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UNIVERSITY BAREILLY

BUILDING VIBRANT PERSONALITIES



SYLLABUS OF COURSE

(SAMPLE)

NAAC CRITERIA 1.1.3



BCM 502: Financial Management -	
Teaching Scheme Lectures: 4 hrs/Week Tutorials: 1 hr/Week Credits: 5	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Course Objectives:

1. To familiarize the students with the principles and practices of financial Management

Detailed Syllabus

Unit-1

Scope and objective, Time value of money, Risk and return (including Capital Asset Pricing Model), Valuation of securities – Bonds and Equities.

Unit-2

The Capital Budgeting Process, Cash flow Estimation, Payback Period Method, Accounting Rate Of Return, Net Present Value (NPV) Net Terminal Value, Internal Rate of Return (IRR), Profitability Index, Capital budgeting under Risk – Certainty Equivalent Approach and Risk- Adjusted Discount Rate.

Unit-3

Cost of Capital and Financing Decision: Sources of long-term financing Estimation of components of cost of capital. Methods for Calculating cost of equity capital, Cost of Retained Earnings, Cost of Debt and Cost of Preference Capital, Weighted Average cost of capital (WACC) and Marginal cost of capital. Capital structure – Theories of Capital

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Structure (Net Income, Net Operating Income, MM Hypothesis, Traditional Approach). Operating and financial leverage. Determinants of capital structure.

Unit-4

Dividend Decision – Theories for Relevance and irrelevance of dividend decision for corporate valuation. Cash and stock dividends. Dividend policies in practice.

Unit-5

Working Capital Decisions: Concepts of working capital, the risk-return trade off, sources of short-term finance, working capital estimation, cash management, receivables management, inventory management and payables management.

Text and Reference Books-

1. Horne, J.C. Van. Financial management and policy. 10th ed. New Delhi Prentice Hall of India.
2. Horne, J.C. Van. Fundamentals of Financial Management. 9th ed. New Delhi Prentice Hall of India.
3. Levy H. and M. Sarnat . Principles of Financial Management. Engelwood Cliffs, Prentice hall
4. Johnson, R.W. Financial Management. Boston Allyn and Bacon.
5. Joy, O.M. Introduction to Financial Management. Homewood: Irwin.
6. Khan and Jain. Financial Management text and problems. 2nd ed. Tata McGraw Hill New Delhi.
7. Pandey, I.M. Financial Management. Vikas Publications.
8. Bhalla, V.K. Financial Management & Policy. Anmol Publications, Delhi.
9. Chandra, P. Financial Management- Theory and Practice. (Tata McGraw Hill).
10. Rustagi, R.P. Fundamentals of Financial Management. Galgotia Publishing House, Delhi)
11. Singh, J.K. Financial Management- text and Problems. 2nd Ed. Dhanpat Rai and Company, Delhi. 12. Sharma, G.L. and Y. P. Singh. ed. Contemporary Issues in Finance and Taxation. Academic Foundation Delhi.
13. Singh, Surender and Kaur Rajeev. Fundamentals of Financial Management. Book Bank International.

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Course Outcomes:

2. To recognize the importance of Financial management in area of Fund Management (procurement of funds and its effective utilisation) and decision making such as Dividend decisions.
3. To understand the different tools and techniques used while procuring (e.g. Cost of capital, Leverage analysis) and utilising funds (Capital expenditure decisions, management of Working capital).
4. To apply the different theories and techniques regarding funds acquisition and its effective utilization.
5. To analyse the impact of different techniques and theories applied in financial management.
6. To Evaluate different theories and techniques in practical cases.
7. To Create some techniques, theories and models which are useful in managing funds.

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BCM511: AUDITING

Teaching Scheme
Lectures: 4hrs/Week
Tutorials: 1 hr/Week

Credits: 5

Examination Scheme
Class Test -12Marks
Teachers Assessment - 6Marks
Attendance – 12 Marks
End Semester Exam – 70 marks

Course Objectives:

1. To provide knowledge of auditing principles, procedures and techniques in accordance with current legal requirements and professional standards.

Detailed Syllabus**Unit-1**

Introduction: Meaning, Objects, Basic Principles and Techniques. Classification of Audit.
Audit Planning. Internal Control – Internal Check and Internal Audit

Unit-2

Audit Procedure – Vouching and verification of Assets & Liabilities..

Unit-3

Audit of Limited Companies:-Company Auditor: (i) Qualifications and disqualifications, Appointment, Removal, Remuneration, Rights, Duties and Liabilities.

(ii) Audit Committee

(iii) Auditor's Report: Contents and Types. Auditor's certificates

(iv) Emphasis on Companies (Auditor's Report) order, 2003 (CARO – 2003)

(v) Liabilities of Statutory Auditors in case of non-compliance.

Unit-4

Special Areas of Audit: Special features of Cost audit. Tax audit and Management audit.

Recent Trends in Auditing: Basic considerations of audit in EDP Environment. Relevant Auditing and Assurance Standards (AASs). Relevant Case Studies/Problems.

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BFM 501: Technical Analysis	
Teaching Scheme Lectures: Tutorials: Credits: 4	Examination Scheme Class Test - 12Marks Teachers Assessment - 6Marks Attendance - 12 Marks End Semester Exam - 70 marks

Course Objectives:

1. To understand what is Technical Analysis.
2. Its historical development.
3. Dow theory and its main tenets.
4. How technical analysis is useful.
5. Basic theories of Technical Analysis
6. Assumptions of Technical analysis
7. Basis of Technical Analysis
8. Steps to Technical Analysis
9. Other important elements of Technical Analysis
10. Strengths and weaknesses of Technical Analysis
11. Support and Resistance Levels
12. Supply and Demand
13. Traders' remorse
14. How support becomes Resistance
15. How Resistance becomes support
16. Some important points on Support and Resistance
17. Trend Indicators
18. Understand charts.
19. Basic patterns and their significance
20. Various important continuation patterns and the significance of each.
21. Various important reversal patterns and the significance of each.
22. Trends and their characteristics, uptrend, downtrend and side trend.
23. Trend lines and what do they show.
24. Channels, Channel lines, Validation, Angles, Internal Trend lines.
25. Understand the importance of volume?
26. Why is it a confirmatory tool?
27. On Balance Volume charts and their uses.
28. Understand what are moving averages (MAs) and their types?
29. Understand Elliott wave concept and Fibonacci retracement
30. Understand the difference between Fundamental and Technical Analysis

Detailed Syllabus

Unit-1

Introduction to Technical Analysis

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Unit-2 Theories, Techniques & Benefits
Unit-3 Important Aspects of Technical Analysis
Unit-4 Charts & Their Patterns
Unit-5 Technical Indicators
Unit-6 Introduction & Basic Assumptions
Unit-7 Fundamental Analysis vs. Technical Analysis
Unit-8 Trend Lines – Support and Resistance
Unit-9 Importance of Volume
Unit-10 Charts and Chart Types , Chart Patterns

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Unit-11 Moving Averages , Indicators & Oscillators
Unit-12 Conclusion
Unit-13 Technical Analysis Step by Step
Unit-14 Important Concepts – Explanations , Case Studies
Text and Reference Books-

Course Outcomes:

1. Enabling students to understand the psychology behind the financial markets.
2. Understand the basic principles of Technical Analysis
3. Being able to perform the analysis and give recommendations independently.
4. Gain a thorough understanding about the various theories on Technical Analysis including the Dow Theory.
5. Understand various charting methods, such as , line graphs, bar graphs, candle stick charts etc.
6. Understand how chart patterns form and how do they work.
7. Understanding various indicators
8. Understanding how and when to use different indicators.
9. Understand the difference between the leading and lagging indicators.
10. Understand when to use momentum oscillators or when to use trend indicators.
11. Gain a thorough understanding about volatility.
12. Enable them to calculate and make use of volatility using standard deviations.
13. Understand the Elliott wave theory and its applications.
14. Get introduced to other theories like Gann method.
15. Understand the importance of volumes and how to forecast on this basis.
16. Understand the importance of Open interest and how to make use of it.

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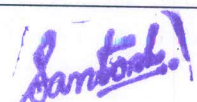
BFM 502: Foreign Exchange Markets	
Teaching Scheme Lectures: Tutorials: Credits: 4	Examination Scheme Class Test - 12Marks Teachers Assessment - 6Marks Attendance - 12 Marks End Semester Exam - 70 marks

Course Objectives:

1. To understand the meaning and concept of foreign exchange and its importance
2. To learn about regulatory norms, FEDAI and business infrastructure of the authorized dealers, like, Banks etc.
3. To understand SWIFT and various types of forex trades
4. To gain knowledge about different types of exchange rates and their calculations
5. To understand factors affecting foreign exchange rates
6. To gain knowledge about forex derivatives and hedging forex risk
7. To gain knowledge about foreign exchange risk management
8. To have an insight of international market, LIBOR and raising funds in international market
9. To understand bond market and types of bond in different currencies

Detailed Syllabus

Unit-1 What is Foreign Exchange, its need and Administration in India
Unit-2 FEDAI, Forex Business Infrastructure in Banks
Unit-3 SWIFT, Different types of forex trades
Unit-4 Different Types of Exchange Rates
Unit-5 Foreign Exchange Arithmetic
Unit-6 Determination of Forex Rates- the factors that affect them
Unit-7 Foreign Exchange Derivatives
Unit-8 Hedging foreign exchange risk
Unit-9 Foreign Exchange Risk Management , Numerical on Forex


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Unit-10 Introduction to International Markets, LIBOR
Unit-11 Raising Funds in the International Markets,
Unit-12 Introduction to Bond Markets
Unit-13 Types of Bonds in Different Currencies
Unit-14 Basic Types of Foreign Currency Derivatives
Text and Reference Books-
1. Foreign exchange practice, concepts and control by <u>C. Jeevanandam</u> 2. Foreign exchange operations by David E De Rosa

Course Outcomes:

1. Enabling students to be conversant with the concepts of foreign exchange and its importance
2. Enabling the student to understand regulatory guidelines, FEDAI and authorized dealers in foreign exchange, like Banks
3. Enabling the student to learn about SWIFT
4. Understanding various types of foreign exchange trades
5. Enabling the student to understand various types of foreign exchange rates and their calculations
6. Understanding the factors affecting foreign exchange rates.
7. Enabling the students to know about foreign exchange derivatives and hedging foreign exchange risk
8. Enabling the students to learn international market, LIBOR and fund raising in international market
9. Enabling students to understand bond market and types of bond in different currencies


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BFM 503: Commodities Markets	
Teaching Scheme Lectures: Tutorials: Credits: 4	Examination Scheme Class Test - 12Marks Teachers Assessment - 6Marks Attendance - 12 Marks End Semester Exam - 70 marks

Course Objectives:

1. Get introduced to the Commodity Futures
2. Understand the contract specifications
3. Hedging using commodity derivatives
4. Understand the clearing and settlement process
5. Learn about the prominent commodity exchanges globally.
6. Understand the tools available for research in commodities
7. Understand various commodity groups.
8. Get to know the trading softwares for commodities
9. Know how risk management is done in commodity markets

Detailed Syllabus

Commodity Futures Trading – History
Introduction to Commodity
Unit-4 Timing & Return
Unit-5 Product Specification
Unit-6 Commodity Hedging
Unit-7 Clearing & Settlement

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Unit-8 Risk Management
Unit-9 Market Watch
Unit-10 Trading Software
Unit-11 Commodity Research
Unit-12 Do's and Don'ts for dealing in Commodity Futures
Unit-13
Unit-14
Text and Reference Books-

Course Outcomes:

1. Learnt about the history and evolution of the commodity markets globally.
2. Got introduced to the Indian Commodity markets.
3. Learnt about various commodity derivatives traded on Indian commodity exchanges.
4. Learnt about the various commodity exchanges in India.
5. Understood about various tools used in researching commodities.
6. Understood how hedging is done in the commodity spot as well as futures markets.
7. Understood the different types of risks involved and how to mitigate them.
8. Learnt about the contract specifications in different commodities.
9. Learnt how the clearing and settlement takes place in this market.

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BCM 303 : MACRO ECONOMICS

Teaching Scheme
Lectures: 4 hrs/Week
Tutorials: 1 hr/Week

Credits: 5

Examination Scheme
Class Test -12Marks
Teachers Assessment - 6Marks
Attendance – 12 Marks
End Semester Exam – 70 marks

Course Objectives:

1. To provide knowledge of basic concepts of the macro economics..
2. To understand the government policies
3. To understand the components of aggregate demand & supply
4. To analyze the concept of Inflation & unemployment
5. To evaluate the importance of open economy

Detailed Syllabus**Unit-1**

Introduction – concepts and variables of macroeconomics, income, expenditure and the circular flow, components of expenditure. Static macro economic analysis short and the long run – determination of supply, determination of demand, and conditions of equilibrium.

Unit-2

Economy in the short run – IS–LM framework, fiscal and monetary policy, determination of aggregate demand, shifts in aggregate demand, aggregate supply in the short and long run, and aggregate demand- aggregate supply analysis

Unit-3

Inflation, causes of rising and falling inflation, inflation and interest rates, social costs of inflation. Unemployment – natural rate of unemployment, frictional and wait employment. Labour market and its interaction with production system. Phillips curve, the trade-off between inflation and unemployment, sacrifice ratio, role of expectations adaptive and rational.

Unit-4

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Introduction to Research: Need for research, Need for design of Experiments, Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph

Designing the methodology: Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Unit-IV

8 Hours

Blocking and confounding system for Two-level factorials

Regression modeling: Hypothesis testing in Simple and Multiple regression models

Introduction to Practical components of Industrial and Clinical Trials Problems:

Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Unit-V

7Hours

Design and Analysis of experiments:

Factorial Design: Definition, 2^2 , 2^3 design. Advantage of factorial design

Response Surface methodology: Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton, publisher Marcel Dekker Inc. NewYork.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
3. Design and Analysis of Experiments –PHI Learning Private Limited, R. Pannerselvam,
4. Design and Analysis of Experiments – Wiley Students Edition, Douglas and C. Montgomery

BP 802T SOCIAL AND PREVENTIVE PHARMACY

Hours: 45

Scope:

The purpose of this course is to introduce to students a number of health issues and their challenges. This course also introduced a number of national health programmes. The roles of the pharmacist in these contexts are also discussed.

Objectives:

After the successful completion of this course, the student shall be able to:

- Acquire high consciousness/realization of current issues related to health and pharmaceutical problems within the country and worldwide.
- Have a critical way of thinking based on current healthcare development.
- Evaluate alternative ways of solving problems related to health and pharmaceutical issues

Course content:

Unit I:

10 Hours

Concept of health and disease: Definition, concepts and evaluation of public health. Understanding the concept of prevention and control of disease, social causes of diseases and social problems of the sick.

Social and health education: Food in relation to nutrition and health, Balanced diet, Nutritional deficiencies, Vitamin deficiencies, Malnutrition and its prevention.

Sociology and health: Socio cultural factors related to health and disease, Impact of urbanization on health and disease, Poverty and health

Hygiene and health: personal hygiene and health care; avoidable habits

Unit II:

10 Hours

Preventive medicine: General principles of prevention and control of diseases such as cholera, SARS, Ebola virus, influenza, acute respiratory infections, malaria, chicken guinea, dengue, lymphatic filariasis, pneumonia, hypertension, diabetes mellitus, cancer, drug addiction-drug substance abuse

Unit III: 10 Hours National health programs, its objectives, functioning and

outcome of the following: HIV AND AIDS control programme, TB, Integrated disease surveillance program

(IDSP), National leprosy control programme, National mental health program, National

programme for prevention and control of deafness, Universal immunization programme, National programme for control of blindness, Pulse polio programme.

Unit IV:

08 Hours

National health intervention programme for mother and child, National family welfare programme, National tobacco control programme, National Malaria Prevention Program, National programme for the health care for the elderly, Social health programme; role of WHO in Indian national program

Unit V:

07 Hours

Community services in rural, urban and school health: Functions of PHC, Improvement in rural sanitation, national urban health mission, Health promotion and education in school.

Recommended Books (Latest edition):

1. Short Textbook of Preventive and Social Medicine, Prabhakara GN, 2nd Edition, 2010, ISBN: 9789380704104, JAYPEE Publications
2. Textbook of Preventive and Social Medicine (Mahajan and Gupta), Edited by Roy Rabindra Nath, Saha Indranil, 4th Edition, 2013, ISBN: 9789350901878, JAYPEE Publications
3. Review of Preventive and Social Medicine (Including Biostatistics), Jain Vivek, 6th Edition, 2014, ISBN: 9789351522331, JAYPEE Publications
4. Essentials of Community Medicine—A Practical Approach, Hiremath Lalita D, Hiremath Dhananjaya A, 2nd Edition, 2012, ISBN: 9789350250440, JAYPEE Publications
5. Park Textbook of Preventive and Social Medicine, K Park, 21st Edition, 2011, ISBN-14: 9788190128285, BANARSIDAS BHANOT PUBLISHERS.
6. Community Pharmacy Practice, Ramesh Adepu, BSP publishers, Hyderabad

Recommended Journals:

1. Research in Social and Administrative Pharmacy, Elsevier, Ireland

BP803ET. PHARMA MARKETING MANAGEMENT (Theory)

45 Hours

Scope:

The pharmaceutical industry not only needs highly qualified researchers, chemists and, technical people, but also requires skilled managers who can take the industry forward by managing and taking the complex decisions which are imperative for the growth of the industry. The Knowledge and Know-how of marketing management groom the people for taking a challenging role in Sales and Product management.

Course Objective: The course aims to provide an understanding of marketing concepts and techniques and their applications in the pharmaceutical industry.

Unit I

10 Hours

Marketing:

Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.

Pharmaceutical market:

Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation & targeting. Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist. Analyzing the Market; Role of market research.

Unit II

10 Hours

Product decision:

Classification, product line and product mix decisions, product life cycle, product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

Unit III

10 Hours

Promotion:

Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC Products.

Unit IV 10 Hours Pharmaceutical marketing channels:

Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

Professional sales representative (PSR):

Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

Unit V

10 Hours

Pricing:

Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing:

Vertical & Horizontal Marketing; Rural Marketing; Consumerism; Industrial Marketing; Global Marketing.

Recommended Books: (Latest Editions)

1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
2. Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MC GrawHill, New Delhi.
3. Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill
4. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India
5. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
6. Ramaswamy, U.S & Nanakamari, S: Marketing Managemnt: Global Perspective, Indian Context, Macmillan India, New Delhi.
7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi
8. Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) Excel Publications.

BP804 ET: PHARMACEUTICAL REGULATORY SCIENCE (Theory)

45Hours

Scope: This course is designed to impart the fundamental knowledge on the regulatory requirements for approval of new drugs, and drug products in regulated markets of India & other countries like US, EU, Japan, Australia, UK etc. It prepares the students to learn in detail on the regulatory requirements, documentation requirements, and registration procedures for marketing the drug products.

Objectives: Upon completion of the subject student shall be able to;

1. Know about the process of drug discovery and development
2. Know the regulatory authorities and agencies governing the manufacture and sale of pharmaceuticals
3. Know the regulatory approval process and their registration in Indian and international markets

Course content:

Unit I

10Hours

New Drug Discovery and development

Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

Unit II

10Hours

Regulatory Approval Process

Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Changes to an approved NDA / ANDA.

Regulatory authorities and agencies

Overview of regulatory authorities of India, United States, European Union, Australia, Japan, Canada (Organization structure and types of applications)

Unit III

10Hours

Registration of Indian drug product in overseas market

Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical

Document (eCTD), ASEAN Common Technical Document (ACTD) research.

Unit IV

08Hours

Clinical trials

Developing clinical trial protocols, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

Unit V

07Hours

Regulatory Concepts

Basic terminology, guidance, guidelines, regulations, Laws and Acts, Orange book, Federal Register, Code of Federal Regulatory, Purple book

Recommended books (Latest edition):

1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan.
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P. Martin, Drugs and the Pharmaceutical Sciences, Vol.185. Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard A Guarino, MD, 5th edition, Drugs and the Pharmaceutical Sciences, Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley & Sons. Inc.
5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, and biologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and Isader Kaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory Compliance By Fay A. Rozovsky and Rodney K. Adams
8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin and Frederick P. Ognibene
9. Drugs: From Discovery to Approval, Second Edition By Rick Ng

BP 805T: PHARMACOVIGILANCE (Theory)

45 hours

Scope: This paper will provide an opportunity for the student to learn about development of pharmacovigilance as a science, basic terminologies used in pharmacovigilance, global scenario of Pharmacovigilance, train students on establishing pharmacovigilance programme in an organization, various methods that can be used to generate safety data and signal detection. This paper also develops the skills of classifying drugs, diseases and adverse drug reactions.

Objectives:

At completion of this paper it is expected that students will be able to (know, do, and appreciate):

1. Why drug safety monitoring is important?
2. History and development of pharmacovigilance
3. National and international scenario of pharmacovigilance
4. Dictionaries, coding and terminologies used in pharmacovigilance
5. Detection of new adverse drug reactions and their assessment
6. International standards for classification of diseases and drugs
7. Adverse drug reaction reporting systems and communication in pharmacovigilance
8. Methods to generate safety data during pre clinical, clinical and post approval phases of drugs' life cycle
9. Drug safety evaluation in paediatrics, geriatrics, pregnancy and lactation
10. Pharmacovigilance Program of India (PvPI) requirement for ADR reporting in India
11. ICH guidelines for ICSR, PSUR, expedited reporting, pharmacovigilance planning
12. CIOMS requirements for ADR reporting
13. Writing case narratives of adverse events and their quality.

Course Content

Unit I

10 Hours

Introduction to Pharmacovigilance

- History and development of Pharmacovigilance
- Importance of safety monitoring of Medicine
- WHO international drug monitoring programme
- Pharmacovigilance Program of India(PvPI)

Introduction to adverse drug reactions

- Definitions and classification of ADRs
- Detection and reporting
- Methods in Causality assessment
- Severity and seriousness assessment
- Predictability and preventability assessment
- Management of adverse drug reactions

Basic terminologies used in pharmacovigilance

- Terminologies of adverse medication related events
- Regulatory terminologies

Unit II

10 hours

Drug and disease classification

- Anatomical, therapeutic and chemical classification of drugs
- International classification of diseases
- Daily defined doses
- International Non proprietary Names for drugs

Drug dictionaries and coding in pharmacovigilance

- WHO adverse reaction terminologies
- MedDRA and Standardised MedDRA queries
- WHO drug dictionary
- Eudravigilance medicinal product dictionary

Information resources in pharmacovigilance

- Basic drug information resources
- Specialised resources for ADRs

Establishing pharmacovigilance programme

- Establishing in a hospital
- Establishment & operation of drug safety department in industry
- Contract Research Organisations (CROs)
- Establishing a national programme

Unit III

10 Hours

Vaccine safety surveillance

- Vaccine Pharmacovigilance
- Vaccination failure
- Adverse events following immunization

Pharmacovigilance methods

- Passive surveillance – Spontaneous reports and case series
- Stimulated reporting
- Active surveillance – Sentinel sites, drug event monitoring and registries
- Comparative observational studies – Cross sectional study, case control study and cohort study
- Targeted clinical investigations

Communication in pharmacovigilance

- Effective communication in Pharmacovigilance
- Communication in Drug Safety Crisis management
- Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

Unit IV

8 Hours

Safety data generation

- Pre clinical phase
- Clinical phase
- Post approval phase (PMS)

ICH Guidelines for Pharmacovigilance

- Organization and objectives of ICH
- Expedited reporting
- Individual case safety reports
- Periodic safety update reports
- Post approval expedited reporting
- Pharmacovigilance planning
- Good clinical practice in pharmacovigilance studies

Unit V

7 hours

- Genetics related ADR with example focusing PK parameters.

Drug safety evaluation in special population


- Paediatrics
- Pregnancy and lactation
- Geriatrics
- CIOMS Working Groups
- CIOMS Form
- D&C Act and Schedule Y
- Differences in Indian and global pharmacovigilance requirements

Recommended Books (Latest edition):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance: Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller, Wiley Publishers.
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert, Jones & Bartlett Publishers.
7. Textbook of Pharmacoepidemiology edited by Brian L. Strom, Stephen E Kimmel, Sean Hennessy, Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills: G. Parthasarathi, Karin Nyfort Hansen, Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal

11. Text book of Pharmacovigilance: concept and practice by GP Mohanta and PK Manna

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12. <http://www.who.unc.org/DynPage.aspx?id=105825&mn1=7347&mn2=7259&mn3=7297>
13. <http://www.ich.org/>
14. <http://www.cioms.ch/>
15. <http://cdsco.nic.in/>
16. http://www.who.int/vaccine_safety/en/
17. http://www.ipc.gov.in/PvPI/pv_home.html

**BP 806 ET. QUALITY CONTROL AND STANDARDIZATION OF HERBALS
(Theory)**

Scope: In this subject the student learns about the various methods and guidelines for evaluation and standardization of herbs and herbal drugs. The subject also provides an opportunity for the student to learn cGMP, GAP and GLP in traditional system of medicines.

Objectives: Upon completion of the subject student shall be able to;

1. know WHO guidelines for quality control of herbal drugs
2. know Quality assurance in herbal drug industry
3. know the regulatory approval process and their registration in Indian and international markets
4. appreciate EU and ICH guidelines for quality control of herbal drugs

Unit I

10 hours

Basic tests for drugs – Pharmaceutical substances, Medicinal plants materials and dosage forms

WHO guidelines for quality control of herbal drugs.

Evaluation of commercial crude drugs intended for use

Unit II

10 hours

Quality assurance in herbal drug industry of cGMP, GAP, GMP and GLP in traditional system of medicine.

WHO Guidelines on current good manufacturing Practices (cGMP) for Herbal Medicines
WHO Guidelines on GACP for Medicinal Plants.

Unit II I

10 hours

EU and ICH guidelines for quality control of herbal drugs.

Research Guidelines for Evaluating the Safety and Efficacy of Herbal Medicines

Unit IV

08 hours

Stability testing of herbal medicines. Application of various chromatographic techniques in standardization of herbal products.

Preparation of documents for new drug application and export registration GMP requirements and Drugs & Cosmetics Act provisions.

Unit V**07 hours**

Regulatory requirements for herbal medicines.

WHO guidelines on safety monitoring of herbal medicines in pharmacovigilance systems Comparison of various Herbal Pharmacopoeias.

Role of chemical and biological markers in standardization of herbal products

Recommended Books: (Latest Editions)

1. Pharmacognosy by Trease and Evans
2. Pharmacognosy by Kokate, Purohit and Gokhale
3. Rangari, V.D., Text book of Pharmacognosy and Phytochemistry Vol. I , Carrier Pub., 2006.
4. Aggrawal, S.S., Herbal Drug Technology. Universities Press, 2002.
5. EMEA. Guidelines on Quality of Herbal Medicinal Products/Traditional Medicinal Products,
6. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.
7. Shinde M.V., Dhalwal K., Potdar K., Mahadik K. Application of quality control principles to herbal drugs. International Journal of Phytomedicine 1(2009); p. 4-8.
8. WHO. Quality Control Methods for Medicinal Plant Materials, World Health Organization, Geneva, 1998. WHO. Guidelines for the Appropriate Use of Herbal Medicines. WHO Regional Publications, Western Pacific Series No 3, WHO Regional office for the Western Pacific, Manila, 1998.
9. WHO. The International Pharmacopeia, Vol. 2: Quality Specifications, 3rd edn. World Health Organization, Geneva, 1981.
10. WHO. Quality Control Methods for Medicinal Plant Materials. World Health Organization, Geneva, 1999.
11. WHO. WHO Global Atlas of Traditional, Complementary and Alternative Medicine. 2 vol. set. Vol. 1 contains text and Vol. 2, maps. World Health Organization, Geneva, 2005.
12. WHO. Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. World Health Organization, Geneva, 2004.

BP 807 ET. COMPUTER AIDED DRUG DESIGN (Theory)

45 Hours

Scope: This subject is designed to provide detailed knowledge of rational drug design process and various techniques used in rational drug design process.

Objectives: Upon completion of the course, the student shall be able to understand

- Design and discovery of lead molecules
- The role of drug design in drug discovery process
- The concept of QSAR and docking
- Various strategies to develop new drug like molecules.
- The design of new drug molecules using molecular modeling software

Course Content:

UNIT-I

10 Hours

Introduction to Drug Discovery and Development

Stages of drug discovery and development

Lead discovery and Analog Based Drug Design

Rational approaches to lead discovery based on traditional medicine, Random screening, Non-random screening, serendipitous drug discovery, lead discovery based on drug metabolism, lead discovery based on clinical observation.

Analog Based Drug Design: Bioisosterism, Classification, Bioisosteric replacement. Any three case studies

UNIT-II 10 Hours Quantitative Structure Activity Relationship (QSAR)

SAR versus QSAR, History and development of QSAR, Types of physicochemical parameters, experimental and theoretical approaches for the determination of physicochemical parameters such as Partition coefficient, Hammett's substituent constant and Taft's steric constant. Hansch analysis, Free Wilson analysis, 3D-QSAR approaches like COMFA and COMSIA.

UNIT-III 10 Hours Molecular Modeling and virtual screening techniques

Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening,

Molecular docking: Rigid docking, flexible docking, manual docking, Docking based screening. *De novo* drug design.

UNIT-IV 08 Hours Informatics & Methods in drug design

Introduction to Bioinformatics, chemoinformatics. ADME databases, chemical, biochemical and pharmaceutical databases.

UNIT-V

07 Hours

Molecular Modeling: Introduction to molecular mechanics and quantum mechanics. Energy Minimization methods and Conformational Analysis, global conformational minima determination.

Recommended Books (Latest Editions)

1. Robert GCK, ed., "Drug Action at the Molecular Level" University Park Press Baltimore.
2. Martin YC. "Quantitative Drug Design" Dekker, New York.
3. Delgado JN, Remers WA eds "Wilson & Gisvold's Text Book of Organic Medicinal & Pharmaceutical Chemistry" Lippincott, New York.
4. Foye WO "Principles of Medicinal chemistry" Lea & Febiger.
5. Koro Ikovas A, Burckhalter JH. "Essentials of Medicinal Chemistry" Wiley Interscience.
6. Wolf ME, ed "The Basis of Medicinal Chemistry, Burger's Medicinal Chemistry" John Wiley & Sons, New York.
7. Patrick Graham, L., An Introduction to Medicinal Chemistry, Oxford University Press.
8. Smith HJ, Williams H, eds, "Introduction to the principles of Drug Design" Wright Boston.
9. Silverman R.B. "The organic Chemistry of Drug Design and Drug Action" Academic Press New York.

BHC604: Applications of Computers in Chemistry -V

Teaching Scheme
Lectures: 3 hrs/Week
Tutorials: 1 hr/Week

Credits: 4

Examination Scheme
Class Test -6 Marks
Teachers Assessment - 3Marks
Attendance – 6 Marks
VI Semester Exam – 35 marks

Course Objectives:

12. To give an overview of recapitulation of computer basics.
13. To describe the computer programming.
14. To explain BASIC programs for numerical differentiation and integration.
15. To explain the conceptual background of molecular modelling..
16. To explain about elementary ideas of molecular mechanics.

Unit-1

Recapitulation of computer basics: PC hardware, operating systems, data storage and backup, networks, information technology. Basic operations using windows.

Unit-2

Computer programming:

Constants, variables, bits, bytes, binary and ASCII formats, arithmetic expressions, hierarchy of operations, inbuilt functions. Elements of the BASIC language. BASIC keywords and commands. Logical and relative operators. Strings and graphics. Compiled versus interpreted languages. Debugging. Simple programs using these concepts. Matrix addition and multiplication. Statistical analysis.

BASIC programs for numerical differentiation and integration (Trapezoidal rule, Simpson's rule), finding roots (quadratic formula, iterative, Newton-Raphson method), numerical solution of differential equations.

Conceptual background of molecular modelling: Potential energy surfaces. Elementary ideas of molecular mechanics.

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Text and Reference Books

1. Noggle, J. H. Physical chemistry on a Microcomputer. Little Brown & Co.(1985).
2. Venit, S.M. Programming in Basic: Problem solving with structure and style.Jaico Publishing House: Delhi (1996).
3. Engel, T. & Reid, P. Physical Chemistry 2nd Ed. Pearson (2010). Chapter on Computational Chemistry.

Course Outcomes:

After completing the course, students will be able to:

1. Describe the PC hardware.
2. Summarize the basic operations using windows.
3. Solve the problems based on matrix addition and multiplication.
4. Differentiate among the basic keywords and commands.
5. Judge the significance of logical and relative operators.
6. Describe the elementary ideas of molecular mechanics.


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BP801T. BIOSTATISTICS AND RESEARCH METHODOLOGY (Theory)

45 Hours

Scope: To understand the applications of Biostatistics in Pharmacy. This subject deals with descriptive statistics, Graphics, Correlation, Regression, logistic regression Probability theory, Sampling technique, Parametric tests, Non Parametric tests, ANOVA, Introduction to Design of Experiments, Phases of Clinical trials and Observational and Experimental studies, SPSS, R and MINITAB statistical software's, analyzing the statistical data using Excel.

Objectives: Upon completion of the course the student shall be able to

- Know the operation of M.S. Excel, SPSS, R and MINITAB[®], DoE (Design of Experiment)
- Know the various statistical techniques to solve statistical problems
- Appreciate statistical techniques in solving the problems.

Course content:

Unit-I

10 Hours

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples

Measures of dispersion: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

Unit-II

10 Hours

Regression: Curve fitting by the method of least squares, fitting the lines $y = a + bx$ and $x = a + by$, Multiple regression, standard error of regression- Pharmaceutical Examples

Probability: Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis, sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test (Sample, Pooled or Unpaired and Paired), ANOVA, (One way and Two way), Least Significance difference

Unit-III

10 Hours

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallis test, Friedman Test

BBA 102: Principles of Economics	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Course Objectives:

1) To Gain basic knowledge and learning of economic principles and concepts.
2) Understanding of demand and supply in price determination
3) Learn how to apply economic theory in order to understand production and cost phenomenon.
4) Demonstrate how economic analysis can be applied to economic decision making
5) Acquire an understanding of the market structures
6) Basic understanding of National income mechanism.

Detailed Syllabus

Unit-1 Definition, Nature, Scope and Limitation of Economics. Economics as an art or Science, Relevance of Economics in Business Management.
Unit-2 A) Demand Analysis: Meaning of Demand, Demand Schedule , Demand Curve and Nature of Curves, Movements v/s Shifts in demand curve and Law of Demand B) Supply Analysis: Meaning and Determinants of Supply, Supply function. Supply Schedule Supply Curve, Movements v/s shifts in supply curve C) Elasticity of Demand & Supply: Meaning and Types
Unit-3 Utility Analysis: Marginal Theory of Utilities and Equi-marginal theory of Utility, Indifference Curve analysis, Consumer equilibrium and Consumer Surplus, Price, Income and Substitution Effect.
Unit-4 A) Cost Concept and Analysis: Relationship between TC, AC and MC Short Run and Long Run Cost Curves. B) Theory of Production: Production Concept, Production function, Single Variable Law of Proportions, Two Variable Law of Return to scale. Iso-quant Curves.
Unit-5 Market Structure Nature of market, Types of Markets and their characteristics under different market structure, - Perfect Competition, monopoly, monopolistic competition and oligopoly, price discrimination under monopoly.

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Unit-6

National Income: Meaning ,components, Methods of Measurement

Text and Reference Books-

1. Management Economics , Adhikari M,Excel Books, 2nd edition
2. Managerial Economics , Gupta, GS; Tata McGraw-Hill, 2006
3. Principles of Economics , Vaish & Sundaram, Sultan Chand and Sons, 13th edition

Course Outcomes:

1. To state economics principles and concepts.
2. To understand the economic theories and principles
3. To solve the problems based on economic theories and principles
4. To analyse the impact of economic theories and principles
5. To find out the relationship between economic variables
6. To explain the economic theories and its outcomes

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BPC 101: Professional Communication I	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Presentation – 15 Marks Viva-Voce- 15 Marks Unit test-20 Marks End Semester Exam – 50 marks

Prerequisite: - English Grammar of 10+2 standard.

Course Objectives:

The objectives of this course are:

1. To understand the concepts, process and importance of communication.
2. To equip students with Oral and written communication skills.
3. To enhance their communication skills in real life situations.
4. To develop awareness regarding appropriate communication strategies.
5. To encourage students by developing their critical thinking through activities.
6. To assist students with employability and job search skills.

Detailed Syllabus

Unit-1 Learning English: Subject Verb Agreement and Tenses: One-word substitution: Jumbled Sentences. Activities: Framing of Sentences, Greetings, Introducing oneself, Invitation, Making Request, Expressing Gratitude, Complimenting and Congratulating.
Unit-2 Learning Through Literature: Sultana's Dream by Rokeya Sakhawat Hussain, The Eyes are not here by Ruskin bond, The Renunciation By Rabindranath Tagore, The Capital of the World by Ernest Hemingway. Poetry: Where the mind is without fear by Rabindranath Tagore; Road not Taken by Robert frost. Activities: Framing of Sentences, Reading, Narration, Dialogue writing, Reading Comprehension, Role play.
Unit-3 Introduction to Communication: Types of communication, Barriers to Communication, and Principles of effective communication. Activities: Role Play, Extempore, Presentation.
Unit-4 Writing skills: Comprehension Chapters 1-4 from Oxford Remedial English Book 1. Activities: Application regarding attendance, Fee extension, Fine-remit, leave application, Requisitions. Writing paragraph on current topics

Unit-5

Listening skills and speaking skills: Communication Lab activities: Situations based role play, Debate, Profile of famous personalities.

Activities: Role Play, Essay writing, one animation Movie and one documentary.

Unit-6**Presentations****Text and Reference Books**

1. Business Communication, Bovee & Thill, McGraw Hill, fifth edition, 2007.
2. Business Communication, Raymond V. Lesikar, McGraw Hill, 7th edition, 2009.
3. Business Communication Strategies, Matthukutty Monippally, Tata McGraw Hill.
4. An Anthology of English Essays, edited by R.P Singh, Oxford University Press.
5. An Anthology of English short Stories, edited by R.P Singh.
6. A Remedial Course in English for colleges, Central Institute of English and Foreign Languages, Book 1, Book 2, Book 3.
7. Soft Skills, Dr.K.Alex, S.Chand 8. Basic English Usage, Michael Swan, Oxford Indian Edition.

Course Outcomes:

After completing the course, students will be able to:

1. Understand the process of communication and its effect on giving and receiving information.
2. Demonstrate his/her ability to speak or write error free while making an optimum use of correct business vocabulary and grammar.
3. Apply effective communication skills in a variety of public and interpersonal settings.
4. To draft effective correspondence with brevity and clarity.
5. Demonstrate his verbal and nonverbal communication ability through presentations.
6. Become aware the numerous carrier opportunities within the fields of communication.

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acceleration and uniform rotation about an axis.

MODULE 2

Dynamics of Fluid Flow : Euler's Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, orifice meter, venturi meter and bend meter, Hot-wire anemometer and LDA, notches and weirs, momentum equation and its application to pipe bends.

Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance, geometric, kinematics and dynamic similarity, model studies.

MODULE 3

Laminar and Turbulent Flow : Equation of motion for laminar flow through pipes, Stokes' law, transition from laminar to turbulent flow, types of turbulent flow, isotropic, homogeneous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and networks

Boundary Layer Analysis : Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sublayer, separation and its control, Drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect.

Text books:

1. Bansal R K, "A text book of Fluid mechanics and Hydraulic Machines", 8th Edition, Laxmi Publications (P) Ltd. New Delhi (2002).
2. Dr. Jagdish Lal/ Fluid Mechanics & Machines Prentice Hall of India Private Limited, New Delhi (1996).

Reference books:

1. Douglas J F, Gasiotckw, and Swaffield J P, "Fluid Mechanics", 3rd Edition Addison Wesley Longman, Inc Pitman (1999).
2. Pao H F Richard, "Fluid Mechanics", John Wiley and Sons (1995).
3. Kumar D S, "Fluid Mechanics and Fluid Power Engineering", 6th Edition SK Kataria and Sons, Delhi (1998).
4. Fay J A, "Introduction to Fluid Mechanics", Prentice Hall of India Private Limited, New Delhi (1996).

Theory

Paper Name: Building Material and Construction

Paper Code: BCE-302

Total Contact Hours: 40

Credit: 4

Prerequisite: An introductory course on construction materials and their properties.

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Course Objective: Study of different construction materials

Course Content:

MODULE- I

Classification of materials, materials and their performance, economics of the building materials.

Stones, Requirement of good building stone, characteristics of stones and their testing. Common building stones. Preservation of stones.

Bricks: Manufacture of clay bricks, and their classification. Properties of clay bricks and their testing. Problems of efflorescence & lime bursting in bricks & tiles.

Gypsum: properties of gypsum plaster, building products of gypsum and their uses.

Lime: Manufacture of lime, classifications of limes, and properties of lime.

Mortars: Introduction, Composition, Types and Functions

Puzzolona: Natural and Artificial fly ash, Surkhi (burnt clay puzzolona), rice husk and ash puzzolona, properties and specifications for use in construction.

Timber: Classification and identification of timber, Fundamental Engineering properties. Defects in timber, Factors affecting strength of timber, seasoning and preservation of timber. Wood based products.

Asphalt, Bitumen and Tar: Terminology, specifications and uses, bituminous materials.

MODULE- II

Chemistry of Plastics manufacturing process, classification, advantages of plastics, Mechanical properties and their use in construction.

Paints varnishes and distempers, Common constituents, types and desirable properties, Cement paints.

Ferrous metals, Desirable characteristics of reinforcing steel. Principles of cold working. Detailed Discussion on reinforcing steel mechanical and physical properties chemical composition. Brief discussion on properties and uses of Aluminium and lead.

Glass: Ingredients, properties types and use in construction.

Insulating Materials: Thermal and sound insulating material desirable properties and type.

MODULE- III

Components of building area considerations, Construction Principle and Methods for layout, Damp proofing and termite treatment, Vertical circulation means staircases ramp design and construction.

Different types of floors, and flooring materials (Ground floor and upper floors).

Bricks and stone masonry construction,. Cavity wall hollow block and Waffle slab construction.

Doors, Windows and Ventilations its types & Construction details, type of roofs & its details, lintels & chajja.

Plastering different types, pointing, Distempering, Colour washing, Painting etc.

Principles & Methods of building maintenance.

Text books:

1. B.C. Punmia: A Text Book of Building Construction, Laxmi Publications, Delhi.
2. S.C. Rangwala, Engineering materials- Charotar Publications.
3. S.C. Rangwala, Building constructions- Charotar publications

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Reference books:

- 1.O.H. Koenisberger: "Manual of tropical housing and building" Orient Longman
2. S.P. Arora et al., "A Text Book of Building Construction - Dhanpat Rai & Sons,

Theory

Paper Name: Surveying

Paper Code: BCE-301

Total Contact Hours: 40

Credit: 4

Prerequisite: An introductory course on surveying and its principle.

Course Objective: To provide knowledge regarding surveying, its different types and various techniques of surveying

Course Content:**MODULE- I**

Importance of surveying to engineers, plane and geodetic surveying, principles of surveying, classification of surveys

Principles of different methods and their accuracies, measurement by tape, Reference meridians, bearing and azimuths, magnetic declination, compass, Vernier theodolite, temporary adjustments, measurements of horizontal angle, modern trends- EDM, electronic theodolites and Electronic Total Station.

Methods of determining elevations, Direct levelling- basic terms and definitions, principle, booking and reduction of field notes, curvature and refraction, automatic levels, Contouring- methods and uses
Definition, Principles of stadia systems, subtense bar and tangential methods

MODULE- II

Elements of simple circular curves, theory and methods of setting out simple circular curves, transition curves- types and their characteristics, ideal transition curve, equations of various transition curves, Introduction to vertical curves

Principles of traversing by compass and theodolite, computations of traverse coordinates, Principles and classification of triangulation systems, strength of figures, satellite stations, intervisibility of stations, triangulation field work

MODULE- III

Plane table surveying, Principles, Accessories of Plane table, orientation, Procedure of setting up Plane table over a station, Methods of plane tabling, special methods of resection, Procedure of Plane table traversing & advantages and disadvantages of Plane table surveying

Text books:

- 1.H. Kanitkar: Surveying & Levelling
- 2.S K Duggal: Surveying Vol 1 & 2, TMH
- 3.Dr.B.C.Punamia, Surveying & Levelling vol-1& vol II, Laxmi publications

Reference books:

10	BCE-554	Seminar	0	0	2	-	-	25	-	25	1
11	GP-501	General Proficiency	-	-	-	-	-	25	-	25	1
Total			16	6	8	100	50	230	395	625	25

Theory

Paper Name: Geotechnical Engineering II

Paper Code: BCE-501

Total Contact Hours: 40

Credit: 4

Prerequisite: An introductory study on site selection and site foundation

Course Objective: Study of soil investigation and methods of checking the quality of soil

Course Content:

MODULE I

SITE INVESTIGATION AND SELECTION OF FOUNDATION

Scope and objective methods of exploration and boring. sampling representative and undisturbed sampling techniques split spoon sampler, thin tube sampler, stationary piston sampler Penetration tests (SPT and SCPT) Data interpretation (strength parameters and liquefaction potential) selection of foundation based on soil condition.

FOUNDATION

Introduction location and depth of foundation, Bearing capacity of shallow foundation on homogeneous deposits Terzaghi's formula and BIS formula factors affecting bearing capacity, allowable bearing pressure, settlement components of settlement, determination of settlement of foundations on granular and clay deposits, allowable settlements, methods of minimizing settlement, differential settlement.

MODULE II

FOOTINGS AND RAFTS

Types of foundation, contact pressure distribution below footings and raft Isolated and combined footings type proportioning, mat foundation types use proportioning.

PILES

Types of piles and their function, factors influencing the selection of pile carrying capacity of single pile in granular and cohesive soil, static formula dynamic formulae engineering news and Hiley's capacity from in situ tests (SPT and SCPT),

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negative skin friction

MODULE III

RETAINING WALLS

Plastic equilibrium in soils, active and passive states, Rankine's theory, cohesionless and cohesive soil, Coulomb's wedge theory, condition for critical failure plane, earth pressure on retaining walls of simple configurations, graphical methods (Rebmann and Culmann), pressure on the wall due to line load, stability of retaining walls.

Text Books

1. Murthy, V.N.S., "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, 1999.
2. Gopal Ranjan Rao, A.S.R., "Basic and Applied Soil Mechanics", Wiley Eastern Ltd., 2003.

References

1. Das, B.M., "Principles of Foundation Engineering, 5th Edition, Thomson Books, 2003.
2. Kaniraj, S.R., "Design Aids in Soil Mechanics and Foundation Engineering", Tata McGraw Hill Publishing Company Ltd., 2002.
3. Bowles, J.E., "Foundation Analysis and Design", McGraw-Hill, 1999

Theory

Paper Name: Structural Analysis I

Paper Code: BCE-502

Total Contact Hours: 40

Credit: 4

Prerequisite: An introductory subject on Structure study

MODULE I

Classification of Structures, stress resultants, degrees of freedom per node, static and Kinematic determinacy. Classification of Pin jointed determinate trusses, analysis of determinate plane and space trusses (compound and complex).

Rolling loads, influence lines for beams and trusses, Absolute maximum bending moment, Muller-Breslau's principle & its application for determinate structures

MODULE II

Analysis of Arches, Linear arch, Eddy's theorem, three hinged parabolic arch, spandrel braced arch, moving load & influence lines.

Strain Energy of deformable systems, Maxwell's reciprocal & Betti's theorem, Castigliano's first theorem, unit load & Conjugate beam methods.

MODULE III

Unsymmetrical bending, location of neutral axis, computation of stresses and deflection, Shear Centre its location for common structural section.

Bending of curved bars in plane of bending, stresses in bars of small & large initial curvatures.

Text Books:

1. Vazirani & Ratwani et al, "Analysis of Structures", Khanna Publishers
2. S. B. Bhavikatti, "Structural Analysis II", Vikash publishing house

References:

1. Hibbler, "Structural Analysis", Pearson Education
2. T. S. Thandavmorthy, "Analysis of Structures", Oxford University Press
3. Wilbur and Norris, "Elementary Structural Analysis", Tata McGraw Hill.
4. Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill.
5. Jain, O.P. and Jain, B.K., "Theory & Analysis of Structures". Vol. I & II Nem Chand.
7. Coates, R.C., Coutie, M.G. & Kong, F.K., "Structural Analysis", English Language Book Society & Nelson, 1980

Theory

Paper Name: Transportation Engineering I

Paper Code: BCE-503

Total Contact Hours: 40

Credit: 4

Prerequisite: An industrial approach to study about complete transportation

Course Objective: To study various mode of transportation, history of transportation, etc

MODULE I

Introduction: Role of Transportation, Modes of Transportation, History of road development, Nagpur road plan,

Bombay road plan & 3rd 20 Year Road Plan, Road types and pattern.

Geometric Design: Cross sectional elements, camber, shoulder, sight distance, horizontal curves, super elevation, extra widening, transition curves and gradient, vertical curves, summit and valley curves.

MODULE II

Traffic Engineering: Traffic characteristic, volume studies, speed study, capacity, density, traffic control devices, signs, signals, design of signals, Island, Intersection at grade and grade separated intersections, design of rotary intersection.

Design of Highway Pavement: Types of Pavements, Design factors, Design of Flexible Pavement by CBR method (IRC: 37-2001), Design of rigid pavement, Westergaard theory, load and temperature stresses, joints, IRC method of rigid pavement design. (IRC: 58 – 2002).

MODULE III

Road Construction Methods: WBM, Surface dressing, bituminous carpeting, Bituminous Bound Macadam and Asphaltic Concrete, Cement Concrete road construction.

Airport Engineering: Air craft characteristics, types of airports, layout of airports, airport planning & design, runway orientation, wind-rose diagram, estimation of runway length & correction.

Text Books:

1. *Highway Engineering* by S. K. Khanna & C.E.G. Justo.
2. *Airport Planning & Design* by S. K. Khanna, M. G. Arora & S. S. Jain.

References:

1. *Transportation Engineering* by L. R. Kadiyali.
2. *Highway Engineering* by S. K. Sharma
3. *Principles of Transportation Engineering* by P. Chakraborty & A. Das.

Theory

Paper Name: Irrigation Engineering

Paper Code: BCE-504

Total Contact Hours: 40

Credit: 4

Prerequisite: An approach to study the necessity of irrigation


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Course Objective: To provide information regarding necessity of irrigation, advantages, disadvantages

MODULE I

Introduction: Necessity of Irrigation in India, Advantages and disadvantages of Irrigation, Techniques of water distribution in farms. Quality of irrigation water, crops and crop season, Consumptive use, Irrigation requirements, Estimation of consumptive use of water by climatic approaches, Irrigation efficiencies, Soil moisture-irrigation relationship

Canal Irrigation: Classification of canals, Canal losses, Alignment of canals. Design of Irrigation Canals: Design of stable channels using Kennedy's and Lacey's theory, Garret's diagram, Cross section of irrigation canals, Lining of Irrigation Canals: Advantages and economics of lining, various types of lining, Design of lined canals

MODULE II

Types of Cross-Drainage Works: Types of CD works, Selection of a suitable type to suite a particular condition, Design consideration for CD works, Canal Falls:

Necessity, Proper location, Types, Design and detailing of one type of fall; Weirs and Barrages: Weirs and Barrages, Types of weirs and barrages, Layout of a diversion head work, Introduction of different components of a diversion head works, Design of weirs and barrages: Bligh's creep theory, design of weir using Bligh's theory, Lane's weighted creep theory, Khosla's theory, Khosla's method of independent variables, exit gradient

MODULE III

Dams: Typical cross section, Various forces acting on gravity dam, Combination of forces for design, modes of failure and criteria for structural stability, High and low gravity dam, Design of high dam, Typical section of low gravity dam, Earth and Rock fill Dams: Types, Causes of failure, Preliminary section of an earth dam, Preliminary section of an earth dam, Seepage control in earth dams

Spillways: Descriptive study of various types of spillways; Reclamation of Water Logged and Saline Soils: Causes and control of water logging. Reclamation of saline and alkaline land, Surface and Sub-surface drainage.

Text Books:

1. S. K. Garg, *Irrigation Engineering and hydraulics structures*, Khanna Publishers, 16th Edition.
2. B. Singh, *Irrigation Engineering*, Nem Chand and Sons, Roorkee.

References:

1. Varshney & Gupta, *Theory and Design of Irrigation Structures*, Nem Chand and Bros, Roorkee.
2. I. E. Hook, *Irrigation Engineering*, John Wiley and Sons, New York.
3. J. D. Zimmerman, *Irrigation*, John Wiley and Sons, New York.

Theory

Paper Name: Environmental Engineering I

Paper Code: BCE-505

Total Contact Hours: 40

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Credit: 4

Prerequisite:

MODULE I

Water supply: Water demands and domestic use, variation in demands; population forecasting by various methods using logistic curve method; per capita supply, basic needs and factors affecting consumption; design period.

Sources of water: Kinds of water sources and their characteristics, collection of surface and ground water; quality of surface and ground waters; factors governing the selection of a source of water supply.

MODULE II

Transmission of water: Various types of conduits, capacity and sizes including economical sizes of rising main, structural requirements; laying and testing of water supply pipelines; pipe materials, joints, appurtenances and valves; leakages and control; water hammer and its control measures.

Storage and distribution of water: Methods of distribution, pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs and equivalent pipe method of pipe network analysis; rural water supply distribution system. Water supply, plumbing systems in buildings and houses: water connections, different cocks and pipe fittings, hot water installation. Institutional and industrial water supply

MODULE III

Wastewater collection: Systems of sanitation and wastewater collection, estimation of wastewater flows and variations in wastewater flows.

Storm water: Collection and estimation of storm water by different formulae.

Flow in sewers: Flow in full and partially full sewers and design of sewers; types of sewers, materials and construction of sewers, joints and sewer appurtenances, layout and construction of sewer lines.

Air pollution: Composition and structure of atmosphere; units of measurement, sources of pollutants, classification of pollutants and their effects, air quality monitoring and standards. Noise pollution: Definition of decibel, sound power level, sound intensity level and sound pressure level; measurement of noise level; basic concept of community noise, transportation noise and industrial noise; acceptable outdoor and indoor noise levels; effects of noise and control measures.

Text books:

1. Peavy, Rowe and Tchobanoglous: *Environmental Engineering*
2. Metcalf and Eddy Inc.: *Wastewater Engineering*
3. Garg: *Water Supply Engineering (Environmental Engineering Vol. – I)*


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4. Garg: *Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol. – II)*.

References:

1. *Manual on Water Supply and Treatment*, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
2. *Manual on Sewerage and Sewage Treatment*, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
3. *Steel and McGhee: Water Supply and Sewerage*
4. *Fair and Geyer: Water Supply and Wastewater Disposal*
5. *Arceivala: Wastewater Treatment for Pollution Control*
6. *Hammer and Hammer Jr.: Water and Wastewater Technology*
7. *Raju: Water Supply and Wastewater Engineering*
8. *Sincero and Sincero: Environmental Engineering: A Design Approach*
9. *Pandey and Carney: Environmental Engineering*
10. *Rao: Textbook of Environmental Engineering*
11. *Davis and Cornwell: Introduction to Environmental Engineering*

Theory

Paper Name: Estimation Costing and Evaluation

Paper Code: BCE-506

Total Contact Hours: 40

Credit: 4

Prerequisite:

MODULE I

Estimation Fundamentals

Importance of estimation, different types of estimates, general and detailed specifications. Methods of Estimation: Items of work for estimates, units and measurement of items.

Detailed Estimation of Buildings and Analysis of Rates

Detailed estimates of a single roomed and a two roomed single storey residential building. Estimates of Steel Framed Industrial Building:, Analysis of rates, material and other cost considerations. Resource planning through analysis of rates, market rates, PW.D. Schedule rates, non scheduled items and cost indices for building material and labour.

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BOE-503	Entrepreneurship Development	L T P 2 1 0	2 Credits
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Pre-requisites: None

Course Objectives:

The students develop and can systematically apply an entrepreneurial way of thinking that will allow them to identify and create business opportunities that may be commercialized successfully.

Detailed Syllabus

MODULE I

Entrepreneurship- Definition, Growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.

Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

MODULE II

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

MODULE III

Project Planning and control:

The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. Profit planning and programming, planning cash flow, capital expenditure and operations. Control of financial flows, control and communication.

Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act.

Role of various national and state agencies which render assistance to small scale industries.

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Text Books: -

1. Forbat, John, "Entrepreneurship" New Age International.
2. Havinal, Veerbhadrappa, "Management and Entrepreneurship" New Age International
3. Joseph, L. Massod, "Essential of Management", Prentice Hall of India.

REFERENCE BOOKS:-

1. Entrepreneurship: Strategies and Resources, 3/E -: Marc Dollinger; Prentice Hall
2. Bringing New Technology to Market- Kathleen R. Allen, Prentice Hall
3. Entrepreneurship in Action, 2/E - Mary Coulter; Prentice Hall

Course Outcomes: After the completion of the course the student will be able to:

CO1	Have the ability to discern distinct entrepreneurial traits
CO2	Understand the systematic process to select and screen a business idea
CO3	Design strategies for successful implementation of ideas
CO4	Write a business plan


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BEC-456	PCB Lab	2 Credit	0-0-2	BEC-456
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Pre-requisites:

Course Educational Objectives:

CEO1	To select and use appropriate test equipment and procedures
CEO2	To analyse and interpret test results and measurements on electric circuits

Course Outcomes: At the end of the course, the student will be able to:

CO1	Fabricate DC regulated power supply.
CO2	Test audio amplifier using power supply.

Objective: To create interest in Hardware Technology.

1. Winding shop: Step down transformer winding of less than 5VA.
2. Soldering shop: Fabrication of DC regulated power supply
3. PCB Lab: (a) Artwork & printing of a simple PCB.
(b) Etching & drilling of PCB.
4. Wiring & fitting shop: Fitting of power supply along with a meter in cabinet.
5. Testing of regulated power supply fabricated.

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BST 501: Analytical Techniques I	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - BST102 Introduction to Biotechnology, BST151 Biotechnology Lab I

Course Objectives:

- 1 To give basic overview of different types of microscopic techniques.
2. To give complete knowledge of Phase contrast microscopy, Transmission Electron Microscope and Scanning Electron Microscope.
3. To explain the technique of electrophoresis and its various types.
4. To explain the importance of western blotting.
5. To explain and focus on various types of chromatographic techniques.

Detailed Syllabus

Unit-1

Microscopic Techniques: History, basic types of light microscopy and their applications in brief; Simple, compound, inverted, stereo, fluorescence, dark field and bright field microscope. Phase contrast microscopy: Amplitude and phase objects, wave terminology, positive or dark phase contrast and negative or bright phase contrast microscopy. Electron microscopy: Transmission Electron Microscope and Scanning Electron Microscope, sample preparation for EM, basic concept of confocal microscope.

Unit-2

Electrophoresis: Principle and types of electrophoresis. Gel electrophoresis: Agarose gel electrophoresis, Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE), Immuno electrophoresis, Capillary or tube gel electrophoresis, isoelectric focusing (IF), Two-dimensional (2D) electrophoresis. Western blotting technique.

Unit-3

Chromatographic Techniques: Principle, application, affinity, mobile phase and stationary phase, types of columns, etc. Types of chromatography: Paper Chromatography, Gel filtration Chromatography, ion-exchange chromatography, affinity chromatography, High Performance Liquid Chromatography (Normal phase and reverse phase).

Text and Reference Books

1. Freifelder D., Physical Biochemistry, Application to Biochemistry and Molecular Biology, 2nd Edition, W.H. Freeman & Company, San Fransisco, 1982.
2. Keith Wilson and John Walker, Principles and Techniques of Practical Biochemistry, 5th Edition, Cambridge University Press, 2000.
3. D. Holme& H. Peck, Analytical Biochemistry, 3rd Edition, Longman, 1998.
4. R. Scopes, Protein Purification - Principles & Practices, 3rd Edition, Springer Verlag, 1994.
5. Selected readings from Methods in Enzymology, Academic Press.

Course Outcomes:

After completing the course, students will be able to:

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| 1. To state the principle and working of various types of Microscopic Techniques i.e. Simple, compound, inverted, stereo, fluorescence, dark field and bright field microscope. |
| 2. To understand the concept of phase contrast microscopy. |
| 3. To explain the principle and working mechanism of TEM and SEM. |
| 4. To analyze and distinguish between different types of electrophoretic techniques. |
| 5. To evaluate and outline the concept of western blotting. |
| 6. To explain the principle, application, affinity, mobile phase and stationary phase, types of columns, used in various chromatographic techniques. |
| 7. To explain the concept of Paper Chromatography, Gel filtration Chromatography, ion-exchange chromatography, affinity chromatography, High Performance Liquid Chromatography (Normal phase and reverse phase). |

BST 502: Recombinant DNA Technology	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - BST302 Molecular Biology, BST402 Immunology

Course Objectives:

- 1 To give brief introduction about Recombinant DNA Technology
2. To give complete knowledge about the construction of genomic and cDNA library.
3. To explain the process of gene transfer mechanism in bacteria, plants and animals.
4. To explain the importance of edible vaccines.
5. To explain and emphasize on the production of monoclonal antibody production and its applications.

Detailed Syllabus

Unit-1 Introduction of RDT, Restriction enzyme, DNA manipulative enzymes and DNA modifying enzymes, concept of cloning, properties of cloning vehicle, plasmid as cloning vectors, viruses (phage, lambda and mu) as cloning vectors, insertion of a DNA molecule in cloning vector, expression of cloned genes, recombinant selection and screening , genomic and cDNA libraries.
Unit-2 Gene transfer mechanisms in bacteria: principles and applications of transformation, conjugation, transduction, particle gun, liposome mediated and microinjection. Applications of microbial genetic engineering in biotechnology.
Unit-3 Gene transfer mechanism in plants: agrobacterium mediated. Applications of transgenic plants, edible vaccines from plants. Gene transfer mechanism in animals: transfection of animal cell lines, HAT selection. Selectable markers and transplantation of cultured cells. Expression of cloned proteins in animal cells – expression vectors.
Text and Reference Books 1. OLD, R.W AND PRIMROSE S.B 1994. Principles of gene manipulation – An introduction to genetic engineering. Fifth edition. Blackwell Scientific Publication. 2. T.A BROWN. Gene cloning and DNA analysis. Sixth Introduction. Wiley and Blackwell. 3. Recombinant DNA 2 nd edition. Watson, James D. and Gilman, M. (2001) W.H Freeman Company, New York. 4. An introduction to genetic Engineering 2 nd edition Desmond Nicholl S.T (2002) Cambridge University Press. 5. Sambrook. Fritsch E.F and Maniatis. 1989. Molecular Cloning – A laboratory.

Course Outcomes:

After completing the course, students will be able to:

1. To remember Restriction enzymes their types and properties, properties of a Cloning vehicles , plasmids as cloning vectors , viruses (phage lambda and mu) as a cloning vectors.
2. To understand the concept of Concept of cloning and HAT selection.

3 To apply the techniques of recombinant DNA technology for the production of transgenic plants.
4. To analyze Gene transfer mechanisms in bacteria, plants and animals i.e. transformation, conjugation, transduction, particle gun, liposome mediated and microinjection.
5. To evaluate the procedure of forming cDNA and genomic library.
6. To create edible vaccines from plants using recombinant DNA technology.
7. To explain and analyze various applications of microbial genetic engineering in biotechnology.

BST 503: Genomics and Proteomics	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - BST302 Molecular Biology, BST451 Biotechnology Lab IV

Course Objectives:

- 1 To give extensive knowledge of structure and organization of prokaryotic and eukaryotic genomes - nuclear, mitochondrial and chloroplast genomes; Human genome project.
2. To give complete knowledge about expression profiling of gene, microarray and data analysis.
3. To analyze tools for genome analysis as well as give detailed information about hybridization based assays, Polymerization based assays, Ligation based assays.
4. To explain and give an outline of a typical proteomics experiment.
5. To explain tryptic digestion of protein, peptide fingerprinting and protein-protein interactions.

Detailed Syllabus

Unit-1 Structure and organization of prokaryotic and eukaryotic genomes - nuclear, mitochondrial and chloroplast genomes; Human genome project-landmarks on chromosomes generated by various mapping methods; BAC libraries and shotgun libraries preparation; Physical maps – cytogenetic map, contig map, restriction map. Human disease genes; DNA polymorphism including those involved in diseases; Hemoglobin and the nemias; Phenylketonuria (monogenic) and diabetes (multigenic) genetic disorders; ‘disease’ gene vs. ‘susceptibility’ gene; SNP detection: hybridization based assays (allele specific probes); Polymerization based assays (allele specific nucleotide incorporation, allele-specific PCR); Ligation based assays (allele specific oligonucleotide ligation).
Unit-2 Clinical aspect of expression profiling of gene, microarray and data analysis, difference in gene expression in nuclear, mitochondrial and chloroplast gene, taxonomic classification of organisms using molecular markers- 16S rRNA typing/sequencing. Tools for genome analysis – PCR, RFLP, DNA fingerprinting, RAPD, automated DNA sequencing; Linkage and pedigree analysis; construction of genetic maps; physical maps, FISH to identify chromosome landmarks.
Unit-3 Overview of protein structure-primary, secondary, tertiary and quaternary structure; Relationship between protein structure and function; Outline of a typical proteomics experiment; Identification and analysis of proteins by 2D analysis; Spot visualization and picking; Tryptic digestion of protein and peptide fingerprinting. Protein-protein interactions. Yeast two hybrid system; Phage display; Protein interaction maps; Protein arrays-definition; Applications- diagnostics, expression profiling.

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Text and Reference Books

1. Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley 2006
2. Brown TA, Genomes, 3rd Edition. Garland Science 2006
3. Campbell AM & Heyer LJ, Discovering Genomics, Proteomics and
4. Bioinformatics, 2nd Edition. Benjamin Cummings 2007
5. Primrose S & Twyman R, Principles of Gene Manipulation and Genomics, 7th Edition, Blackwell, 2006.

Course Outcomes:

After completing the course, students will be able to:

1. To define Structure and organization of prokaryotic and eukaryotic genomes - nuclear, mitochondrial and chloroplast genomes; Human genome project.
2. To understand the mechanisms for Human disease genes; DNA polymorphism including those involved in diseases; Hemoglobin and the nemias; Phenylketonuria (monogenic) and diabetes (multigenic) genetic disorders; 'disease' gene vs. 'susceptibility' gene.
- 3 To determine Clinical aspect of expression profiling of gene, microarray and data analysis, difference in gene expression in nuclear, mitochondrial and chloroplast gene, taxonomic classification of organisms using molecular markers- 16S rRNA typing/sequencing.
4. To analyze Tools for genome analysis – PCR, RFLP, DNA fingerprinting, RAPD, automated DNA sequencing; Linkage and pedigree analysis; construction of genetic maps; physical maps, FISH to identify chromosome landmarks.
5. To evaluate the concept of SNP detection: hybridization based assays (allele specific probes); Polymerization based assays (allele specific nucleotide incorporation, allele-specific PCR); Ligation based assays (allele specific oligonucleotide ligation).
6. To explain and give an outline of a typical proteomics experiment; Identification and analysis of proteins by 2D analysis.
7. To explain Tryptic digestion of protein and peptide fingerprinting. Protein-protein interactions, Yeast two hybrid system; Phage display; Protein interaction maps; Protein arrays-definition; Applications- diagnostics, expression profiling.

BST 504: Bioprocess Technology	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - BST203 Microbiology, BST404 Genetics

Course Objectives:

- 1 To give the basic concept of fermentation and types of bioreactors in fermentation industry.
2. To give complete knowledge of various types of fermentation, sterilization and microbes used in fermentation industry.
3. To explain the process of different techniques of upstream and downstream processing.
4. To explain the importance of processing of major fermented foods and beverages.
5. To explain and emphasize the importance of food additive: colors, flavors, preservatives in food industry.

Detailed Syllabus

Unit-1 Bioreactor designs; Types of fermentation and fermenters; Concepts of basic modes of fermentation - Batch, fed batch and continuous; Conventional fermentation v/s biotransformation; Solid substrate, surface and submerged fermentation; Fermentation economics; Fermentation media; Fermenter design- mechanically agitated; Pneumatic and hydrodynamic fermenters; Large scale animal and plant cell cultivation and air sterilization; Upstream processing: Media formulation; Sterilization; Aeration and agitation in bioprocess; Measurement and control of bioprocess parameters; Scale up and scale down process.
Unit-2 Bioseparation - filtration, centrifugation, sedimentation, flocculation; Cell disruption; Liquid-liquid extraction; Purification by chromatographic techniques; Reverse osmosis and ultra filtration; Drying; Crystallization; Storage and packaging; Treatment of effluent and its disposal.
Unit-3 Fermented foods and beverages; Food ingredients and additives prepared by fermentation and their purification; fermentation as a method of preparing and preserving foods; Microbes and their use in pickling, producing colours and flavours, alcoholic beverages and other products; Process wastes- whey, molasses, starch substrates and other food wastes for bioconversion to useful products; Bacteriocins from lactic acid bacteria – Production and applications in food preservation.
Text and Reference Books <ol style="list-style-type: none"> 1. Voet D, Voet JG & Pratt CW, Fundamentals of Biochemistry, 2nd Edition. Wiley Jackson AT., Bioprocess Engineering in Biotechnology, Prentice Hall, Engelwood Cliffs, 1991. 1. Shuler ML and Kargi F., Bioprocess Engineering: Basic concepts, 2nd Edition, Prentice Hall, Engelwood Cliffs, 2002. 2. Stanbury RF and Whitaker A., Principles of Fermentation Technology, Pergamon press, Oxford, 1997. 3. Baily JE and Ollis DF., Biochemical Engineering fundamentals, 2nd Edition, McGraw-Hill Book Co., New York, 1986. 4. Aiba S, Humphrey AE and Millis NF, Biochemical Engineering, 2nd Edition, University of Tokyo press Tokyo, 1973. 5. Comprehensive Biotechnology: The Principles, Applications and Regulations of Biotechnology in Industry.

Course Outcomes:

After completing the course, students will be able to:

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|---|
| 1. To define the basic concept of fermentation and types of fermentors and bioreactors used in fermentation industry: their working mechanism. |
| 2. To understand various types of fermentation like Batch, fed batch and continuous; Conventional fermentation v/s biotransformation; Solid substrate, surface and submerged fermentation |
| 3 To determine the mechanisms sterilization and their types. |
| 4. To analyze different techniques of upstream and downstream processing in detail: Bioseparation - filtration, centrifugation, sedimentation, flocculation; Cell disruption; Liquid-liquid extraction; Purification by chromatographic techniques; Reverse osmosis and ultra filtration; Drying; Crystallization; Storage and packaging; Treatment of effluent and its disposal. |
| 5. To evaluate the processing of major fermented foods and beverages; Food ingredients and additives prepared by fermentation and their purification. |
| 6. To explain the use of microbes and their use in pickling, producing colours and flavours, alcoholic beverages and other products; Process wastes-whey, molasses, starch substrates and other food wastes for bioconversion to useful products; |
| 7. To explain role of preservatives in food industry: Bacteriocins from lactic acid bacteria – Production and applications in food preservation. |

BFD501 Fashion Forecast-III**Teaching Scheme**

Lectures: 1 hr./ week

Tutorials: Nil

Credits: 4

Examination Scheme

Class Test: 12Marks

Teachers Assessment: 6 Marks

Attendance: 12 marks

End Semester Exam: 70 Marks

Prerequisite:BFD456 Minor Project, BFD651 Graduation Design Collection**Course Objectives:**

1. To provide the knowledge of visual merchandising.
2. To give the knowledge of techniques of merchandising.
3. Describe the elements and tools of visual merchandising.
4. Explain the all window display.
5. To give the knowledge of brands national and international.

Detailed Syllabus**Module I:**Concept of Visual Merchandising.**Module II:**Elements, tools and techniques of visual merchandising.**Module III:** Study the brand signature in visual merchandising**Module IV:** Window display

Prepare the window display for a theme.

Module V:Visit to mall**Text and References books:**

1. Fashion designs and illustrations
2. Introduction to fashion design, By Patrick John Ireland
3. Inside fashion design Simplicity
4. Encyclopedia of fashion detail, By Patrick John Ireland,
5. Femina, Elle, FNL, Apparel views to consult

Course Outcomes:

After completing the course, students will be able to:

1. Understand about the knowledge of windows display.
2. Understand the knowledge of blocking and themes.
3. Understand about the knowledge of good store layouts.
4. Understand about the merchandising techniques.
5. Understand the knowledge of presentation of the product.
6. Understand about the advance knowledge of visual merchandising according to theme and stories.

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BFD 502: ORGANIZATIONAL BEHAVIOUR	
Teaching Scheme Lectures: 1 hr./ week Labs: 3hrs/week Tutorials: Nil Credits: 4	Examination Scheme Class Test: 12Marks Teachers Assessment: 6 Marks Attendance: 12 marks End Semester Exam: 70 Marks

Prerequisite:BFD 456 Minor project, BFD 551-652 Portfolio Development, BFD 651 Graduation Design Collection, BFD 503 Industrial Learning and Internship

Course Objectives:

1. To give complete knowledge of organizational behavior.
2. To give an overview of different business ethics in fashion world.
3. To explain the concept of professional behavior in an industry or business.
4. To give knowledge of teamwork.

Detailed Syllabus

Module I: Introduction: Concept, nature, scope and importance of Organizational Behavior. It's interdisciplinary nature. Hawthorne experiments.
Module II: Perception: Definition, factors influencing and importance of perception. Perception process, perceptual errors and distortions due to stereotypes, halo effects, projection, Self-serving bias and attribution error and selective perception. Attitude: Concept of Attitude, Attitude and behavior, attitude formation, factors determining Attitude formation, Attitude measurement.
Module III: Motivation: Importance of Motivation. Theories of motivation – Maslow's, Herzberg's, McClelland's. McGregor's theory, Merits and demerits. Learning: Principles of learning. Factors in Human learning. Theories of Learning, Types of Reinforcement
Module IV: Personality: Definition, factors in shaping of personality, Theory of personality development by Freud, Personality traits influencing OB.
Module V: Inter-personal behavior: Importance of inter-personal relationships in organizations, Transactional analysis and its applications in organizations-JOHARI window and its managerial applications Group Dynamics: Concept of Groups & team. Types of Groups. Theories of Group Formation. Life cycle of group, Group norms and roles. Leadership: Types of Leader and styles. Stress Management and counseling.
Module VI: Conflict and Change: Meaning and Process of conflict, causes, sources, Consequences of conflict, conflict resolution strategies. Types of change, identification of the

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Problem and implementation of change, resistance to change, overcoming resistance to change.

Text and References books:

- 1. Organizational Behavior by Fred Luthans**
- 2. Organizational Behavior by Stephen P. Robbins**

Course Outcomes:

After completing the course, students will be able to:

1. Understand the working behavior of a business or industry.
2. Understand about the personality development in an organization.
3. Understand how we can work ethically in an organization.
4. Understand the principles of leadership and team work in an organization.
5. Understand the different work environment in any organization.
6. To increase the motivation and perception power of any worker.

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BFD 503: INDUSTRIAL LEARNING AND INTERNSHIP**Teaching Scheme**

Lectures: 1 hr./ week

Labs: 3hrs/week

Tutorials: Nil

Credits: 4

Examination Scheme

Class Test: 12Marks

Teachers Assessment: 6 Marks

Attendance: 12 marks

End Semester Exam: 70 Marks

Prerequisite: BFD651- Graduation Design Collection, BFD652- Portfolio Development-II**Course Objectives:**

1. To give complete knowledge of different sectors of fashion industry.
2. To give an overview of different departments involve in them.
3. To explain the concept of export, buying and domestic house
4. To give knowledge of different methods to export or import of any product.

Detailed Syllabus**Module I: Apparel Industry****Domestic industry**

- Export industry
- Buying house

Module II: Various departments of apparel manufacturing unit and workflow, Types of production processes in apparel industry**Module III: Different types of sewing machines, classification of stitches****Module IV: Presentation of Internship report****Text and References books:**

1.

Course Outcomes:

After completing the course, students will be able to:

1. Understand the working of different sectors of the export and import industry in fashion.
2. Understand the various departments involved in the production of fashion garments.
3. Understand how an industrial machine works on a large scale.
4. Understand the various parts and elements of the industrial machine with their working.
5. Understand the different work processes of the export house, buying house and domestic

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industry.

6. Understand the difference between the working and departments of different industrial houses.

BFD 504: Environmental Science

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Teaching Scheme Lectures: 1 hr./ week Labs: 3hrs/week Tutorials: Nil Credits: 4	Examination Scheme Class Test: 12Marks Teachers Assessment: 6 Marks Attendance: 12 marks End Semester Exam: 70 Marks
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Prerequisite: BFD 651 Graduation Design Collection

Course Objectives:

1. To give complete knowledge of environmental science.
2. To give an overview on different ways in which we can save our environment.
3. To explain the concept of different environmental issues and their problems.
4. To give knowledge of different aspects involve in saving the environment.

Detailed Syllabus

Module I: Definition, Scope & Importance, Need For public awareness- Environment definition, Eco system – Balanced ecosystem, Human activities – Food, Shelter, Economic and

social Security. Effects of human activities on environment-Agriculture, Housing, Industry, Mining and Transportation activities, Basics of Environmental Impact Assessment.

Module II: Natural Resources- Water Resources- Availability and Quality aspects. Water borne diseases, Water induced diseases, Fluoride problem in drinking water. Mineral Resources, Forest Wealth, Material cycles- Carbon, Nitrogen and Sulphur Cycles. Energy – Different types of energy, Electro-magnetic radiation. Conventional and Non-Conventional sources – Hydro Electric, Fossil Fuel based, Nuclear, Solar, Biomass and Bio-gas. Hydrogen as an alternative future source of Energy.

Text and References books:

1. Environmental Studies by Benny Joseph, Tata Mcgraw Hill; 2005
2. Environmental Studies by Dr. D.L. Manjunath, Pearson Education; 2006.
3. Environmental studies by R. Rajagopalan, Oxford Publication; 2005.

Reference:

1. Principles of Environmental Science and Engineering by P. Venugopalan Rao, Prentice Hall of India.
2. Environmental Science and Engineering by Meenakshi, Prentice Hall India.

Course Outcomes:

After completing the course, students will be able to:

1. Understand the importance of environmental science.
2. Understand about the public awareness and its need.

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3. Understand how we can design our garment in such way so that environment is not harmed.
4. Understand the availability of good and bad resources present in our environment.
5. Understand the advantages and disadvantages of the different types of resources we use in our design.
6. Understand our eco system.

BFD 551: PORTFOLIO DEVELOPMENT-I

Teaching Scheme
Lectures: 1 hr./ week

Examination Scheme
Class Test: 12Marks

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Labs: 3hrs/week Tutorials: Nil Credits: 4	Teachers Assessment: 6 Marks Attendance: 12 marks End Semester Exam: 70 Marks
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Prerequisite: BFD652- Portfolio Development- II, BFD 651 Graduation Design Collection

Course Objectives:

1. To give complete knowledge to students about how to display their work on professional level.
2. To give an overview of different digital and handmade medium to display their work.
3. To explain the concept of Portfolio Development in fashion world.
4. To give knowledge websites and social media to display their work.

Detailed Syllabus

Module I: Introduction to Portfolio preparation.
Module II: Development of Portfolio based upon Design assignments & projects of previous semesters
Module III: Portfolio Presentation
Module VII: Introduction of drapery in different color mediums.
<i>Text and References books:</i> 1. Visual Merchandising and Display by Martin. M. Pegler, 2. Retail Buying from Basics to Fashion by Richard Clodfelter, <i>References:</i> Note: Please note that since this is a project based subject the students would not be consulting any books but instead would have to conduct surveys and site visits to judge the nature of the enterprise so that they prepare their portfolio accordingly.

Course Outcomes:

After completing the course, students will be able to:

1. Understand the various platforms to display their work
2. Understand about the various methods to display their work professionally
3. Understand how we can creatively display our work on social media
4. Understand the different types of portfolio development and there use.
5. Understand the importance of portfolio development skills for our future careers.
6. Understand the compilation of whole semester work on different platforms.

BFD 552: Men's Wear	
Teaching Scheme Lectures: Nil Practical: 2hrs/week	Examination Scheme Class Test: 12Marks Teachers Assessment: 6 Marks

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Tutorials: 1 hr./ week
Credits: 3

Attendance: 12 marks
End Semester Exam: 70 Marks

Prerequisite: BFD 652 Portfolio Development-II, BFD 651 Graduation Design Collection

Course Objectives:

1. To give complete knowledge about the men's tailored garments.
2. To explain difference between the measurements of young and mature male body figure type.
3. To give an overview of shirt designs with variation of cuffs and collars.
4. To give knowledge about different lining, interlining and fusing required during the stitching of men's garments.
5. To explain complete knowledge about shirt manufacturing from design idea to actual construction.
6. To explain complete knowledge about construction of waist coat
7. To give knowledge about the stitching of trouser & its parts and their finishing.

Detailed Syllabus

Module I: Introduction

Tools and equipment's needed, grain, seam allowance, preparation of fabrics
Measurement differences among different figure types and age groups.

Module II: Drafting and construction of shirt

Module III: Variations of cuffs and collars

Module IV: Drafting and construction of waistcoat

Module V: Drafting and construction of trouser

Text and References books:

Armstrong, H.J., "Pattern making for fashion design", Pearson, 5th edition 2018.

Aldrich, W., "Metric pattern cutting for Men's wear", Wiley, 5th edition, 2005.

Kim, M., "Patternmaking for Menswear: Classic to Contemporary" Fairchild Books; Spi edition, 2014

Course Outcomes:

After completing the course, students will be able to:

1. Understand the constructional knowledge about the men's tailored garments
2. Understand difference between the body types and measurements of young and mature

male
3. Understand about cuffs and collar for different style of shirts.
4. Analyze the types of fabric used for tailored garment like lining, fusing, and interlining.
5. Understand the construction details of shirt, waist coat and trouser.
6. Understand complete knowledge about the constructional details of men's tailored garments

BFD 553 GARMENT CONSTRUCTION-IV

Teaching Scheme	Examination Scheme
Lectures: 1 hr./ week	Class Test: 12Marks
Tutorials: Nil	Teachers Assessment: 6 Marks
Credits: 4	Attendance: 12 marks

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BBT-701 : Structural Biology	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: BBT-501 Environmental Biotechnology, BBT-502 Genetic Engineering, BBT-503 Animal Biotechnology, BBT- 504 Bioprocess Engineering, BBT- 505 genomics and proteomics, BBT-506 Molecular Dynamics & Bioenergetics, BBT-551 Environmental Biotechnology Lab, BBT-552 Bioprocess Engineering Lab.

Course Objectives:

1. The course aims to provide the students with a detailed understanding of the behavior of proteins in solution and how their properties may be altered by changing the physical surroundings.
2. To provide an understanding of the theory and practical techniques involved in developing a purification process.

Detailed Syllabus

Unit-1 Chemistry of amino acids and peptides Side chain structure and function in protein folding and functionality: Secondary structure of proteins -helices, sheets, loops and turns; Structural and functional proteins. Tertiary structure of proteins, homo and hetero-dimers, trimers and tetramers; forces governing protein-protein interactions; open tertiary structure; Classification of proteins; structure of hemoglobin
Unit-2 Protein-ligand interactions: Lock and key versus handshake mechanism of substrate recognition; structural basis of recognition; reaction mechanisms of enzymes, G-Protein coupled receptors. Protein solubility, protein stability and stabilization Salting in and salting out, Parameters affecting; enthalpic and entropic stabilization, mutations increasing stability, helix capping; Native, partially denatured and denatured proteins; Protein denaturation, Physical and chemical denaturants

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Unit-3

DNA structure: Covalent structure of DNA, base pairing, hydrogen bonding, DNA melting and annealing, difference between AT and GC pairing, Watson Crick model; Crystal structure of B-DNA, major and minor grooves, dyad symmetry, base pair stacking, propellor twist, A and Z- DNA, triple stranded DNA, telomeric sequences and structure, G-quartets, palindromic and tandem sequences, Base pair flipping and DNA bulges, DNA methylation; Protein-DNA interactions; drug-DNA interactions; Databases of sequences and structure for protein and DNA, public domain softwares for visualizing and modeling biomolecules -Rasmol, Deepview, Whatif.

Text and Reference Books

1. Biochemistry, R.H. Abeles, P.A. Frey and W.A. Jencks, Jones and Bartlett.
2. Essentials of Molecular Biology, D. Freifelder, Jones and Bartlett Publications.
3. Genes VII, B. Lewin, Oxford University Press.
4. Introduction to Protein Structure, C. Branden and J Tooze, Garland Publishing Company.
5. Proteins (Structures and Molecular Properties), T.E. Creighton, W.H. Freeman and Company.
6. Database Annotation in Molecular Biology, Arthur M. Lesk.
7. Genes & Genomes, M.S. Paul Berg.
8. Structure and Mechanism in Protein Science, Alan Fersht.

Course Outcomes:

After completing the course, students will be able to:

1. At the end of this course, students will be able to understand methods to determine, study protein structures and structural knowledge on proteins.
2. Understand energetics and kinetics of proteins.

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BBT 702: Bioenterpreneurship	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: BBT-501 Environmental Biotechnology, BBT-502 Genetic Engineering, BBT-503 Animal Biotechnology, BBT- 504 Bioprocess Engineering, BBT- 505 genomics and proteomics, BBT-506 Molecular Dynamics & Bioenergetics, BBT-551 Environmental Biotechnology Lab, BBT-552 Bioprocess Engineering Lab.

Course Objectives:

1. Understanding basic concepts in the area of entrepreneurship,
2. Understanding the role and importance of entrepreneurship for economic development,
3. Developing personal creativity and entrepreneurial initiative,
4. Adopting of the key steps in the elaboration of business idea,
5. Understanding the stages of the entrepreneurial process.
6. The resources needed for the successful development of entrepreneurial ventures.

Detailed Syllabus

Unit-1

Accounting and Finance Taking decision on starting a venture; Assessment of feasibility of a given venture/new venture; Approach a bank for a loan; Sources of financial assistance; Making a business proposal/Plan for seeking loans from financial institution and Banks; Funds from bank for capital expenditure and for working; Statutory and legal requirements for starting a company/venture; Budget planning and cash flow management; Basics in accounting practices: concepts of balance sheet, P&L account, and double entry bookkeeping; Estimation of income, expenditure, profit, income tax etc.

Marketing Assessment of market demand for potential product(s) of interest; Market conditions, segments; Prediction of market changes; Identifying needs of customers including gaps in the market, packaging the product; Market linkages, branding issues; Developing distribution channels; Pricing/Policies/Competition; Promotion/ Advertising; Services Marketing

Unit-2

Negotiations/Strategy With financiers, bankers etc.; With government/law enforcement authorities; With companies/Institutions for technology transfer; Dispute resolution skills; External environment/changes; Crisis/ Avoiding/Managing; Broader vision–Global thinking.

Information Technology How to use IT for business administration; Use of IT in improving business performance; Available software for better financial management; E-business setup, management.

Human Resource Development (HRD) Leadership skills; Managerial skills; Organization structure, pros & cons of different structures; Team building, teamwork; Appraisal; Rewards in small scale set up.

Fundamentals of Entrepreneurship Support mechanism for entrepreneurship in India

Role of knowledge centre and R&D Knowledge centres like universities and research institutions; Role of technology and upgradation; Assessment of scale of development of Technology; Managing Technology Transfer; Regulations for transfer of foreign technologies; Technology transfer agencies.

Unit-3

Case Study

1. Candidates should be made to start a 'mock paper company', systematically following all the procedures.

- The market analysis developed by them will be used to choose the product or services.
- A product or service is created in paper and positioned in the market. As a product or services available only in paper to be sold in the market through the existing links. At this juncture, the pricing of the product or the service needs to be finalized, linking the distribution system until the product or services reaches the end consumer.
- Candidates who have developed such product or service could present the same as a project work to the Panel of Experts, including representatives from industry sector. If the presented product or service is found to have real potential, the candidates would be exposed to the next level of actual implementation of the project.

2. Go to any venture capital website (like sequoiacap.com) and prepare a proposal for funding from venture capital.

Course Outcomes:

After completing the course, students will be able to:

1. Explore entrepreneurial leadership and management style.
2. To explore different biotech business models and to acquire the fundamentals of biotech business management.
3. To understand the requirements of a biotech business plan in particular from the perspective of prospective funders.
4. To be able to manage issues in intellectual property and licensing as they pertain to biotech
5. To understand the nature of business incubation and its place in the biotech value chain.
6. To develop fundamental notions with regard to marketing in the biotech space and to understand the complexity of the interface between stakeholders.

BBT- 703 Medical Biotechnology	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: BBT-501 Environmental Biotechnology, BBT-502 Genetic Engineering, BBT-503 Animal Biotechnology, BBT- 504 Bioprocess Engineering, BBT- 505 genomics and proteomics, BBT-506 Molecular Dynamics & Bioenergetics, BBT-551 Environmental Biotechnology Lab, BBT-552 Bioprocess Engineering Lab.

Course Objectives:

1. The course aims to build on previous study and, through team-based research, student-led journal clubs and critical evaluation of scientific literature, challenge you to investigate new developments in selected, medical applications of biotechnology.

Detailed Syllabus

Unit-1 Classification of genetic diseases: Chromosomal disorders (Numerical disorders like trisomies & monosomies); Structural disorders (deletions, duplications, translocations & inversions); Chromosomal instability syndromes. Gene controlled diseases (Autosomal and Xlinked disorders) Molecular basis of human diseases: Pathogenic mutations. Gain of function mutations: Oncogenes, Huntingtons Disease. Loss of function: Tumour Suppressor. Genomic. Dynamic Mutations: Fragile- X syndrome, Myotonic dystrophy. Mitochondrial diseases
Unit-2 Prenatal diagnosis: Invasive techniques (Amniocentesis, Fetoscopy, Chorionic Villi Sampling (CVS) and Non-invasive techniques (Ultrasonography, X-ray, TIFA, maternal serum and fetal cells in maternal blood). Diagnosis using protein and enzyme markers, monoclonal antibodies. DNA/RNA based diagnosis Hepatitis, CML– bcr/abl, HIV-CD4 receptor. Clinical management and Metabolic manipulation – PKU, Familial Hypercholesterolemia, Rickets. Gene therapy - Ex-vivo, Invivo, Insitu gene therapy.
Unit-3 Vectors used in gene therapy Biological vectors (retrovirus, adenoviruses); Herpes Synthetic vectors (liposomes, receptor mediated gene transfer).

Gene therapy trials: Familial Hypercholesterolemia, Cystic Fibrosis, Solid tumors. Cell and tissue engineering: Stem cell Potential use of stem cells – Cell based therapies, Nanomedicine.

Text / Reference Books

1. Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine by Andrew J.T. George (Editor), Catherine E. Urch (Editor) Publisher: Humana Press; edition (2000)
2. Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) by Jochen Decker, U. Reischl Amazon
3. Human Molecular Genetics by T. Strachan, Andrew Read Amazon Sales Rank:
4. Principles of Biostatistics by Marcello Pagano , Kimberlee Gauvreau
5. Essentials of Epidemiology in Public Health, 2nd Edn by Ann Aschengrau , George R., III Seage

Course Outcomes:

After completing the course, students will be able to:

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| 1. Research, evaluate and critically assess the theoretical basis and practical application of selected medical biotechnologies. |
| 2. Demonstrate knowledge and understanding of selected medical biotechnologies. |
| 3. Describe in detail essential facts and theory in molecular biology and biotechnology when applied to medicine. |
| 4. Describe and critically evaluate aspects of current research in the biosciences with reference to reviews and research articles |
| 5. With limited guidance, deploy established techniques of analysis and enquiry within the biosciences. |

BBT- 704 Biosensors	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: BBT-501 Environmental Biotechnology, BBT-502 Genetic Engineering, BBT-503 Animal Biotechnology, BBT- 504 Bioprocess Engineering, BBT- 505 genomics and proteomics, BBT-506 Molecular Dynamics & Bioenergetics, BBT-551 Environmental Biotechnology Lab, BBT-552 Bioprocess Engineering Lab.

Course Objectives:

1. The course aims to provide education that prepares students to lead, innovate, and self-educate throughout their careers in bioengineering and biomedical professions and industries.
2. The course will also provide understanding of biosensors, optical and ultrasonic sensors.

Detailed Syllabus

Unit-1 Biosensors: Definition, History, Principle and types of biosensors. Properties of biosensors, Design features of Biosensors, The Biological Component, Signal Transduction: Amperometric Biosensors, Potentiometric Biosensors, Detection of H ⁺ cation, Detections of NH ₄ ⁺ cation, Detection of CN ⁻ anion, Calorimetric biosensors, Optical Biosensors, Measuring the change in light reflectance, Measuring luminescence, Pizo-electric biosensors, Immunosensors.
Unit-2 Commercial examples of biosensors. Biosensors markets- Opportunities and obstacles. Introduction to MEMS (Micro-Electro-Mechanical Systems). Applications of MEMS in Biotechnology and medicine. Fabricating MEM S and Nanotechnology
Unit-3 Biomedical sensors Sensors and transducers: an overview, measurement systems, Classification of Biomedical sensors and transducers, who do we need Biomedical sensors and Transducers? Important Design considerations and system calibration, the future of Biosensors and Transducers, Sensing Layer: The importance of computers in sensors and Transducer technology. Biosensors and Transducers in modern health care solutions.
Text / Reference Books 1. Affinity Biosensors: Techniques and Protocols, K.R. Rogers and A. Mulchandani, Humana Press. 2. Biosensors and their Applications, V.C. Yang and T.T. Ngo, Plenum Publishing Corporation.

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| 3. Chemical Sensors and Biosensors, B.R. Eggins, John Wiley and Sons Inc.
4. Sensors and Sensing in Biology and Engineering, F.G. Barth, wt al, Springer Verlag. |
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Course Outcomes:

After completing the course, students will be able to:

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| 1. With limited guidance, deploy established techniques of analysis and enquiry within the biosciences. |
| 2. Explain basic concepts of transducers. |
| 3. Elucidate different types of electrodes used in bio-potential recording. |
| 4. Differentiate biosensors, optical and ultrasonic sensors |
| 5. Analyze, formulate and select suitable sensor/biosensor. |

MST 301: BIOPROCESS ENGINEERING	
Teaching Scheme Lectures: 4 hrs/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - MST101, MST151 Biochemistry, MST103, MST153 Molecular Biology, MST202, MST252 Microbiology & Industrial Applications, MST203, MST253 Genetic Engineering.

Course Objectives:

1. To understand the basic of fermentation, different bioreactor design, different media used for the fermentation of product, overview of product produced by biotechnological industries.
2. To learn the different instrumentation used for the downstream processing of different products.
3. To learn and have complete knowledge of type of enzymes and different fermented food products of different industries.
4. To understand how downstream processing instrumentation works or they can use like crystallization, during, liquid-liquid extraction, centrifugation, chromatography etc.
5. To learn the enzyme kinetics, microbial kinetics, thermal kinetics and the application of these in fermentation.
6. To expertise in the process involved in the effluents or waste of fermentation industries by latest technologies involved in treatment of waste like, Activated sludge process, Rotating Disk Biological Contractor (RBC) etc.

Detailed Syllabus

Unit-1 <i>Basic principle of Biochemical engineering</i> Isolation, screening and maintenance of industrially important microbes; Microbial growth and death kinetics (an example from each group, particularly with reference to industrially useful microorganisms); Strain improvement for increased yield and other desirable characteristics.
Unit-2 <i>Concepts of basic mode of fermentation processes</i> Bioreactor designs; Types of fermentation and fermenters; Concepts of basic modes of fermentation - Batch, fed batch and continuous; Conventional fermentation v/s biotransformation; Solid substrate, surface and submerged fermentation; Fermentation economics; Fermentation media; Fermenter design- mechanically agitated; Pneumatic and hydrodynamic fermenters; Large scale animal and plant cell cultivation and air sterilization; Upstream processing: Media formulation; Sterilization; Aeration and agitation in bioprocess; Measurement and control of bioprocess parameters; Scale up and scale down process..
Unit-3 <i>Downstream processing</i> Bioseparation - filtration, centrifugation, sedimentation, flocculation; Cell disruption; Liquid-liquid extraction; Purification by chromatographic techniques; Reverse osmosis and ultra filtration; Drying; Crystallization; Storage and packaging; Treatment of effluent and its disposal.

Unit-4

Applications of enzymes in food processing Mechanism of enzyme function and reactions in process techniques; Enzymic bioconversions e.g. starch and sugar conversion processes; High-Fructose Corn Syrup; Interesterified fat; Hydrolyzed protein etc. and their downstream processing; baking by amylases, deoxygenation and desugaring by glucoses oxidase, beer mashing and chill proofing; cheese making by proteases and various other enzyme catalytic actions in food processing.

Applications of Microbes in food process operations and production Fermented foods and beverages; Food ingredients and additives prepared by fermentation and their purification; fermentation as a method of preparing and preserving foods; Microbes and their use in pickling, producing colours and flavours, alcoholic beverages and other products; Process wastes-whey, molasses, starch substrates and other food wastes for bioconversion to useful products; Bacteriocins from lactic acid bacteria – Production and applications in food preservation.

Unit-5

Enzyme kinetics; Two-substrate kinetics and pre-steady state kinetics; Allosteric enzymes; Enzyme mechanism; Enzyme inhibitors and active site determination Production, recovery and scaling up of enzymes and their role in food and other industries; Immobilization of enzymes and their industrial applications.

Text and Reference Books

1. Jackson AT., Bioprocess Engineering in Biotechnology, Prentice Hall, Engelwood Cliffs, 1991.
2. Shuler ML and Kargi F., Bioprocess Engineering: Basic concepts, 2nd Edition, Prentice Hall, Engelwood Cliffs, 2002.
3. Stanbury RF and Whitaker A., Principles of Fermentation Technology, Pergamon press, Oxford, 1997
4. Baily JE and Ollis DF., Biochemical Engineering fundamentals, 2nd Edition, McGraw-Hill Book Co., New York, 1986.
5. Aiba S, Humphrey AE and Millis NF, Biochemical Engineering, 2nd Edition, University of Tokyo press, Tokyo, 1973.
6. Comprehensive Biotechnology: The Principles, Applications and Regulations of Biotechnology in Industry, Agriculture and Medicine, Vol 1, 2, 3 and 4. Young M.M., Reed Elsevier India Private Ltd, India, 2004.

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand various types of fermentation mode of operation and their kinetics. |
| 2. Analyze the effect of various fermentation and downstream processes involved in the synthesis of products. |
| 3. Understand the enzyme production and their application involved in modern world. |
| 4. Understand the instrumentation involved in the downstream processing of products produced by different pharmaceutical and biotechnological industries. |
| 5. Evaluate performance of different fermentation processes i.e., whose work in batch and continuous mode of operation. |
| 6. Will understand the production and application of some enzymes used in food and biotechnological industries. |

MST 302: BIOENERGETICS AND METABOLISM	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - MST101, MST151 Biochemistry, MST103, MST153 Molecular Biology, MST201, MST 251 Analytical Techniques.

Course Objectives:

1. To understand the basic of bioenergetics and thermodynamics which include laws of thermodynamics, biological oxidation and dehydrogenation etc.
2. To learn the few cellular metabolisms, their pathways involved inside a cell like glycolysis etc.
3. To learn and have complete knowledge of type of metabolic strategies like TCA.
4. To understand how energy is transported and electron regulation during a cellular metabolism.
5. To learn the metabolism and regulation of amino acid synthesis in an organism.
6. To expertise in the process involved in estimation and governance of different metabolic strategies.

Detailed Syllabus

Unit-1 Bioenergetics and Thermodynamics: System, surroundings, universe, energy, matter, etc., Laws of Thermodynamics, Gibbs free energy, Equilibrium Constant, Enthalpy, Entropy. Energy Yielding and Energy Requiring Reactions, Energy Conversions, Calculations of Equilibrium Concentrations, Oxidation-Reduction Reactions, Structure and properties of ATP, Transphosphorylations. Biological Oxidations and dehydrogenation. Activation Energy.
Unit-2 Glycolysis and Fermentation, Fates of pyruvate, preparatory phase and payoff phase of Glycolysis, Balance sheet of glycolysis, Regulation of glycolysis. Feeder pathways for glycolysis. Gluconeogenesis: energetically expensive pathway, Regulation of gluconeogenesis, the Pentose phosphate Pathway: Oxidative and nonoxidative phase of PPP.
Unit-3 Metabolic Strategies: General Principles of Intermediary Metabolism, Regulation of Pathways, Strategies for Pathway Analysis. The Tricarboxylic Acid Cycle: Discovery of the TCA Cycle, Steps in the TCA Cycle, Stereo-chemical aspects of TCA cycle reactions, ATP stoichiometry of TCA cycle, thermodynamics of the TCA Cycle, amphibolic nature of TCA Cycle. Oxidation of other substrates by TCA Cycle, Regulation of TCA Cycle, The Glyoxylate Cycle.
Unit-4 Electron transport and oxidative phosphorylation: electron carriers, complexes I to IV, Chemiosmotic theory, substrate level phosphorylation, Plant phenolics, alkaloids: classification and functions. Plant hormones: structure and biological functions. Lipid metabolism: Biosynthesis and degradation of odd carbon and even carbon. Saturated and unsaturated fatty acids, formation and of ketone bodies, regulation of lipid metabolism, associated inborn errors.

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MST303: GENETICS	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - MST103, MST153 Molecular Biology, MST102, Cell and development biology, MST105 Computer application and statistics.

Course Objectives:

1. To understand the basic of bacterial mutation which include their types, gene transfer from one to another etc.
2. To learn about the association of gene in the genome and how they are expressed in other parts of genome like transposable elements or jumping genes.
3. To learn and have complete knowledge of type of plasmids and their important in genetics and recombinant DNA technology.
4. To understand how Mendelian Genetics plays important role in understand the concept, by the virtue of different laws that he proposed.
5. To learn the basic terminology and concept of cytogenetics, how cell divide? How information transfer from one to another etc .
6. To expertise themselves in understanding the concepts of evolution and how population genetics works.

Detailed Syllabus

Unit-1 <i>Bacterial mutants and mutations</i> Isolation; Useful phenotypes (auxotrophic, conditional, lethal, resistant); Mutation rate; Types of mutations(base pair changes; frameshift; insertions; deletions; tandem duplication); Reversion vs. suppression; Mutagenic agents; Mechanisms of mutagenesis; Assay of mutagenic agents (Ames test) <i>Gene transfer in bacteria</i> History; Transduction – generalized and specialized; Conjugation – F, F', Hfr; F transfer; Hfr-mediated chromosome transfer; Transformation – natural and artificial transformation; Merodiploid generation; Gene mapping; Transposable genetic elements; Insertion sequences; Composite and Complex transposons; Replicative and non-replicative transposition; Genetic analysis using transposons.
Unit-2 <i>Bacteriophages and Plasmids</i> Bacteriophage–structure; Assay; Lambda phage – genetic map, lysogenic and lytic cycles; Gene regulation; Filamentous phages such as M13; Plasmids – natural plasmids; their properties and phenotypes; Plasmid biology - copy number and its control; Incompatibility; Plasmid survival strategies; Antibiotic resistance markers on plasmids (mechanism of action and resistance); Genetic analysis using phage and plasmid <i>Restriction-modification systems</i> History; Types of systems and their characteristics; Methylation-dependent restriction systems; applications.
Unit-3 <i>Mendelian Genetics</i> Introduction to human genetics; Background and history; Types of genetic diseases; Role of genetics in medicine; Human pedigrees; Patterns of single gene inheritance-autosomal recessive; Autosomal dominant; X linked inheritance; Complicating factors - incomplete penetrance; variable expression; Multiple alleles; Co dominance; Sex influenced expression; Hemoglobinopathies - Genetic disorders of hemoglobin and their diseases. <i>Non Mendelian inheritance patterns</i> Mitochondrial inheritance; Genomic imprinting; Lyon hypothesis; isodisomy; Complex inheritance-genetic. Heritability; Twin studies; Behavioral traits; Analysis of quantitative and qualitative traits

Unit-4

Cytogenetics Cell division and errors in cell division; Non disjunction; Structural and numerical chromosomal abnormalities – deletion; duplication; translocation; Sex determination; Role of Y chromosome; Genetic recombination; Disorders of sex chromosomes and autosomes; Molecular cytogenetics – Fluorescence In Situ Hybridization (FISH); Comparative Genomic Hybridization (CGH). **Developmental genetics** Genes in early development; Maternal effect genes; Pattern formation genes; Homeotic genes; Signaling and adhesion molecules. **Immunogenetics** Major histocompatibility complex; Immunoglobulin genes - tissue antigen and organ transplantation; Single gene disorders of immune system.

Unit-5

Genetic variation Mutations; kinds of mutation; agents of mutation; genome polymorphism; uses of polymorphism. **Gene mapping and human genome project** Physical mapping; linkage and association. **Population genetics and evolution** Phenotype; Genotype; Gene frequency; Hardy Weinberg law; Factors distinguishing Hardy Weinberg equilibrium; Mutation selection; Migration; Gene flow; Genetic drift; Human genetic diversity; Origin of major human groups.

Text and Reference Books

1. S.R. Maloy, J.E. Cronan, D. Friefelder, Microbial Genetics, 2nd Edition, Jones and Bartlett Publishers, 1994.
2. N. Trun and J. Trempy, Fundamental Bacterial Genetics, Blackwell publishing, 2004.
3. Strachan T and Read A P, Human molecular genetics, 3rd Edition Wiley Bios, 2006.
4. Mange E J and Mange A. P., Human genetics, 2nd Edition, Sinauer Associates publications, 1999.

Course Outcomes:

After completing the course, students will be able to:

1. Understand basics of genetics by experiencing the experimentation used by Mendal.
2. Analyze the bacterial transformation and gene transfer.
3. Understand the importance of mutation and how the mutation can be fruitful for the human kind.
4. Understand the principle of cytogenetics and learn different kind of genetic disorders.
5. Will learn how gene function can be judged, importance of human genome project.
6. Will analyze and learn to determine the changes in genes in population genetics .

MST304: TISSUE CULTURE	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - MST101, MST151 Biochemistry, MST103, MST153 Molecular Biology, MST201, MST 251 Analytical Techniques.

Course Objectives:

1. To understand the basic of tissue culture methods in respect to animal and plant cell culture system in lab.
2. To learn few culturing methods that will help to understand the methods to prepare tissue cultures by Enzymatic, mechanical etc.
3. To learn and have complete knowledge of type of organ culture and their scale up.
4. To understand the isolation, preservation and maintenance of important tissue culture used for various purposes.
5. To learn cloning methods for the improvement of culture and their application in modern world.
6. To expertise in the process involved in animal and plant tissue culture and their associated methodology.

Detailed Syllabus

Unit-1 Animal tissue culture: Introduction- advantages and disadvantages of tissue culture; equipment for a tissue culture laboratory; aseptic techniques- sterile handling, standard procedures, sterilization; Culture vessels- substrates ; Media- properties, natural media, artificial media- serum containing media, serum free media , chemically defined media.
Unit-2 Primary culture- isolation of tissue by enzymatic methods, mechanical methods; Cell line- sub culture, routine maintenance, suspension culture, adherent culture, Cell quantitation- cell counting, Cytotoxicity- Viability assay using dye, cell proliferation assay, metabolic assay; Cryopreservation- need, methods and stages of cryopreservation. Contamination- source, monitoring for contamination.
Unit-3 Organ culture; Tumor cells & transformation; Scale up- batch culture, continuous culture, Scale up in monolayer; scale up in – suspension culture, Animal tissue culture products & application- vaccines, monoclonal antibodies, enzymes, hormones, factors.
Unit-4 Plant tissue culture- Introduction ; Methods- media preparation, aseptic techniques, sterilization, pretreatment to explant tissue; Callus culture, Meristem culture, Organ culture, Cryopreservation. Somatic hybridization- isolation of protoplast, viability testing of protoplast ,protoplast fusion, regeneration of plant, selection of fusion hybrid.
Unit-5 Cloning, Large scale culture, Somatic embryogenesis- development & application; Micropropagation – advantages, methods, application; Biochemical production, Somaclonal variation.

Text and Reference Books

1. Freshney, *Culture of Animal Cells*, 5th Edition, Wiley-Liss, 2005
2. Ed. Martin Clynes, *Animal Cell Culture Techniques.*, Springer, 1998.
3. B.Hafez, E.S.E Hafez, *Reproduction in Farm Animals*, 7th Edition, Wiley- Blackwell, 2000.
4. *Plant tissue culture: SS Bhojwani and M.K. Razdan*, Elsevier Science, The Netherlands.
5. *Cell culture methods and cell biology procedure: A. Doyle.*
6. *Plant Tissue Culture – A practical Apporch: R.A. Dixon*, IRL press.
7. *Cell and Tissue Culture: Lab procedures in biotechnology*, Alan Doyal (ed) J.Bryan Griffth
8. Doods. J.H. & Roberts L.W. (1985). *Experiments in plant tissue culture* Cambridge Univ.
9. *Animal or Animal cell & tissue culture techniques 5th freshness.*

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand basics of tissue culture. |
| 2. learn the methods involved for the isolation and preservation of animal and plant tissues. |
| 3. Understand the concept to do the experimentation in aseptic condition and analyze the outcome of it. |
| 4. Understand the principle and media used for culture of different cell lines. |
| 5. Will learn the application of tissue culture methods adopted in the animal and plant cell lines. |
| 6. Will analyze and learn the methods associated with the large scale production different tissue cultures. |

MST305: BIOENTERPRENUERSHIP	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - , MST105 Computer application and statistics

Course Objectives:

1. To understand the basic of accounting and finance for the start up of any industry.
2. To learn the procedure for deciding the marketing strategies for the product and analyze the product demand and supply.
3. To learn and have complete knowledge about the management and entrepreneurship.
4. To understand how Information technology and software has a regulatory role in entrepreneurship.
5. To learn the organization of human resource for the upliftment of the organization.
6. To get expertise in entrepreneurship by understand a case study of any organization about the various pits and falls.

Detailed Syllabus

Unit-1 Accounting and Finance Taking decision on starting a venture; Assessment of feasibility of a given venture/new venture; Approach a bank for a loan; Sources of financial assistance; Making a business proposal/Plan for seeking loans from financial institution and Banks; Funds from bank for capital expenditure and for working; Statutory and legal requirements for starting a company/venture; Budget planning and cash flow management; Basics in accounting practices: concepts of balance sheet, P&L account, and double entry bookkeeping; Estimation of income, expenditure, profit, income tax etc.
Unit-2 Marketing Assessment of market demand for potential product(s) of interest; Market conditions, segments; Prediction of market changes; Identifying needs of customers including gaps in the market, packaging the product; Market linkages, branding issues; Developing distribution channels; Pricing/Policies/Competition; Promotion/ Advertising; Services Marketing Fundamentals of Entrepreneurship Support mechanism for entrepreneurship in India.
Unit-3 Negotiations/Strategy With financiers, bankers etc.; With government/law enforcement authorities; With companies/Institutions for technology transfer; Dispute resolution skills; External environment/changes; Crisis/Avoiding/Managing; Broader vision–Global thinking. Information Technology How to use IT for business administration; Use of IT in improving business performance; Available software for better financial management; E-business setup, management.
Unit-4 Human Resource Development (HRD) Leadership skills; Managerial skills; Organization structure, pros & cons of different structures; Team building, teamwork; Appraisal; Rewards in small scale set up. Role of knowledge centre and R&D Knowledge centres like universities and research institutions; Role of technology and upgradation; Assessment of scale of development of Technology; Managing Technology Transfer; Regulations for transfer of foreign technologies; Technology transfer agencies.

Unit-5

Case Study

1. Candidates should be made to start a 'mock paper company', systematically following all the procedures.
 - The market analysis developed by them will be used to choose the product or services.
 - A product or service is created in paper and positioned in the market. As a product or services available only in paper to be sold in the market through the existing links. At this juncture, the pricing of the product or the service needs to be finalized, linking the distribution system until the product or services reaches the end consumer.
 - Candidates who have developed such product or service could present the same as a project work to the Panel of Experts, including representatives from industry sector. If the presented product or service is found to have real potential, the candidates would be exposed to the next level of actual implementation of the project.
2. Go to any venture capital website (like sequoiacap.com) and prepare a proposal for funding from venture capital.

Text and Reference Books

1. *Human Resource Management (14th Edition)* By Gary Dessler.
2. *Digital Business and E-Commerce Management*, Pearson, 6th Edition by Dave Chaffey
3. *Fundamentals of Entrepreneurship*. Author, H. Nandan. Publisher, PHI Learning Pvt. Ltd., 2011.

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand basics of entrepreneurship. |
| 2. Analyze the marketing strategies of the product. |
| 3. Understand the problems associated with the negotiation and their strategies. |
| 4. Understand the Human resource structure of an organization and its regulation as required. |
| 5. Will learn how research and development is important for the knowing the strategies. |
| 6. Will analysis and learn how a particular industry works in terms of service, manufacturing etc. |

MMB301: MICROBIAL PATHOGENICITY	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - MMB101, Microbial Ecology, MMB205, Environmental microbiology, MMB-302; Plant -Pathogen Interactions.

Course Objectives:

- 1.To provide broad overview of microbial pathogenicity and its relevance.
2. To explain pathogenicity postulates and the microbial virulence and its mechanisms.
3. To explain role of environment and the genetic basis and mechanisms and features of pathogens.
- 4 To explain emerging and re-emerging pathogens and its basis and adaptation in environment.
5. To provide an overview of molecular and biochemical tools to study microorganisms.
6. To explain vector and non vector based diseases and its sources, diagnostic tools and controls.

Detailed Syllabus

Unit-1 Classical view of microbial pathogenicity: Define pathogenicity and virulence; Quantitative measures of virulence: minimal lethal dose (MLD), LD50, ID50, TCID50. Virulence determinants: colonization, toxins, enzymes and invasiveness. Facultative / obligate intracellular pathogens.
Unit-2 Molecular microbial pathogenicity: Molecular Koch's postulates, multiplicity of virulence features, coordinated regulation of virulence genes, two component signal transduction systems and environmental regulation of virulence determinants, antigenic variation; clonal and panmictic nature of microbial pathogens, type I-IV secretion systems, biofilms and quorum sensing.
Unit-3 Emerging and re-emerging pathogens: Illustrate emerging and re-emerging pathogens using V. cholerae O: 139, X-MDR M. tuberculosis, Helicobacter pylori, Enterohaemorrhagic E. coli (EHEC), Cryptosporidium parvum, Lyme disease, SARS virus, Bird flu, prions, AIDS, Dengue Hemorrhagic Fever, and Chlamydiae, opportunistic fungal pathogens. Mechanisms of emergence of new pathogens: microbial change and adaptation, horizontal gene transfer (HGT), pathogenicity islands (PAI), role of integrons.
Unit-4 Molecular microbial epidemiology: Objectives of microbial epidemiology. Biochemical and Immunological tools - Biotyping, serotyping, phage typing, FAME, Curie Point PyMS, protein profiling, multilocus enzyme electrophoresis (MLEE); Molecular typing: RFLP (ribotyping, IS based), RAPD, 16S-23S IGS, ARDRA, rep (REP, ERIC, BOX)-PCR, PFGE, AFLP, MLST, MVLST, VNTR, SNP, Microarray and whole genome sequence; GIS.

Unit-5

Environmental change and infectious diseases: Global warming lead increase in vector-borne and water-borne infectious diseases; Impact of increasing urbanization, international travel and trade on infectious diseases. **Antimicrobial resistance:** Recent concepts – Multidrug efflux pumps, extended spectrum β -lactamases (ESBL), XMDR M. tuberculosis, Methacillin-resistant S. aureus (MRSA). **Newer vaccines:** Recombinant vaccines, subunit vaccines, DNA vaccines, Vaccinia, BCG and HIV–vector based Vaccines **Rapid diagnostic principles:** Nucleic acid probes in diagnostic microbiology, nucleic acid amplification methods, Real-time PCR, diagnostic sequencing and mutation detection, molecular typing methods, array technology.

Text and Reference Books

1. Jawetz, Melnick, & Adelberg's Medical Microbiology by Brooks GF, Butel JS, Morse SA, Melnick JL, Jawetz E, Adelberg EA. 23rd edition. Lange Publication. 2004.
2. Cellular Microbiology by Cossart P, Boquet P, Normark S, Rappuoli R eds. 2nd edition. American Society for Microbiology Press. 2005.
3. Bacterial Pathogenesis: A molecular approach by Salyers AA and Whitt DD eds. American Society for Microbiology Press, Washington, DC USA. 2002.
4. Pathogenomics: Genome analysis of pathogenic microbes by Hacker J and Dorbindt U. ed. Wiley-VCH. 2006.
5. Molecular Microbiology: Diagnostic Principles and Practice by Persing DH, Tenover FC, Versalovic

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand concepts on pathogens and pathogenicity. |
| 2. Analyze and understand the virulence features and use its quantitative measures. |
| 3. Identify the pathogenicity and use/ know about tools and techniques to study pathogens. |
| 4. Understand occurring and re-occurring pathogenicity, cause and the mechanisms |
| 5. To understand the vectors and the source and the prevalence in environments |
| 6. Understand the recent methods its principles and its applications to study microorganisms |
| 7. To understand concepts on vaccines and recombinant technologies for controlling certain pathogens. |

MMB-302: PLANT-PATHOGEN INTERACTION	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - MMB101, MMB-302, Basic concepts of microbiology, plant and the functional role of microorganism, plant pathology.

Course Objectives:

1. To give an overview on disease, disease triad and the plant physiology and microbial interaction with plants.
2. To give overview of pathogen infecting the plants, interaction and infection and progression.
3. To describe the biochemical basis of plant disease and the pathogen infecting various plant.
4. To explain the genetic basis of plant disease, disease resistance or susceptibility concept and genes and mechanisms in disease controls.
5. To explain approaches for plant protection and the disease forecasting.

Detailed Syllabus

Unit-1 Concepts and physiology of plant diseases: What is a disease, its causes, pathogenesis in relation to environment, effect of microbial infections on plant physiology, photosynthesis, respiration, transpiration, translocation.
Unit-2 Biochemical basis of plant diseases: Enzymes and toxins in plant diseases, phytoalexins. Some important plant diseases and their etiological studies: Crown gall, symptoms of viral diseases and their control, diseases of some important cereals, vegetables and crops.
Unit-3 Genetically basis of plant diseases and molecular approach: Genetics of host-pathogen interactions, resistance mechanism and resistance genes in plants. Molecular diagnosis, its futuristic vision, applications and constraints. Transgenic approach for plant protection.
Unit-4 Disease control: Principles of plant disease control, physical and chemical methods of disease control, biocontrol, biocontrol agents - concepts and practices, fungal agents, Trichoderma as biocontrol agent, biocontrol agents – uses and practical constraints.
Unit-5 Disease forecasting: History and important milestones in disease control, disease forecasting and its relevance in Indian farming.

Text and Reference Books

1. *Plant pathology* by George N. Agrios: 4th ed., Academic press, New York, 1969.
2. *Bacterial plant pathology, cell and molecular aspects* by David C. Sige, Cambridge University Press, 1993.
3. *Bacterial plant pathology, cell and molecular aspects* by David C. Sige, Cambridge University Press, 1993.
4. *Molecular plant pathology* by M. Dickinson: BIOS Scientific Publishers, London, 2003.
5. *The essentials of Viruses, Vectors and Plant diseases* by A.N. Basu & B.K. Giri: Wiley Eastern Limited, 1993.
6. *Biocontrol of Plant Diseases (Vol. I)* by K.G. Mukerji & K.L. Garg: CRC Press, Inc., Boca Raton, Florida, 1988.

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand plant and microorganism interaction and pathogenesis |
| 2. Understand the current agriculture practices and factors and basis for the diseases. |
| 3. Understand the genetic basis of disease, its progression and the basis to control |
| 4. Identify the technique that are useful to control some the common diseases in plants |
| 5. Identifying the plant biocontrol and the strains, or microorganisms for effective antagonisms and plant growth promotion and the chemical and physical control methods. |
| 6. Understand the disease forecasting methods and its relevance in Indian farming. |

MMB-303: MICROBIAL GENETICS	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Prerequisite: - MMB101, Basic concepts of genetics, microbiology and genomics

Course Objectives:

1. To give an overview of basic principles of genetics, inheritance and the hypothesis testing to study heredity.
2. To give overview of genes and the allelic variations.
3. To describe the inheritance pattern of genes to chromosomes and the genetic disorders.
4. To explain the chromosome mapping techniques and the genetic distance.
5. To explain the allelic frequency and concepts of population genetics and genetic drift.
6. To explain the effects of inbreeding and the genetic analysis of inbreeding and measuring the genetic relationships.

Detailed Syllabus

Unit-1 MENDELISM- The basic principles of inheritance: A Scientific Revolution, Mendel's Study of Heredity: Mendel's Experimental Organism, The Garden Pea, Monohybrid Crosses: The Principles of Dominance and Segregation, Dihybrid Crosses: The Principle Of Independent Assortment, Applications of Mendel's Principles, The Punnett Square Method, The Forked-Line Method, The Probability Method, Testing Genetic Hypotheses: The Chi-Square Test, Mendelian Principles in Human Genetics: Pedigrees, Mendelian Segregation in Human Families, Genetic Counseling.
Unit-2 EXTENSIONS OF MENDELISM- Genetics Grows Beyond Mendel's Monastery Garden, Allelic Variation and Gene Function, Incomplete Dominance and Co-dominance, Multiple Alleles, Allelic Series, Testing Gene Mutations for Allelism, Variation Among the Effects of Mutations, Genes Function to Produce Polypeptides. Gene Action: From Genotype to Phenotype; Influence of the Environment, Environmental Effects on the Expression of Human Genes, Penetrance and Expressivity, Gene Interactions, Epistasis, Pleiotropy, Inbreeding: Another Look at Pedigrees; The Effects of Inbreeding, Genetic Analysis of Inbreeding, Measuring Genetic Relationships.
Unit-3 THE CHROMOSOMAL BASIS OF MENDELISM- Genes and Chromosomes. The Chromosome Theory of Heredity, Experimental Evidence Linking The Inheritance of Genes to Chromosomes, Nondisjunction as Proof of the Chromosome, Theory the Chromosomal Basis of Mendel's Principles, Segregation and Independent Assortment Sex Chromosome Nondisjunction, Tracking X-Linked, and Autosomal Inheritance, Sex-Linked Genes in Humans, Hemophilia, An X-Linked Blood-Clotting Disorder, Color Blindness, An X-Linked Vision Disorder.
Unit-4 Linkage, Crossing Over, and Chromosome Mapping in Eukaryotes- The World's First Chromosome Map, Linkage, Recombination, and Crossing, Over: Early Evidence for Linkage and

Recombination, Crossing Over as the Physical Basis of Recombination, Evidence that Crossing Over Causes, Recombination, Chiasmata and the time of Crossing Over, Chromosome Mapping: Crossing Over as a Measure of Genetic Distance, Recombination Mapping with a Two-Point, Testcross.

UNIT-5

Population Genetics- A Remote Colony, The Theory of Allele Frequencies, Estimating Allele Frequencies, Relating Genotype Frequencies To Allele, Frequencies: The Hardy–Weinberg Principle, Applications Of The Hardy–Weinberg Principle, Exceptions To The Hardy–Weinberg Principle, The Effects of Inbreeding on Hardy-, Weinberg Frequencies:, Using Allele Frequencies In Genetic Counseling, Natural Selection: The Concept Of Fitness, Natural Selection At The Level Of The Gene, Selection Against a Harmful Recessive, Allele, Random Genetic Drift: Random Changes In Allele Frequencies, The Effects Of Population Size, Applying Genetic Drift, to Pitcairn Island, Populations in Genetic Equilibrium, Balancing Selection, Mutation-Selection Balance, Mutation-Drift Balance.

Text and Reference Books

1. *Molecular Genetics of Bacteria* by Larry Snyder and Wendy Champness, 3rd edition; ASM press; 2007.
2. *Fundamental Bacterial Genetics* by Nancy Trun and Janine Trempy, 1st edition; Blackwell Science Publishers; 2004.
3. *Modern Microbial Genetics* by U.N. Streips and R.E. Yasbin, 2nd edition; Wiley Publishers; 2002.
4. *Microbial Genetics* by Stanley.

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand the concepts of genetics and the role of inheritance and the genetic variations. |
| 2. Analyze the effect of crosses and the principles in heredity. |
| 3. Identify the allelic variation and the gene functions such as of multiple alleles |
| 4. Understand normal and abnormal combustion gene and gene functions. |
| 5. Evaluate the linkages and the chromosomes mapping and evaluations. |
| 6. Understand the population genetics, genetic influences and the mutation drift |

MFT-103 Instrumentation and Analytical Techniques	
Teaching Scheme Lectures: 3 hr./ week Tutorials: 1 Credits: 4	Examination Scheme Class Test: 12 Marks Teachers Assessment: 6 Marks Attendance: 12 marks End Semester Exam: 70 Marks

Course Objectives:

1. To give knowledge of various process variables in food processing.
2. To give knowledge about principles and equipments related to various food technologies.
3. Gives knowledge of various chromatographic techniques.
4. To impart knowledge on technology various sensor based system in food technology.

Detailed Syllabus

MODULE I
Process variables in food processing industries: Canned and bottled fruits and vegetables, Beer, Ciders, Soft drinks, Sugar, Jams and Jellies, Black tea. Classification of transducers: Definitions, active and passive transducers, resistive, capacitive, inductive, magnetic, optical, hall sensors. Moisture measurements: Role of moisture in food, weigh and dry method, microwave absorption method, RF, IR, DC resistance technique, moisture release measurement. Humidity measurement: Role in food processing, types, wet and dry bulb hygrometer, Electronic methods. Turbidity and colour: Role, standards and Modules, basic turbidity meter, light scattering type, absorption type, reflectance type colour measurement, digital image processing method.
MODULE II
Food flow and viscosity: Magnetic flow meter, flow meter, man flow meter, turbine flow meter, gravimetric feeder meter, definition of viscosity, Newtonian and non-Newtonian flow, various types of viscometers. Brix and pH: Brix standard, refractometer, pH scale, role of brix and pH in food. pH electrode.
MODULE III
Food enzymes and flavour: Importance of enzyme sensors, biosensors, human olfaction, Electronics Nose. Controllers and indicators: Basic control concept, Temperature controller in dryer, ration control in food pickling, atmospheric controller in food preservation, timers and indicators. Practicals Experiments on transducers such as Load Cell, Thermocouple, RPM Sensors, IC Sensor, LVDT, Optical sensor, E-Nose etc.
Module IV
Chromatography Techniques: TLC and Paper chromatography; Chromatographic methods for macromolecule separation - Gel permeation, Ion exchange, Hydrophobic, Reverse-phase and Affinity chromatography; HPLC and FPLC; Criteria of protein purity. Electrophoretic techniques: Theory and application of Polyacrylamide and Agarose gel electrophoresis; Capillary electrophoresis; 2D Electrophoresis; Disc gel electrophoresis; Gradient electrophoresis; Pulsed field gel electrophoresis.
Module V
Centrifugation: Basic principles; Mathematics & theory (RCF, Sedimentation coefficient etc); Types of centrifuge - Microcentrifuge, High speed & Ultracentrifuges; Preparative centrifugation; Differential & density gradient centrifugation; Determination of molecular weight by sedimentation velocity methods. Microscopic Techniques: Simple, compound, inverted, stereo, fluorescence, phase contrast microscopy. Dark field and bright field microscope. Electron microscopy: Transmission Electron Microscope and Scanning Electron Microscope, Basic concept of confocal microscope.

Text/References:

1. M. Bhuyan , "Measurement and Control in Food Processing", CRC Press (1st ed), 2007.
2. R G. Moreira, T.P Coultate "Automatic Control for Food Processing System". 2001.
3. D. Patranabis, "Industrial Instrumentation", McGraw Hill, 1990.
4. B.G.Liptak, "Instrument Engineers Handbook: Process Measurement and Analysis", 1995
5. Keith Wilson and John Walker, Principles and Techniques of Practical Biochemistry, Cambridge University.

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand the different types of process variables involved in food processing techniques. |
| 2. Understand the principles of food rheology. |
| 3. Understand about the different transducers and sensor based systems. |
| 4. Understand the different chromatographic techniques. |

Text/References:

1. M. Bhuyan , "Measurement and Control in Food Processing", CRC Press (1st ed), 2007.
2. R G. Moreira, T.P Coultate "Automatic Control for Food Processing System". 2001.
3. D. Patranabis, "Industrial Instrumentation", McGraw Hill, 1990.
4. B.G.Liptak, "Instrument Engineers Handbook: Process Measurement and Analysis", 1995
5. Keith Wilson and John Walker, Principles and Techniques of Practical Biochemistry, Cambridge University.

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand the different types of process variables involved in food processing techniques. |
| 2. Understand the principles of food rheology. |
| 3. Understand about the different transducers and sensor based systems. |
| 4. Understand the different chromatographic techniques. |

Unit-5

Overview of amino acid metabolism: biosynthetic families of amino acids, breakdown of amino acids into six (to check) common intermediates. Regulation of amino acid metabolism (steps for the biosynthesis and breakdown of amino acids are not required), associated inborn errors. Nucleic acid metabolism: biosynthesis and breakdown of purine, pyrimidines, nucleotides by de novo and salvage pathways, Regulation of metabolism, associated inborn errors.

Text and Reference Books

1. *Principles of Biochemistry* by Nelson, Cox and Lehninger.
2. *Biochemistry* by G. Zubay
3. *Biochemistry* by Stryer
4. *Biochemistry* by Garrett and Grisham
5. *Biochemical Calculations*, Irwin H. Segel, John Wiley and Sons Inc
6. *Biochemistry*, DVoet and JG Voet, J Wiley and Sons.
7. *Biochemistry*, D Freifilder, W.H. Freeman & Company.
8. *Laboratory Techniques in Biochemistry and molecular Biology*, Work and Work.

Course Outcomes:

After completing the course, students will be able to:

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| 1. Understand basics of biogenergetics and thermodynamics. |
| 2. Analyze the metabolic strategies involved in cellular metabolism in a cell. |
| 3. Understand the thermodynamic stability while degradation of glucose and the energy released from it. |
| 4. Understand the principle of TCA cycle and its regulation. |
| 5. Will learn how electron transport and electron carriers work inside a cell during a cellular metabolism. |
| 6. Will analysis and learn the amino acid synthesis and Nucleic acid metabolism work in a cell and how to manuplulate it for the welfare of human kind. |

MFT-203 Packaging of Food Materials	
Teaching Scheme Lectures: 3 hr./ week Tutorials: 1 Credits: 4	Examination Scheme Class Test: 12 Marks Teachers Assessment: 6 Marks Attendance: 12 Marks End Semester Exam: 70 Marks

Course Objectives:

- 1.To give knowledge of definitions and functions of packaging.
- 2.To give knowledge about properties of packaging materials, metal cans and prediction of shelf life of various packaged food products.
- 3.To impart knowledge of methods of packaging like modified atmospheric packaging, intelligent packaging and their quality control.
- 4.To impart knowledge about package sterilization techniques.

Detailed Syllabus

MODULE 1
Definitions and functions of packaging and packaging materials. Packaging requirements and selection of packaging materials; Types of packaging materials: paper: pulping, fibrillation and beating, types of paper and their testing methods; Glass: composition, properties, methods of making bottles and jars; Metals: Tin plate containers, tinning process, components of tin plate, tin free steel (TFS), types of cans, aluminum containers, lacquers; Plastics: types of plastic films, laminated plastic materials, coextrusion, edible films and biodegradable plastics.
MODULE 2
Properties of materials such as tensile strength, bursting strength, tearing resistance, puncture resistance, impact strength, tear strength, their methods of testing and evaluation; Barrier properties of packaging materials: Theory of permeability, factors affecting permeability, permeability coefficient, gas transmission rate (GTR) and its measurement, water vapour transmission rate (WVTR) and its measurement, prediction of shelf life of foods.
MODULE 3
Different packaging systems for dehydrated foods, frozen foods, dairy foods, fresh fruits and vegetables, meat, poultry and sea foods. Process of Packaging: Material handling, filling, air removal, sealing, retorting, Modified atmosphere packaging, vacuum and gas packaging. Package sterilization techniques, cushioning, modelling, palletizing, stacking and containerization.
MODULE 4
Quality Control: Evaluation of Packaging materials, toxicity, corrosion prevention, shelf life testing, minimization of transport losses, Hazards in handling and storage and packaging and their minimization.
MODULE 5
Packaging Laws and Regulations, Standards of Weights and Measures Act, Advancement in packaging Technology: Smart packaging, Active packaging, Anti-microbial packaging etc.

BOOKS FOR REFERENCE

1. Painy, F.A. and Painy, H.Y. 1983. A Handbook of Food Packaging. Leonard Hill, Glasgow, UK.
2. Scicharow, S. and Griffin, R.C. 1970. Food Packaging. AVI, Westport.
3. Food Packaging Principles by Gordon Robertson, 2005.
4. Food Packaging by Takashi Kadoya, 1990.
5. Foods & Packaging Materials Chemical Interactions by Paul Acherman
6. S. K. Sharma, S.J.Mulvaney, and S.S.H.Rizvi, Food Process Engineering: Theory and Laboratory Experiments, Wiley and Sons, 2000
7. H. Pandey, H.K. Sharma, R.C.Chouhan, B.C. Sarkar and M.C. Bera, Experiments in Food Process Engineering, CBS Publishers and Distributors, 2004
8. M.A. Rao, S.S. H.Rizvi and A.K.Dutta, Engineering properties of Foods, 3rd ed., Marcel Dekker, 2005

Course Outcomes:

After completing the course, students will be able to:

1. Understand the functions of packaging ,types of packaging materials and their properties.
2. Understand the features of various packaging systems for all type of foods.
3. Quality control and evaluation methods of packaging materials and their barrier properties.
4. Understand the modified,gas,vacuum ,smart,active,antimicrobial and intelligent packaging techniques and process.
5. Gain knowledge about packaging laws and regulations.

MMA 104: Fundamental of computer & C programming	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test: 12 Marks Teachers Assessment: 06Marks Attendance: 12 Marks End Semester Exam: 70 Marks

Course Objectives:

1. To define fundamental concept computer i.e. hardware and software.
2. To describe basic knowledge of operating system, algorithms and number system.
3. To introduce the principles of designing structured programs
4. To develop the programming skills of students
5. To write basic programs using conditional statements, iteration statements, functions, pointers, arrays, strings, and file handling.

Detailed Syllabus

General Concepts: Introduction to basic computer architecture, Categories of software – System software, Application software, Compiler, Interpreter, Utility program, Operating System and its significance. Binary arithmetic for integer and fractional numbers.

C Programming: Introduction to algorithm, Flow charts, Problem solving methods, C character set, Identifiers and keywords, Data types, Declarations, Statement and symbolic constants, Input-output statements, Preprocessor commands, Operators, expressions and library functions, decision making and loop control statements, Functions, Storage Classes, Arrays, Strings, Pointers, Structure and union, File handling.

Recommended Books:

1. Norton, P., *Introduction to Computers*, Tata McGraw Hill (2008).
2. Shelly, G.B., Cashman T.J., Vermaat M.E., *Introduction to Computers*, Cengage India Pvt Ltd (2008).
3. Kernighan, B. W. and Ritchie D.M., *The C Programming Language*, PHI (1989)
4. Kanetkar, Y., *Let Us C*, BPB (2007).
5. Forouzan, A., *Structured Programming Approach Using C*, Cengage India Pvt Ltd (2008).

Course Outcomes:

After completing the course, students will be able to:

1. Understanding the working of digital computer, operating systems like DOS, Windows, Linux, define peripheral devices, understand algorithm concept, list out features of C programming and computer
2. Classify data types and operators, explain pre processor directives and file handling concept.
3. Implement the concept of recursion, looping, file handling to solve programming

- problems.
4. Differentiate between while and do-while, compiler and interpreter, high level and low level, array and linked list, Exercise user defined functions to solve real time problems.
 5. Inscribe C programs using Pointers to access arrays strings, functions, structures and files.

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MMA151: C Programming Lab	
Teaching Scheme Practical: 2 hr/Week Credits: 2	Examination Scheme Internal Marks : 15 Marks External Marks : 35 Marks End Semester Exam: 50 Marks

Course Objectives:

1. To Define fundamental concept computer i.e. hardware and software.
2. To describe basic knowledge of operating system, algorithms and number system.
3. To introduce the principles of designing structured programs
4. To develop the programming skills of students
5. To write basic programs using conditional statements, iteration statements, functions, pointers, arrays, strings, and file handling.

Assignments for lab classes are as follows:

1. Introduction of Computer System: I/O devices, storage devices.
2. Getting familiar with software: OS and C compiler.
3. Write a program to print Hello.
4. Write a program to add two integers.
5. Write a program to compute factorial of a number.
6. Write a program to determine whether a number is prime or not.
7. Write a program to print Fibonacci series. .
8. Write a program in C to check whether a given number is Armstrong or not?
9. Write a program to calculate factorial of an integer using recursion.
10. Show with example (program) how arguments are passed using „Call by value“ and „Call by reference“ respectively.
11. Write a program to print the sum of all values of an array.
12. Write a program in C that accepts N x N matrix as input and prints transpose of this matrix.
13. Write a program to add the elements of two arrays in to third array using dynamic memory allocation.
14. Write a program in C to calculate the sum of series up to first 10 terms
 $1^4 + 2^4 + 3^4 + 4^4 + 5^4 + 6^4 + 7^4 + \dots + 10^4$
15. Write a program in C that takes input from a file and write it into another file.
16. Write a program to implement stack operation (Push & Pop).
17. Write a program to create a link list.

Reference books:

1. Jeri R. Hanly, Elliot B. Koffman, “Problem Solving and Program Design in C”, PearsonAddison-Wesley, 2006.
2. Victor Alvarado, Mocygo San Jose,”M. S. Office For ME Word, Excel, Power Point, CA”Balagurusamy, “Programming in ANSI „C“, TMH, 3rd Edition
3. Detiel&Detiel, “„C“ How to program, ISBN: 0132404168, 5th Edition, 2007”.

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Course Outcomes:

After completing the course, students will be able to:

1. Develop small applications using c programming knowledge.
2. Design various application software components and also easily understand other programming concepts.
3. Design programs connecting decision structures, Write, Compile and Debug programs in C language
4. Develop simple C Programs using pointers and Functions

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Text and Reference Books:

Ross L. Spencer and Michael Ware, *Introduction to Matlab*, Brigham Young University.

Suresh Chandra, *Applications of Numerical Techniques with C*, Narosa.

Vinay K. Lngle and John G. Proakis, *Digital Signal Processing Using Matlab*, PWS Publishing Company.

Course Outcomes:

- CO1.** Describe basic concepts of C like function, arrays, etc. and tools of MATLAB like signal processing, filtering, etc.
- CO2.** Summarize methods used for signal processing, filtering and electric field computation of PIC code.
- CO3.** Implement filtering methods like DFT, FFT, etc. on signals using MATLAB and to implement mathematical method for improvement in result like Iteration method on C.
- CO4.** Differentiate PIC code using parameters such as charge density, electric potential, etc.
- CO5.** Monitor processing of signals and filtering methods using MATLAB and improvement of mathematical methods using C.
- CO6.** Design a program to solve computational method with more accuracy.

Course Objectives:

1. To make students aware of computational techniques.
2. To make students learn to solve physical problems.
3. Make students capable to work in groups to solve common problems.

List of Experiments:

Note: Minimum 10 experiments should be performed. (Experiments may be added /deleted subject to availability of time and facilities)

1. To implement programs in C language
2. Time delay subroutine and a clock program.
3. Newton's and Lagrange's interpolation with algorithm, flow chart C Program and output.
4. Numerical integration by Trapezoidal/Simpson's rule with algorithm, flowchart C Program & output.
5. Solution of a polynomial equation and determination of roots by Newton Raphson method with algorithm, flowchart C Program and output.
6. Numerical solution of ordinary first order differential equation –Euler's method with algorithm, flowchart C Program and output.
7. Curve fitting - Least square fitting with algorithm, flowchart C program and output.
8. Matrix manipulation - Multiplication Transpose and Inverse with algorithm, Flow chart C program and output.
9. Iteration method, flowchart C program and output.
10. Gauss Interpolation, flowchart C program and output.
11. MATLAB – Matrix operations.
12. MATLAB: Digital Signal Processing.
13. MATLAB: Solving Ordinary Differential Equation.
14. Determination of polynomial using method of least square curve fitting.
15. Determination of time response of an R-L-C circuit.

Reference Books:

R.A. Dunlap, *Experimental Physics: Modern Methods*, Oxford University Press.
B.K. Jones, *Electronics for Experimentation and Research*, Prentice-Hall.
P.B. Zbar and A.P. Malvino, *Basic Electronics: A Text-Lab Manual*, Tata Mc-Graw Hill.
L.A. Leventhal, *Micro Computer Experimentation with the Intel SDK-85*.

5. Organizational Behaviour -Robbins Stephen P., Pearson Education
6. Organizational Behaviour: Human Behaviour at Work-Newstrom John W., TMH
7. Organizational Behaviour-McShaneL. Steven, Glinow Mary Ann Von, Sharma R.,TMH
8. Organizational Behaviour -Luthans Fred, TMH
9. Organisational Behaviour-Aswathappa K., Himalaya Publishing House

Course Outcomes: Upon the successful completion of this course, the student will be able to:

- Analyse the behaviour of individuals and groups in organisations.
- Assess the potential effects of organisational-level factors (such as structure, culture and change) on organisational behaviour.
- Critically evaluate the potential effects of important developments in the external environment (such as globalisation and advances in technology) on organisational behaviour.
- Analyse organisational behavioural issues in the context of organisational behaviour theories

Employable Skills	Measuring Tools
Ability to identify and apply the knowledge of subject practically in real life situations	Exercise Workshop Quiz Classroom Discussions

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MBA104: RECORDING AND ANALYSIS OF BUSINESS OPERATIONS

Teaching Scheme	Examination Scheme
Lectures: 4 hrs./Week Tutorials: 1 hrs./Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Hours: 40

Course Objectives:

- To provide a comprehensive treatment of accounting principles, technique and practices.
- To get the students acquainted with fundamental concepts and processes of accounting.
- To have a basic understanding of significant tools and techniques of financial analysis, which are useful in the interpretation of financial statements.
- To have a brief knowledge about international accounting standards.
- To understand basics of fundamental analysis

Unit I (8 Hrs): Meaning and Scope of Accounting : Overview of Accounting, Users of Accounting, Accounting Concepts Conventions, Book keeping and Accounting, Principles of Accounting, Basic Accounting terminologies, Accounting Equation, Overview to Depreciation (straight line and diminishing method).

Accounting Standards and IFRS : International Accounting Principles and Standards; Matching of Indian Accounting Standards with International Accounting Standards, Human Resource Accounting, Forensic Accounting.

Unit II (10 Hrs): Mechanics of Accounting : Double entry system of Accounting, Journalizing of transactions; Ledger posting and Trial Balance, Preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Excel Application to make Balance sheet, Case studies and Workshops.

Unit III(10 Hrs): Analysis of financial statement: Ratio Analysis- solvency ratios, Profitability ratios, activity ratios, liquidity ratios, Market capitalization ratios; Common Size Statement; Comparative Balance Sheet and Trend Analysis of manufacturing, Service & Banking organizations, Case Study and Workshops in analysing Balance sheet.

Unit IV (12 Hrs): Funds Flow Statement: Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis; Cash Flow Statement: Various cash and non-cash transactions, flow of cash, difference between cash flow and fund flow, preparation of Cash Flow Statement and its analysis.

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SUGGESTED READINGS:

Text Books:

1. Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management (Vikas, 10th Edition)
2. Essentials of Financial Accountng (based on IFRS), Bhattacharya (PHI, 3rd Ed)
3. Ramachandran Kakani- Financial Accounting for Management(TMH ,3rd Edition).
4. PC Tulsian- Financial Accounting (Pearson, 2016)
5. Dhamija - Financial Accounting for managers: (Prentice Hall, 2nd Edition).

Reference Books:

1. Narayanswami - Financial Accounting: A Managerial Perspective (PHI, 5th Ed)
2. Dhaneshk Khatri- Financial Accounting (TMH, 2015)
3. Ambrish Gupta - Financial Accounting: A Managerial Perspective (Prentice Hall, 4th Edition)
4. Ramchandran & Kakani - Financial Accounting for Management (TMH, 2nd Edition).
5. Mukherjee - Financial Accounting for Management (TMH, 2nd Edition).

Course Outcome: Upon the successful completion of this course, the student will be able to:

- Subject will provide an insight to the concepts and principles for their routine monetary transaction.
- Prepare financial statements in accordance with Generally Accepted Accounting Principles and its excel application.
- Employ critical thinking skills to analyze financial data as well as the effects of differing financial accounting methods on the financial statements.
- Effectively define the needs of the various users of accounting data and demonstrate the ability to communicate such data effectively, as well as the ability to provide knowledgeable recommendations.
- Recognize circumstances providing for increased exposure to fraud and define preventative internal control measures.

Employable skills	Measuring Tools
Ability to apply excel techniques for Balance Sheet and Profit and Loss Preparation	Exercise + Workshop
Ability to Analyze balance sheet	Exercise
Knowledge about Indian and International Accounting Standards	Presentation

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MBA301: STRATEGIC MANAGEMENT

Teaching Scheme	Examination Scheme
Lectures: 4 hrs./Week Tutorials: 1 hrs./Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Course Objectives:

- To expose students to various perspectives and concepts in the field of Strategic Management
- The course would enable the students to understand the principles of strategy formulation, implementation and control in organizations.
- To help students develop skills for applying these concepts to the solution of business problems
- To help students master the analytical tools of strategic management

Hours:40

UNIT I (5 Hrs)

Introduction: Concept of Strategy, Concept of Corporate Strategy, Strategic Management Process, Role of strategists, Impact of Globalization

UNIT II (10 Hrs)

Environmental Appraisal: BOD- Role and Functions, Board functioning in Indian Context, Environment Scanning, Industry Analysis, Synthesis of External Factors, External factors Analysis Summary (EFAS), Internal Scanning, Value Chain Analysis, Synthesis of Internal Factors, Internal factors Analysis Summary (IFAS), Case Study 1

UNIT III (15 Hrs)

Strategy Formulation, Strategic factors Analysis Summary (SFAS), Business Strategy, Corporate Strategy, Functional Strategy, Strategic Choice, Case Study 2.

Blue Ocean Strategy and Fortune at the Bottom of the Pyramid Capability Approach and Strategy

UNIT V (10 Hrs)

Strategy Implementation, 7-S framework, Organization Structure, Corporate Culture, Diversification, Mergers and Acquisition, Case Study 3.

Evaluation and Control, Strategic Information Systems, Strategic Issues in Small and Medium Enterprises and Non-Profit Organizations

Suggested Reading:

1. Strategic Management Concepts and Cases- F.R. David, Prentice Hall of India
2. Business Policy and Strategic Management, Lawrence R. Jauch, Glueck William F., Frank Brothers & Co

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3. Strategic Management- Pearce II John A. and Robinson J.R., Richard B. And Amita Mittal, McGraw Hill
4. Strategic Management and Business Policy- Wheelen Thomas L., Hunger J. David and Rangarajan Krish, PHI
5. Cases in Strategic Management- Budhiraja S.B. and Athreya M.B., Tata McGraw Hill
6. Business Policy and Strategic Management- Kazmi Azar, Tata McGraw Hill
7. Strategic Management: Concepts and Cases- Thomson and Strickland, TMH

Course Outcomes: After reading this course students will be able to reach the following outcomes:

- Understand the strategic decisions that organisations make and have an ability to engage in strategic planning.
- Explain the basic concepts, principles and practices associated with strategy formulation and implementation.
- Integrate and apply knowledge gained in basic courses to the formulation and implementation of strategy from holistic and multi-functional perspectives.
- Analyze and evaluate critically real life company situations and develop creative solutions, using a strategic management perspective.
- Conduct and present a credible business analysis in a team setting.
- Understand the crucially important role that the HRM function plays in the setting and implementation of an organisation's strategy

Employable Skills	Measuring Tools
Ability to identify and apply the knowledge of subject practically in real corporate situations	Exercise Workshop Case Study Quiz Classroom Discussions

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BME-751	CAD/CAM lab		0 2	0	1 credits
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Pre-requisites: none

Course Objectives:

This course is to teach the theory and tools of Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) with an emphasis on the central role of the geometric model in their seamless integration. It focuses on the integration of these tools and the automation of the product development cycle. It is to introduce geometric modeling techniques, data structure design and algorithms for solid modeling. It also covers the machining theory, automated CNC machining, and process control.

Course outcomes: At the end of the course, the student will be able to:

- Execute steps required for modeling 3D objects by using protrusion, cut, sweep, extrude commands
- Convert 3D solid models into 2D drawing-different views, sections
- Use isometric views and dimensioning of part models
- Machine simple components on CNC machines
- Use CAM software to generate NC code

Detailed Syllabus:

Total TEN Experiments are to carried out. FIVE Experiments each from CAD and CAM.

CAD Experiments

Line Drawing or Circle Drawing experiment: Writing and validation of computer program.

Geometric Transformation algorithm experiment for translation/rotation/scaling:

Writing and validation of computer program.

Design of machine component or other system experiment: Writing and validation of computer program.

Understanding and use of any 3-D Modeling Software commands.

Pro/E/Idea etc. Experiment: Solid modeling of a machine component

Writing a small program for FEM for 2 spring system and validation of program or using a fem Package

Root findings or curve fitting experiment: Writing and validation of computer program.

Numerical differentiation or numerical integration experiment: Writing and validation of computer program.

CAM Experiments

To study the characteristic features of CNC machine

Part Programming (in word address format) experiment for turning operation (including operations such as grooving and threading) and running on CNC machine

Part Programming (in word address format or ATP) experiment for drilling operation

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MODULE-III

Computer Integrated Manufacturing system

Group Technology, Flexible Manufacturing System, CIM, CAD/CAM, Computer aided process planning-Retrieval and Generative, Concept of Mechatronics, Computer aided Inspection.

Robotics

Types and generations of Robots, Structure and operation of Robot, Robot applications.

Economics, Robot programming methods. VAL and AML with examples.

Intelligent Manufacturing

Introduction to Artificial Intelligence for Intelligent manufacturing. 2

Books/References-

Automation, Production Systems and Computer Integrated Manufacturing by Mikell P.

Groover

Computer Aided Manufacturing by Kundra and Rao

Computer control of Manufacturing systems by Koren

NC Machine Tools by S.J. Martin.

NC Machines by Koren

CAD/CAM by Groover.

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MFT-203 Packaging of Food Materials

Teaching Scheme

Lectures: 3 hr./ week

Tutorials: 1

Credits: 4

Examination Scheme

Class Test: 12 Marks

Teachers Assessment: 6 Marks

Attendance: 12 Marks

End Semester Exam: 70 Marks

Course Objectives:

- 1.To give knowledge of definitions and functions of packaging.
- 2.To give knowledge about properties of packaging materials, metal cans and prediction of shelf life of various packaged food products.
- 3.To impart knowledge of methods of packaging like modified atmospheric packaging, intelligent packaging and their quality control.
- 4.To impart knowledge about package sterilization techniques.

Detailed Syllabus**MODULE I**

Definitions and functions of packaging and packaging materials. Packaging requirements and selection of packaging materials; Types of packaging materials: paper: pulping, fibrillation and beating, types of paper and their testing methods; Glass: composition, properties, methods of making bottles and jars; Metals: Tin plate containers, tinning process, components of tin plate, tin free steel (TFS), types of cans, aluminum containers, lacquers; Plastics: types of plastic films, laminated plastic materials, coextrusion, edible films and biodegradable plastics.

MODULE 2

Properties of materials such as tensile strength, bursting strength, tearing resistance, puncture resistance, impact strength, tear strength, their methods of testing and evaluation; Barrier properties of packaging materials: Theory of permeability, factors affecting permeability, permeability coefficient, gas transmission rate (GTR) and its measurement, water vapour transmission rate (WVTR) and its measurement, prediction of shelf life of foods.

MODULE 3

Different packaging systems for dehydrated foods, frozen foods, dairy foods, fresh fruits and vegetables, meat, poultry and sea foods. Process of Packaging: Material handling, filling, air removal, sealing, retorting, Modified atmosphere packaging, vacuum and gas packaging. Package sterilization techniques, cushioning, modelling, palletizing, stacking and containerization.

MODULE 4

Quality Control: Evaluation of Packaging materials, toxicity, corrosion prevention, shelf life testing, minimization of transport losses, Hazards in handling and storage and packaging and their minimization.

MODULE 5

Packaging Laws and Regulations, Standards of Weights and Measures Act, Advancement in packaging Technology: Smart packaging, Active packaging, Anti-microbial packaging etc.

BOOKS FOR REFERENCE

1. Painy, F.A. and Painy, H.Y. 1983. A Handbook of Food Packaging. Leonard Hill, Glasgow, UK.
2. Scicharow, S. and Griffin, R.C. 1970. Food Packaging. AVI, Westport.
3. Food Packaging Principles by Gordon Robertson, 2005.
4. Food Packaging by Takashi Kadoya, 1990.
5. Foods & Packaging Materials Chemical Interactions by Paul Acherman
6. S. K. Sharma, S.J.Mulvaney, and S.S.H.Rizvi, Food Process Engineering: Theory and Laboratory Experiments, Wiley and Sons, 2000
7. H. Pandey, H.K. Sharma, R.C.Chouhan, B.C. Sarkar and M.C. Bera, Experiments in Food Process Engineering, CBS Publishers and Distributors, 2004
8. M.A. Rao, S.S. H.Rizvi and A.K.Dutta, Engineering properties of Foods, 3rd ed., Marcel Dekker, 2005

Course Outcomes:

After completing the course, students will be able to:

1. Understand the functions of packaging ,types of packaging materials and their properties.
2. Understand the features of various packaging systems for all type of foods.
3. Quality control and evaluation methods of packaging materials and their barrier properties.
4. Understand the modified,gas,vacuum ,smart,active,antimicrobial and intelligent packaging techniques and process.
5. Gain knowledge about packaging laws and regulations.

MMA 104: Fundamental of computer & C programming	
Teaching Scheme Lectures: 3 hrs/Week Tutorials: 1 hr/Week Credits: 4	Examination Scheme Class Test: 12 Marks Teachers Assessment: 06Marks Attendance: 12 Marks End Semester Exam: 70 Marks

Course Objectives:

1. To define fundamental concept computer i.e. hardware and software.
2. To describe basic knowledge of operating system, algorithms and number system.
3. To introduce the principles of designing structured programs
4. To develop the programming skills of students
5. To write basic programs using conditional statements, iteration statements, functions, pointers, arrays, strings, and file handling.

Detailed Syllabus

General Concepts: Introduction to basic computer architecture, Categories of software – System software, Application software, Compiler, Interpreter, Utility program, Operating System and its significance. Binary arithmetic for integer and fractional numbers.

C Programming: Introduction to algorithm, Flow charts, Problem solving methods, C character set, Identifiers and keywords, Data types, Declarations, Statement and symbolic constants, Input-output statements, Preprocessor commands, Operators, expressions and library functions, decision making and loop control statements, Functions, Storage Classes, Arrays, Strings, Pointers, Structure and union, File handling.

Recommended Books:

1. Norton, P., *Introduction to Computers*, Tata McGraw Hill (2008).
2. Shelly, G.B., Cashman T.J., Vermaat M.E., *Introduction to Computers*, Cengage India Pvt Ltd (2008).
3. Kernighan, B. W. and Ritchie D.M., *The C Programming Language*, PHI (1989)
4. Kanetkar, Y., *Let Us C*, BPB (2007).
5. Forouzan, A., *Structured Programming Approach Using C*, Cengage India Pvt Ltd (2008).

Course Outcomes:

After completing the course, students will be able to:

1. Understanding the working of digital computer, operating systems like DOS, Windows, Linux, define peripheral devices, understand algorithm concept, list out features of C programming and computer
2. Classify data types and operators, explain pre processor directives and file handling concept.
3. Implement the concept of recursion, looping, file handling to solve programming

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- problems.
4. Differentiate between while and do-while, compiler and interpreter, high level and low level, array and linked list, Exercise user defined functions to solve real time problems.
 5. Inscribe C programs using Pointers to access arrays strings, functions, structures and files.

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MMA151: C Programming Lab	
Teaching Scheme Practical: 2 hr/Week Credits: 2	Examination Scheme Internal Marks : 15 Marks External Marks : 35 Marks End Semester Exam: 50 Marks

Course Objectives:

1. To Define fundamental concept computer i.e. hardware and software.
2. To describe basic knowledge of operating system, algorithms and number system.
3. To introduce the principles of designing structured programs
4. To develop the programming skills of students
5. To write basic programs using conditional statements, iteration statements, functions, pointers, arrays, strings, and file handling.

Assignments for lab classes are as follows:

1. Introduction of Computer System: I/O devices, storage devices.
2. Getting familiar with software: OS and C compiler.
3. Write a program to print Hello.
4. Write a program to add two integers.
5. Write a program to compute factorial of a number.
6. Write a program to determine whether a number is prime or not.
7. Write a program to print Fibonacci series. .
8. Write a program in C to check whether a given number is Armstrong or not?
9. Write a program to calculate factorial of an integer using recursion.
10. Show with example (program) how arguments are passed using „Call by value“ and „Call by reference“ respectively.
11. Write a program to print the sum of all values of an array.
12. Write a program in C that accepts N x N matrix as input and prints transpose of this matrix.
13. Write a program to add the elements of two arrays in to third array using dynamic memory allocation.
14. Write a program in C to calculate the sum of series up to first 10 terms
 $1^4 + 2^4 + 3^4 + 4^4 + 5^4 + 6^4 + 7^4 + \dots + 10^4$
15. Write a program in C that takes input from a file and write it into another file.
16. Write a program to implement stack operation (Push & Pop).
17. Write a program to create a link list.

Reference books:

1. Jeri R. Hanly, Elliot B. Koffman, “Problem Solving and Program Design in C”, PearsonAddison-Wesley, 2006.
2. Victor Alvarado, Mocygo San Jose,”M. S. Office For ME Word, Excel, Power Point, CA”Balagurusamy, “Programming in ANSI „C“, TMH, 3rd Edition
3. Detiel&Detiel, “„C“ How to program, ISBN: 0132404168, 5th Edition, 2007”.

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Course Outcomes:

After completing the course, students will be able to:

1. Develop small applications using c programming knowledge.
2. Design various application software components and also easily understand other programming concepts.
3. Design programs connecting decision structures, Write, Compile and Debug programs in C language
4. Develop simple C Programs using pointers and Functions

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Text and Reference Books:

Ross L. Spencer and Michael Ware, *Introduction to Matlab*, Brigham Young University.
Suresh Chandra, *Applications of Numerical Techniques with C*, Narosa.

Vinay K. Lingle and John G. Proakis, *Digital Signal Processing Using Matlab*, PWS Publishing Company.

Course Outcomes:

- CO1. Describe basic concepts of C like function, arrays, etc. and tools of MATLAB like signal processing, filtering, etc.
- CO2. Summarize methods used for signal processing, filtering and electric field computation of PIC code.
- CO3. Implement filtering methods like DFT, FFT, etc. on signals using MATLAB and to implement mathematical method for improvement in result like Iteration method on C.
- CO4. Differentiate PIC code using parameters such as charge density, electric potential, etc.
- CO5. Monitor processing of signals and filtering methods using MATLAB and improvement of mathematical methods using C.
- CO6. Design a program to solve computational method with more accuracy.

Course Objectives:

1. To make students aware of computational techniques.
2. To make students learn to solve physical problems.
3. Make students capable to work in groups to solve common problems.

List of Experiments:

Note: Minimum 10 experiments should be performed. (Experiments may be added /deleted subject to availability of time and facilities)

1. To implement programs in C language
2. Time delay subroutine and a clock program.
3. Newton's and Lagrange's interpolation with algorithm, flow chart C Program and output.
4. Numerical integration by Trapezoidal/Simpson's rule with algorithm, flowchart C Program & output.
5. Solution of a polynomial equation and determination of roots by Newton Raphson method with algorithm, flowchart C Program and output.
6. Numerical solution of ordinary first order differential equation –Euler's method with algorithm, flowchart C Program and output.
7. Curve fitting - Least square fitting with algorithm, flowchart C program and output.
8. Matrix manipulation - Multiplication Transpose and Inverse with algorithm, Flow chart C program and output.
9. Iteration method, flowchart C program and output.
10. Gauss Interpolation, flowchart C program and output.
11. MATLAB – Matrix operations.
12. MATLAB: Digital Signal Processing.
13. MATLAB: Solving Ordinary Differential Equation.
14. Determination of polynomial using method of least square curve fitting.
15. Determination of time response of an R-L-C circuit.

Reference Books:

R.A. Dunlap, *Experimental Physics: Modern Methods*, Oxford University Press.
 B.K. Jones, *Electronics for Experimentation and Research*, Prentice-Hall.
 P.B. Zbar and A.P. Malvino, *Basic Electronics: A Text-Lab Manual*, Tata Mc-Graw Hill.
 L.A. Leventhal, *Micro Computer Experimentation with the Intel SDK-85*.

5. Organizational Behaviour -Robbins Stephen P., Pearson Education
6. Organizational Behaviour: Human Behaviour at Work-Newstrom John W., TMH
7. Organizational Behaviour-McShaneL. Steven, Glinow Mary Ann Von, Sharma R.,TMH
8. Organizational Behaviour -Luthans Fred, TMH
9. Organisational Behaviour-Aswathappa K., Himalaya Publishing House

Course Outcomes: Upon the successful completion of this course, the student will be able to:

- Analyse the behaviour of individuals and groups in organisations.
- Assess the potential effects of organisational-level factors (such as structure, culture and change) on organisational behaviour.
- Critically evaluate the potential effects of important developments in the external environment (such as globalisation and advances in technology) on organisational behaviour.
- Analyse organisational behavioural issues in the context of organisational behaviour theories

Employable Skills	Measuring Tools
Ability to identify and apply the knowledge of subject practically in real life situations	Exercise Workshop Quiz Classroom Discussions

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MBA104: RECORDING AND ANALYSIS OF BUSINESS OPERATIONS

Teaching Scheme	Examination Scheme
Lectures: 4 hrs./Week Tutorials: 1 hrs./Week Credits: 4	Class Test -12Marks Teachers Assessment - 6Marks Attendance – 12 Marks End Semester Exam – 70 marks

Hours: 40

Course Objectives:

- To provide a comprehensive treatment of accounting principles, technique and practices.
- To get the students acquainted with fundamental concepts and processes of accounting.
- To have a basic understanding of significant tools and techniques of financial analysis, which are useful in the interpretation of financial statements.
- To have a brief knowledge about international accounting standards.
- To understand basics of fundamental analysis

Unit I (8 Hrs): Meaning and Scope of Accounting : Overview of Accounting, Users of Accounting, Accounting Concepts Conventions, Book keeping and Accounting, Principles of Accounting, Basic Accounting terminologies, Accounting Equation, Overview to Depreciation (straight line and diminishing method).

Accounting Standards and IFRS : International Accounting Principles and Standards; Matching of Indian Accounting Standards with International Accounting Standards, Human Resource Accounting, Forensic Accounting.

Unit II (10 Hrs): Mechanics of Accounting : Double entry system of Accounting, Journalizing of transactions; Ledger posting and Trial Balance, Preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Excel Application to make Balance sheet, Case studies and Workshops.

Unit III(10 Hrs): Analysis of financial statement: Ratio Analysis- solvency ratios, Profitability ratios, activity ratios, liquidity ratios, Market capitalization ratios; Common Size Statement; Comparative Balance Sheet and Trend Analysis of manufacturing, Service & Banking organizations, Case Study and Workshops in analysing Balance sheet.

Unit IV (12 Hrs): Funds Flow Statement: Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis; Cash Flow Statement: Various cash and non-cash transactions, flow of cash, difference between cash flow and fund flow, preparation of Cash Flow Statement and its analysis.

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SUGGESTED READINGS:

Text Books:

1. Maheshwari S.N & Maheshwari S K – A text book of Accounting for Management (Vikas, 10th Edition)
2. Essentials of Financial Accountng (based on IFRS), Bhattacharya (PHI,3rd Ed)
3. Ramachandran Kakani- Financial Accounting for Management(TMH ,3rd Edition).
4. PC Tulsian- Financial Accounting (Pearson, 2016)
5. Dhamija - Financial Accounting for managers: (Prentice Hall, 2nd Edition).

Reference Books:

1. Narayanswami - Financial Accounting: A Managerial Perspective (PHI,5th Ed)
2. Dhaneshk Khatri- Financial Accouting (TMH,2015)
3. Ambrish Gupta - Financial Accounting: A Managerial Perspective (Prentice Hall, 4th Edition)
4. Ramchandran & Kakani - Financial Accounting for Management (TMH, 2nd Edition).
5. Mukherjee - Financial Accounting for Management (TMH, 2nd Edition).

Course Outcome: Upon the successful completion of this course, the student will be able to:

- Subject will provide an insight to the concepts and principles for their routine monetary transaction.
- Prepare financial statements in accordance with Generally Accepted Accounting Principles and its excel application.
- Employ critical thinking skills to analyze financial data as well as the effects of differing financial accounting methods on the financial statements.
- Effectively define the needs of the various users of accounting data and demonstrate the ability to communicate such data effectively, as well as the ability to provide knowledgeable recommendations.
- Recognize circumstances providing for increased exposure to fraud and define preventative internal control measures.

Employable skills	Measuring Tools
Ability to apply excel techniques for Balance Sheet and Profit and Loss Preparation	Exercise + Workshop
Ability to Analyze balance sheet	Exercise
Knowledge about Indian and International Accounting Standards	Presentation

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