learn organizational skills, including time management, leadership development and interpersonal skills, all of which are highly transferable skills sought by employers.

**The syllabus for T.Y.B.Sc., Vocational students** thus is aimed at creating an awareness amongst the students about the benefits of becoming an entrepreneur and at the same time equip them with information about a good and a viable opportunity; making a business plan by assessing the techno-economic feasibility, seeking financial assistance, variety of procedures and formalities for setting up an enterprise, taking decisions in such a manner so that entrepreneurship becomes a life time career goal.

### **❖ OBJECTIVES:**

- To create awareness about self-employment and motivate the students to go for self-employment.
- To study entrepreneurship concepts and their applicability.
- To expose the students to the practical world of business.

1 **INTRODUCTION:** Concept of entrepreneurship, Historical background, need and scope of entrepreneurship in modern society, Entrepreneurial behavior, attributes and skills.

Key elements of entrepreneur, Entrepreneurial process, Entrepreneurial culture, Environment of Entrepreneurship, Socio economic origins of Entrepreneurship, Barriers of Entrepreneurship and means to reduce them, types of Entrepreneurs, Characteristics of Entrepreneur. 8 Lectures

2 **BUSINESS ORGANIZATIONS:** Forms of business organizations such as sole proprietorship, partnership, Joint Stock Company, cooperative organization etc. Relative merits and demerits of each form, Meaning and definition, types of Small Scale Industry. 3 Lectures

Sources of Information: Where to go for what?

- a. District Industry Centre (DIC)
- b. Maharashtra Industrial Development Corporation (MIDC)
- c. Maharashtra State Small Industries Development Corporation (MSSI DC)
- d. Small Industries Services Institute (SISI)

- e. National Institutes of Entrepreneurship and Small business Development (NIESBUD)
- f. National Entrepreneurship Development Board(12) (NEDB)
- g. Entrepreneurship Development Institute of India
- h. Commercial and Co-operative Banks
- i. State Industrial Development Bank (SIDBI)
- j. Maharashtra State Electricity Board
- k. Pollution Control Boar 3 Lectures

Legal Aspects of Small Business: Elementary knowledge of Income Tax, Sales Tax, VAT, Service Tax, Patent Rules, Excise Rules, Factory Act and Payment of Wages Act, Procedures for registration of SSI. 4 Lectures

- 3 ENTREPRENEURSHIP DEVELOPMENT:** Identification of opportunities for entrepreneurship, ideas to start new business, criteria for selection of new product or service, Market Survey as a tool, Technical and economic feasibility of a project, Role of consultancy organizations. 8 Lectures

Project formulation and project report 4 Lectures

- 4 FINANCIAL ASPECTS:** Sources of finance, Role of various funding agencies , government and commercial Role of various funding corporations and funding institutes such as chamber of commerce, MSFC, MCED, NSSIDC, Banks, special institutes such as IDBI,MIDC,SICOM etc, Working capital, cash flow, fund flow, preparations of basic financial statements, costing and pricing, breakeven point, SWOT analysis. 6 Lectures

- 5 MARKETING ASPECTS:** Meaning, scope and importance, Marketing strategy, Market segmentation, marketing channels. Marketing mix and its effect. 6 Lectures

- 6 HUMAN RESOURCE ASPECTS :** Concept and scope in modern industry, Different modes of employment, Placement of proper person for a job, Interpersonal relations and communication skills, training of personnel, guidance for stress management, soft skills. 6 Lectures

## Practicals/ Assignments

The practicals to be conducted are with an objective to transform the knowledge gained by the students in their classes to real life experience. These practicals will be based on the vocational subject and the Principal subject a student has offered.

Internal assessment should be carried out on the practicals/ assignments done by a student

| Sr. No. | Title of Practical               | Objective   | Mode                        |
|---------|----------------------------------|---|-----------------------------|
| 1       | Role of District industry centre | Understand the working of District industry centre  | Visit and report submission |
| 2       | Visit to a small scale Industry  | To understand plant location and plant layout and to submit a report  | Visit and report submission |
| 3       | Visit to a service unit          | To study the legal aspects of a service unit and to submit a report   | Visit and report submission |
| 4       | Entrepreneurial ideas            | Describe in brief two entrepreneurial ideas of yours  | Home assignment             |
| 5       | Project formulation              | Prepare a preliminary document about an enterprise you want to start. It should contain executive summary, customer/target market analysis and strategy       | Home Assignment             |
| 6       | Review business plans            | Submit a review of a business plan of other team. It should include critical and constructive comments  | Home assignment             |
| 7       | Drafting a business plan         | It should contain executive summary, customer/target market analysis and strategy, marketing and operations, risks, management team and financial projections | Power Point Presentation    |

## **RECOMMENDED BOOKS:**

### **Text book**

- 7 Dynamics of Entrepreneurial Development and Management – Shri. Vasant Desai.

### **Reference books**

- 8 Environment & Entrepreneur: Mr.B.C.Tondon
- 9 Business Environment: Dr.G.V.Kayande Patil
- 10 Udyogvardhini –MCED
- 11 Basic Communication Skills: By P. Kiranmai Dutt & Geetha Rajeevan, 2000
- 12 Fundamentals of Office Management: By J.P. Mahajan , Office Management – By S. P. Arrora, latest edition
- 13 A guide to small Scale Entrepreneurs, Director of Industries, Govt. of Tamil Nadu Chennai, latest edition
- 14 Entrepreneurship and small Business Management- Dr. C. B. Gupta & Dr. Khanna
- 15 Project Management- K. Nagarajan
- 16 100 project Reports Yashwantrao Chavan Open University (YCMOU) Edition
- 17 .Entrepreneurship Ideas in Action Cynthia L. Greene (YCMOU) Edition

## **T.Y.B.Sc Vocational Computer Hardware & Network Administration**

### **Paper-VI: Network Concepts Semester -III: Network Concepts - I**

**Objective:** The Course shall introduce the Networking Concepts and its use in the Information Technology industry. It also elaborates on the protection and security aspects.

#### **Unit1: Networking Fundamentals**

- Basics of Networks.
- Network Topologies
  - o BUS
  - o STAR
  - o MESH
  - o Hybrid
- OSI Reference Model
- Protocol Basics
  - o TCP/IP
  - o NetBeui
  - o VPN
  - o SNMP
  - o FTP/SMTP/POP/HTTP
  - o SSL/TSL
- Arcnet, Ethernet, MAN,SAN, NAS, Virtual LANs, ATM's
- Networking Components (Hardware)
  - o Cables & Connectors (Coaxial, UTP/STP, Fiber Optics, Cat(x) Cables)

#### **Unit 2: Classification of Servers**

- Concept of Client Server Technology
- Application Server
- File / Print Server
- Mail / Web Servers
- Data Base Server (Oracle /SQL)

#### **Unit3: Server Operating Systems**

- Introduction to Network Operating Systems
- Functions of Network Operating System
- Microsoft Network Operating Systems
- Linux Operating Systems
- DNS,WINS, DHCP, Concepts
- User and Group Management Concepts

## **T.Y.B.Sc Vocational Computer Hardware & Network Administration**

- **Paper-VI: Network Concepts**
- **Semester -IV: Network Concepts - II**

### **Unit1: Network Threats & Protection**

- Types of Internet Attacks:
  - o Passive Attacks:
    - Network Analysis
    - Eavesdropping
    - Traffic Analysis
  - o Active Attacks
    - Brute-Force Attacks
    - Masquerading
    - Phishing
    - Denial of Service Attacks
    - Email Bombing & Spamming
    - Email Spoofing
- Network Data Protection Measures
  - o Physical Access
  - o Logical Access
  - o Firewalls/Antivirus/IDS/IPS
  - o Data Encryption –Cryptographic Methods.
  - o Concepts of Cold Sites, Warm Sites, Hot sites, Mirroring

### **Unit 2: Network Configuration Management & Monitoring**

- Network Planning
  - o Environmental Study & Site Requirement
  - o Resource Planning: Hardware, Software & Personnel
- Configuration of Peer to Peer Network using Windows XP
  - o Installation of Windows XP Operating System
  - o Configuring Ethernet Driver
  - o Configuring TCP/IP Protocol
  - o Configuring File Sharing & Printing Protocol
  - o Sharing a Drive on Network
  - o Sharing a printer on Network
  - o Assign Access Right Definitions while Sharing
- Configuration of Broad Band/Dial Up Internet Connection on the PC
  - o Installation of Router /Modem
  - o Configuration of Gateways, TCP/IP/DNS settings
  - o Use of Proxy Server for Internet Sharing.

### **Unit3: Advanced Networking Concepts**

- Basics of VOIP
- Basics of VPN
  - o Remote Access VPN
  - o Intranet Access VPN
  - o Extranet Access VPN
  - o Basics of VLANS

## **T.Y.B.Sc Vocational Computer Hardware & Network Administration Paper-III: Practical Course**

**Objective:** Give hands on training to the students and make them acquainted with various Real time Applications implemented currently in the Industry.

### **List of Practicals:**

1. Installation of Operating System – WinXP/ Win2003 / Linux / WinVista
2. Configuration of Antivirus Software as a Fire Wall. (Configure ACL)
3. Study of Brute Force Attack Method using Free Tools.
4. Using PGP Software – Demonstrate Cryptography
5. Configure a Peer to Peer Network using WinXP
6. Install a Modem/Router and configure Internet Settings
7. Install analog Proxy and Demonstrate Internet Sharing
8. Prepare a Straight & Cross Patch Chord using Cat5 Cable & RJ45 jacks.
9. Install a Email Server and Demonstrate its Working
10. Using SIW software find out the Installed Applications on PC
11. Prepare a RPF/ITT proposal for Hardware & Software acquisition  
Assignments based on Entrepreneurship Development

### **Books for References: (All Latest Versions)**

1. Cisco Certified Network Associate – BPB Publication
2. Upgrading and Trouble Shooting of Networks by Zackers
3. Linux Bible (Any Publication)
4. Mastering Windows 2003 Server by Minasi
5. Computer Networks by Tanen Baum
6. Network Hand Book by Taylor
7. Computer Network Protocols, Stds, & Interfaces
8. Firewalls – A Complete Guide by Black
9. Firewall & Internet Security by Cheswick Bellovin
10. Network + Certification by Microsoft Press
11. Upgrading & Repairing PC's by Scott Muller