## SEMESTER II

(Common to all B. E. / B. Tech. Degree Programmes except B. E. – Marine Engineering)

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   2. B.E. Electronics and Instrumentation Engineering
   3. B.E. Instrumentation and Control Engineering

II Faculty of Information and Communication Engineering
   1. B.E. Computer Science and Engineering
   2. B.E. Electronics and Communication Engineering
   3. B.E. Bio Medical Engineering
   4. B.Tech. Information Technology

B. NON–CIRCUIT BRANCHES

I Faculty of Civil Engineering
   1. B.E. Civil Engineering

II Faculty of Mechanical Engineering
   1. B.E. Aeronautical Engineering
   2. B.E. Automobile Engineering
   3. B.E. Marine Engineering
   4. B.E. Mechanical Engineering
   5. B.E. Production Engineering

III Faculty of Technology
   1. B.Tech. Chemical Engineering
   2. B.Tech. Biotechnology
   3. B.Tech. Polymer Technology
   4. B.Tech. Textile Technology
   5. B.Tech. Textile Technology (Fashion Technology)
   7. B.Tech. Plastics Technology
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# ELECTIVE II

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# ELECTIVE III

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AIM
To encourage students to actively involve in participative learning of English and to help them acquire Communication Skills.

OBJECTIVES
• To help students develop listening skills for academic and professional purposes.
• To help students acquire the ability to speak effectively in English in real-life situations.
• To inculcate reading habit and to develop effective reading skills.
• To help students improve their active and passive vocabulary.
• To familiarize students with different rhetorical functions of scientific English.
• To enable students write letters and reports effectively in formal and business situations.

UNIT I
Technical Vocabulary - meanings in context, sequencing words, Articles- Prepositions, intensive reading & predicting content, Reading and interpretation, extended definitions, Process description

Suggested activities:
1. Exercises on word formation using the prefix ‘self’ - Gap filling with preposition.
2. Exercises - Using sequence words.
3. Reading comprehension exercise with questions based on inference – Reading headings
4. and predicting the content – Reading advertisements and interpretation.
5. Writing extended definitions – Writing descriptions of processes – Writing paragraphs based on discussions – Writing paragraphs describing the future.

UNIT II

Suggested activities:
1. Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) - Reading comprehension exercises with texts including graphic communication - Exercises in interpreting non-verbal communication.
2. Listening comprehension exercises to categorise data in tables.
3. Writing formal letters, quotations, clarification, complaint – Letter seeking permission for Industrial visits– Writing analytical paragraphs on different debatable issues.
UNIT III

Cause and effect expressions – Different grammatical forms of the same word
Speaking – stress and intonation, Group Discussions - Reading – Critical reading
Listening, - Writing – using connectives, report writing – types, structure, data collection,
content, form, recommendations.

Suggested activities:
1. Exercises combining sentences using cause and effect expressions – Gap filling exercises
   using the appropriate tense forms – Making sentences using different grammatical forms
   of the same word. (Eg: object –verb / object – noun)
2. Speaking exercises involving the use of stress and intonation – Group discussions –
analysis of problems and offering solutions.
3. Reading comprehension exercises with critical questions, Multiple choice question.
4. Sequencing of jumbled sentences using connectives – Writing different types of
   reports like industrial accident report and survey report – Writing recommendations.

UNIT IV

Numerical adjectives – Oral instructions – Descriptive writing – Argumentative paragraphs –
Letter of application - content, format (CV / Bio-data) - Instructions, imperative forms - Checklists,
Yes/No question form – E-mail communication.

Suggested Activities:
1. Rewriting exercises using numerical adjectives.
2. Reading comprehension exercises with analytical questions on content – Evaluation
   of content.
3. Listening comprehension – entering information in tabular form, intensive listening
   exercise and completing the steps of a process.
4. Speaking - Role play – group discussions – Activities giving oral instructions.
5. Writing descriptions, expanding hints – Writing argumentative paragraphs – Writing
   formal letters – Writing letter of application with CV/Bio-data – Writing general and
   safety instructions – Preparing checklists – Writing e-mail messages.

UNIT V

Speaking - Discussion of Problems and solutions - Creative and critical thinking –
Writing an essay, Writing a proposal.

Suggested Activities:
1. Case Studies on problems and solutions
2. Brain storming and discussion
3. Writing Critical essays
4. Writing short proposals of 2 pages for starting a project, solving problems, etc.
5. Writing advertisements.

TOTAL: 60 PERIODS

TEXT BOOK
1. Chapters 5 – 8. Department of Humanities & Social Sciences, Anna University,
   ‘English for Engineers and Technologists’ Combined Edition (Volumes 1 & 2),
   Chennai: Orient Longman Pvt. Ltd., 2006. Themes 5 – 8 (Technology,
   Communication, Environment, Industry)
REFERENCES

Extensive Reading:

Note:
The book listed under Extensive Reading is meant for inculcating the reading habit of the students. They need not be used for testing purposes.

MA2161 MATHEMATICS – II L T P C
3 1 0 4

UNIT I ORDINARY DIFFERENTIAL EQUATIONS 12
Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy’s and Legendre’s linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT II VECTOR CALCULUS 12

UNIT III ANALYTIC FUNCTIONS 12
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy – Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w= z+c, cz, 1/z, and bilinear transformation.

UNIT IV COMPLEX INTEGRATION 12

UNIT V LAPLACE TRANSFORM 12
Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

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PH2161 ENGINEERING PHYSICS – II

UNIT I CONDUCTING MATERIALS

UNIT II SEMICONDUCTING MATERIALS

UNIT III MAGNETIC AND SUPERCONDUCTING MATERIALS
Superconductivity : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.
UNIT IV  DIELECTRIC MATERIALS  9

UNIT V  MODERN ENGINEERING MATERIALS  9
Metallic glasses: preparation, properties and applications.
Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA

TOTAL : 45 PERIODS

TEXT BOOKS
2. Charles P. Poole and Frank J.Ownen, 'Introduction to Nanotechnology’, Wiley India(2007) (for Unit V)

REFERENCES

CY2161  ENGINEERING CHEMISTRY – II  L T P C  3 0  0 3

AIM
To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.

OBJECTIVES
• The student should be conversant with the principles electrochemistry, electrochemical cells, emf and applications of emf measurements.
• Principles of corrosion control
• Chemistry of Fuels and combustion
• Industrial importance of Phase rule and alloys
• Analytical techniques and their importance.
UNIT I  ELECTROCHEMISTRY
Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf –
Single electrode potential – Nernst equation (problem) – reference electrodes – Standard
Hydrogen electrode - Calomel electrode – Ion selective electrode – glass electrode and
measurement of pH – electrochemical series – significance – potentiometer titrations
(redox - Fe²⁺ vs dichromate and precipitation – Ag⁺ vs Cl⁻ titrations) and conduct metric
titrations (acid-base – HCl vs, NaOH) titrations,

UNIT II  CORROSION AND CORROSION CONTROL
Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different
types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion
– corrosion control – sacrificial anode and impressed cathodic current methods –
corrosion inhibitors – protective coatings – paints – constituents and functions – metallic
coatings – electroplating (Au) and electroless (Ni) plating.

UNIT III  FUELS AND COMBUSTION
Calorific value – classification – Coal – proximate and ultimate analysis metallurgical
coke – manufacture by Otto-Hoffmann method – Petroleum processing and fractions –
cracking – catalytic cracking and methods-knocking – octane number and cetane
number – synthetic petrol – Fischer Tropsch and Bergius processes – Gaseous fuels-
water gas, producer gas, CNG and LPG, Flue gas analysis – Orsat apparatus –
thoretical air for combustion.

UNIT IV  PHASE RULE AND ALLOYS
Statement and explanation of terms involved – one component system – water system –
condensed phase rule – construction of phase diagram by thermal analysis – simple
eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys –
nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and
bronze.

UNIT V  ANALYTICAL TECHNIQUES
Beer-Lambert’s law (problem) – UV-visible spectroscopy and IR spectroscopy –
principles – instrumentation (problem) (block diagram only) – estimation of iron by
colorimetry – flame photometry – principle – instrumentation (block diagram only) –
estimation of sodium by flame photometry – atomic absorption spectroscopy – principles
– instrumentation (block diagram only) – estimation of nickel by atomic absorption
spectroscopy.

TOTAL: 45 PERIODS

TEXT BOOKS
Delhi (2002).

REFERENCES
(2008).
OBJECTIVE
At the end of this course the student should be able to understand the vectorial and scalar representation of forces and moments, static equilibrium of particles and rigid bodies both in two dimensions and also in three dimensions. Further, he should understand the principle of work and energy. He should be able to comprehend the effect of friction on equilibrium. He should be able to understand the laws of motion, the kinematics of motion and the interrelationship. He should also be able to write the dynamic equilibrium equation. All these should be achieved both conceptually and through solved examples.

UNIT I  BASICS & STATICS OF PARTICLES  12

UNIT II  EQUILIBRIUM OF RIGID BODIES  12

UNIT III  PROPERTIES OF SURFACES AND SOLIDS  12

UNIT IV  DYNAMICS OF PARTICLES  12

UNIT V  FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS  12
Translation and Rotation of Rigid Bodies – Velocity and acceleration – General Plane motion.

TOTAL: 60 PERIODS
TEXT BOOK

REFERENCES

EE2151 CIRCUIT THEORY
(Common to EEE, EIE and ICE Branches) 3 1 0 4

UNIT I BASIC CIRCUITS ANALYSIS 12

UNIT II NETWORK REDUCTION AND NETWORK THEOREMS FOR DC AND AC CIRCUITS 12
Network reduction: voltage and current division, source transformation – star delta conversion.
Thevenins and Novton & Theorem – Superposition Theorem – Maximum power transfer theorem – Reciprocity Theorem.

UNIT III RESONANCE AND COUPLED CIRCUITS 12
Series and paralled resonance – their frequency response – Quality factor and Bandwidth - Self and mutual inductance – Coefficient of coupling – Tuned circuits – Single tuned circuits.

UNIT IV TRANSIENT RESPONSE FOR DC CIRCUITS 12
Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. with sinusoidal input.

UNIT V ANALYSING THREE PHASE CIRCUITS 12
Three phase balanced / unbalanced voltage sources – analysis of three phase 3-wire and 4-wire circuits with star and delta connected loads, balanced & un balanced – phasor diagram of voltages and currents – power and power factor measurements in three phase circuits.

TOTAL : 60 PERIODS
TEXT BOOKS

REFERENCES

EC2151 ELECTRIC CIRCUITS AND ELECTRON DEVICES L T P C
(For ECE, CSE, IT and Biomedical Engg. Branches) 3 1 0 4

UNIT I CIRCUIT ANALYSIS TECHNIQUES 12

UNIT II TRANSIENT RESONANCE IN RLC CIRCUITS 12

UNIT III SEMICONDUCTOR DIODES 12

UNIT IV TRANSISTORS 12
Principle of operation of PNP and NPN transistors – study of CE, CB and CC configurations and comparison of their characteristics – Breakdown in transistors – operation and comparison of N-Channel and P-Channel JFET – drain current equation – MOSFET – Enhancement and depletion types – structure and operation – comparison of BJT with MOSFET – thermal effect on MOSFET.
UNIT V  SPECIAL SEMICONDUCTOR DEVICES (Qualitative Treatment only)  12

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

GE2151    BASIC ELECTRICAL AND ELECTRONICS ENGINEERING    L T P C
(Common to branches under Civil, Mechanical and Technology faculty)  4 0 0 4

UNIT I    ELECTRICAL CIRCUITS & MEASUREMENTS  12

Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.

UNIT II   ELECTRICAL MECHANICS  12

UNIT III   SEMICONDUCTOR DEVICES AND APPLICATIONS    12

UNIT IV DIGITAL ELECTRONICS  12
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)

UNIT V FUNDAMENTALS OF COMMUNICATION ENGINEERING  12

Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).

TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

GE2152 BASIC CIVIL & MECHANICAL ENGINEERING L T P C
(4 0 0 4)
(Common to branches under Electrical and I & C Faculty)

A – CIVIL ENGINEERING

UNIT I SURVEYING AND CIVIL ENGINEERING MATERIALS  15


UNIT II BUILDING COMPONENTS AND STRUCTURES  15
Foundations: Types, Bearing capacity – Requirement of good foundations.


TOTAL: 30 PERIODS
B – MECHANICAL ENGINEERING

UNIT III POWER PLANT ENGINEERING 10

UNIT IV I C ENGINES 10
Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles – Comparison of four stroke and two stroke engines – Boiler as a power plant.

UNIT V REFRIGERATION AND AIR CONDITIONING SYSTEM 10

TOTAL: 30 PERIODS

REFERENCES

GE2155 COMPUTER PRACTICE LABORATORY – II L T P C
0 1 2 2

LIST OF EXPERIMENTS

1. UNIX COMMANDS 15
Study of Unix OS - Basic Shell Commands - Unix Editor

2. SHELL PROGRAMMING 15
Simple Shell program - Conditional Statements - Testing and Loops

3. C PROGRAMMING ON UNIX 15
Dynamic Storage Allocation-Pointers-Functions-File Handling

TOTAL : 45 PERIODS
HARDWARE / SOFTWARE REQUIREMENTS FOR A BATCH OF 30 STUDENTS

Hardware
- 1 UNIX Clone Server
- 33 Nodes (thin client or PCs)
- Printer – 3 Nos.

Software
- OS – UNIX Clone (33 user license or License free Linux)
- Compiler - C

GS2165 PHYSICS LABORATORY – II

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LIST OF EXPERIMENTS

1. Determination of Young’s modulus of the material – non uniform bending.
2. Determination of Band Gap of a semiconductor material.
3. Determination of specific resistance of a given coil of wire – Carey Foster Bridge.
5. Spectrometer dispersive power of a prism.
6. Determination of Young’s modulus of the material – uniform bending.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.

GS2165 CHEMISTRY LABORATORY – II

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LIST OF EXPERIMENTS

1. Conduct metric titration (Simple acid base)
2. Conduct metric titration (Mixture of weak and strong acids)
3. Conduct metric titration using BaCl₂ vs Na₂ SO₄
4. Potentiometric Titration (Fe²⁺ / KMnO₄ or K₂ Cr₂ O₇)
5. PH titration (acid & base)
6. Determination of water of crystallization of a crystalline salt (Copper sulphate)
7. Estimation of Ferric iron by spectrophotometry.

- A minimum of FIVE experiments shall be offered.
- Laboratory classes on alternate weeks for Physics and Chemistry.
- The lab examinations will be held only in the second semester.
List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

TOTAL: 45 PERIODS

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

List of Equipments for a batch of 30 students:

1. Pentium IV computer or better hardware, with suitable graphics facility -30 No.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 No.
1. Verification of KVL and KCL
2. Verification of Thevenin and Norton Theorems.
3. Verification of superposition Theorem.
4. Verification of Maximum power transfer and reciprocity theorems.
5. Frequency response of series and parallel resonance circuits.
6. Characteristics of PN and Zener diode
7. Characteristics of CE configuration
8. Characteristics of CB configuration
9. Characteristics of UJT and SCR
10. Characteristics of JFET and MOSFET

TOTAL: 45 PERIODS

1. Listening: 5
   Listening & answering questions – gap filling – Listening and Note taking- Listening to telephone conversations

2. Speaking: 5
   Pronouncing words & sentences correctly – word stress – Conversation practice.

Classroom Session 20
   1. Speaking: Introducing oneself, Introducing others, Role play, Debate-
      Presentations: Body language, gestures, postures.
      Group Discussions etc
   2. Goal setting – interviews – stress time management – situational reasons

Evaluation
   (1) Lab Session – 40 marks
       Listening – 10 marks
       Speaking – 10 marks
       Reading – 10 marks
       Writing – 10 marks

   (2) Classroom Session – 60 marks
       Role play activities giving real life context – 30 marks
       Presentation – 30 marks

Note on Evaluation
   1. Examples for role play situations:
      a. Marketing engineer convincing a customer to buy his product.
      b. Telephone conversation – Fixing an official appointment / Enquiry on availability of flight or train tickets / placing an order. etc.
2. Presentations could be just a Minute (JAM activity) or an Extempore on simple topics or visuals could be provided and students could be asked to talk about it.

REFERENCES

LAB REQUIREMENTS
1. Teacher – Console and systems for students
2. English Language Lab Software
3. Tape Recorders.

MA2211 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATION
(3 1 0 4)

OBJECTIVES
The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. The course will also serve as a prerequisite for post graduate and specialized studies and research.

UNIT I FOURIER SERIES

UNIT II FOURIER TRANSFORMS

UNIT III PARTIAL DIFFERENTIAL EQUATIONS
Formation of partial differential equations – Lagrange’s linear equation – Solutions of standard types of first order partial differential equations - Linear partial differential equations of second and higher order with constant coefficients.
UNIT IV  APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS  9 + 3
Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in cartesian coordinates.

UNIT V  Z -TRANSFORMS AND DIFFERENCE EQUATIONS  9 + 3

LECTURES: 45 TUTORIALS : 15 TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

PY3201  PHARMACEUTICAL ORGANIC CHEMISTRY  L T P C
4 0 0 4

UNIT I  CONCEPT OF AROMATICITY AND AROMATIC CHARACTER  12

UNIT II  MOLECULAR REARRANGEMENTS  12
Wolff rearrangement – Schmidt reaction – Curtius rearrangement – Mechanism and applications – Oxidation mechanism – Applications of the following oxidation reactions – KMnO₄ – MnO₂ – Stereochemistry and applications of the following reduction reactions – Catalytic dehydrogenation – Meerwein-Ponndorf-Verley – NaBH₄ – Clemmenson.

UNIT III  AROMATIC AMINES AND SULPHONIC ACIDS  12
Methods of introduction of the aromatic amino group into an aromatic nucleus – Diazotization reaction and reactions of aryl diazonium salts such as Sandmeyer – Ullmann – Azo coupling – Deamination – Benzidine rearrangement – Aromatic sulphonic acids – Sulphonation reaction – Chlorosulphonation.
UNIT IV  POLYNUCLEAR AROMATIC HYDROCARBONS  12
Synthesis and reactions of napthalene – Anthracene – Phenanthrene – Diphenyl and triphenyl compounds and its medicinally important derivatives.

UNIT V  HETEROCYCLIC AROMATIC COMPOUNDS  12

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

GE 2021  ENVIRONMENTAL SCIENCE AND ENGINEERING  L T P C
3 0 0 3

AIM
• The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional Endeavour that they participates.

OBJECTIVE
• At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

UNIT I  ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY  14
Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains,
food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds
Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT II  ENVIRONMENTAL POLLUTION  8
Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

UNIT III  NATURAL RESOURCES  10
Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

UNIT IV  SOCIAL ISSUES AND THE ENVIRONMENT  7
UNIT V   HUMAN POPULATION AND THE ENVIRONMENT


TOTAL: 45 PERIODS

TEXT BOOKS:

REFERENCES BOOKS:

PY3202     PHYSICAL PHARMACEUTICS

UNIT I     MICROMERITICS

Particle size and size distribution – Methods of determining particle size – Particle shape and surface area – Methods of determining surface area pore size and derived properties of powders.

UNIT II    RHEOLOGY


UNIT III   COLLOIDS

UNIT IV  SUSPENSIONS AND EMULSIONS  12


UNIT V  DRUG STABILITY  12


TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES


CH3225  PROCESS CALCULATIONS  L T P C

UNIT I  STOICHIOMETRY  12

Introduction – Units and dimensions – Stoichiometric principles – Composition relations – Density and specific gravity.

UNIT II  IDEAL GASES AND VAPOR PRESSURE  12

UNIT III  HUMIDITY AND SOLUBILITY


UNIT IV  MATERIAL BALANCE


UNIT V  ENERGY BALANCE

Thermo chemistry – Calculation of heat of reaction at other temperatures – Hess’s law of summation – Heat of formation, reaction, mixing, combustion – Mean specific heat – Theoretical flame temperature.

TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES


CE3214  FLUID FLOW OPERATIONS

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UNIT I  PROPERTIES OF FLUIDS AND CONCEPT OF PRESSURE


UNIT II  MOMENTUM BALANCE AND ITS APPLICATIONS

UNIT III       FLOW OF INCOMPRESSIBLE FLUIDS THROUGH DUCTS          9
Flow of incompressible fluids in pipes – Laminar and turbulent flow through closed
conduits – Velocity profile and friction factor for smooth and rough pipes – Heat loss
due to friction in pipes and Fittings – Introduction to compressible flow – Isentropic flow
through convergent and divergent nozzles and sonic velocity.

UNIT IV      FLOW OF FLUIDS THROUGH SOLIDS                       9
Form drag – Skin drag – Drag co-efficient – Flow around solids and packed beds –
Friction factor for packed beds – Ergun’s Equation – Motion of particles through fluids –
Motion under gravitational and centrifugal fields – Terminal settling velocity – Fluidization
– Mechanism – Types – General properties – Applications.

UNIT V      TRANSPORTATION AND METERING                         9
Weirs and notches – Hot wire anemometers – Transportation of fluids – Positive
displacement pumps – Rotary and Reciprocating pumps – Centrifugal pumps –
Performance and characteristics – Air lift and diaphragm pumps.

TOTAL: 45 PERIODS

TEXT BOOKS
1. McCabe, W.L., Smith, J.C. and Harriott, P., "Unit operations of Chemical
2. Coulson, J.M., and Richardson, J.F., "Coulson and Richardson’s Chemical

REFERENCES
   Ltd., 1995.

PY3205 PHARMACEUTICAL ORGANIC CHEMISTRY LABORATORY

1. Determination of Impurities
2. Synthesis of some organic compounds involving single step reactions like
   nitration, halogenation, acetylation and hydrolysis.
3. Synthesis of organic compounds involving Two steps
4. Assay of organic compounds involving acidimetry, alkalimetry, Iodometry etc.
5. Determination of rate of reaction in zero, first order reactions.
6. Determination of physical constants used as criteria of purity like melting point, boiling point, weight per ml, refractive index and viscosity.
7. Determination of pH, potentiometric and dead stop endpoint technique.
8. Preparation of buffers, sensitivity, specificity, precision and accuracy.
9. Tests for Purity for official compounds mentioned in IP/BP/USP.
10. Limit test for marketed formulations.
11. Functional group analysis
12. Molecular weight calculations

TOTAL: 45 PERIODS

PY3206 PHYSICAL PHARMACEUTICS LABORATORY

1. Determination of density of Liquid.
2. Determination of surface tension/ interfacial tension of liquid.
3. Determination of critical micellar concentration of surfactant.
4. Effect of concentration on adsorption.
5. Determination of half life, rate constant and order of chemical reaction.
6. Effect of temperature on specific rate constant.
7. Determination of specific surface area of powder by adsorption method.
8. Determination of derived properties of powders like density, porosity, compressibility, angle of repose etc.
10. Preparation of various types of suspensions and determination of their sedimentation parameters.
11. Determination of particle size of powders and globules.

TOTAL: 45 PERIODS
CE3221 FLUID FLOW OPERATIONS LABORATORY

1. To verify Hagen-Poiseuille Equation.
2. To relate Reynolds Number and Friction factor.
3. To study the effect of coil diameter on Friction factor.
4. Experiment on Orificemeter.
5. Experiment on Venturimeter.
7. To evaluate the performance of Weirs and Notches.
8. To evaluate the performance of centrifugal pump.
9. Draining time of open tank.
10. To verify Ergun’s equation.
11. To characterize the behavior of Fluidized bed.

TOTAL: 45 PERIODS

MA3021 NUMERICAL METHODS

UNIT I SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS (10 +3)

UNIT II INTERPOLATION AND APPROXIMATION (8 +3)
Interpolation with unequal intervals - Lagrange interpolation – Newton’s divided difference interpolation – Cubic Splines - Interpolation with equal intervals - Newton’s forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION (9 +3)

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS (9 +3)
UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS (9 + 3)

Finite difference methods for solving two-point linear boundary value problems. Finite difference techniques for the solution of two dimensional Laplace’s and Poisson’s equations on rectangular domain – One dimensional heat-flow equation by explicit and implicit (Crank Nicholson) methods - One dimensional wave equation by explicit method.

L: 45 T: 15 TOTAL : 60 PERIODS

TEXT BOOKS

REFERENCES

PY3211 BIOCHEMISTRY L T P C
3 0 0 3

UNIT I BIOMOLECULES 9


UNIT II BIOSYNTHESIS 9

Biosynthesis of amino acids, neocleotides and lipids.

UNIT III INTERMEDIARY METABOLISM 9


UNIT IV BIOENERGETICS 9

Electron transport chain (Phosporylation) in mitochondria – Exergonic and endergonic reactions – Chemiosmotic hypothesis.
UNIT V ENZYMES

Classification and nomenclature – Mechanism of enzyme action – Specificity of enzyme – Factors affecting enzyme activity.

TOTAL: 45 PERIODS

TEXT BOOKS


REFERENCES


PY3212 MICROBIOLOGY

UNIT I INTRODUCTION TO MICROBIOLOGY

Classification and identification of microorganisms – Phase contrast and electron microscopy – Chemistry and structural organization of bacteria, virus, fungi, actinomycetes – Multiplication of bacteriophage, bacteria and organisms such as yeast, fungi.

UNIT II GROWTH OF MICROORGANISMS

Microbial nutrition and environment – Factors controlling growth of microorganisms in different media – Growth curve – Methods of enumeration of multiplying microorganisms – Culture media – Preservation of microbes – Sterilization and disinfection.

UNIT III MICROBIAL METABOLISM

Microbial Metabolism – Metabolic pathways - Production of secondary metabolites and their complication in industry – Beneficial micro organisms and products – Formation of toxic materials by microorganisms – A general study of food, industrial and agricultural microbiology.
UNIT IV  CONTROL OF MICROORGANISMS  9
Diseases caused by microorganisms and control – Chemotherapeutic agents – Beta-lactum antibiotics – Macrolide antibiotics – Cephalosprins – Quiolones – Sulphonamides and disinfectants.

UNIT V  ENVIRONMENTAL APPLICATIONS OF MICROBIOLOGY  9

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

PY3213  REGULATORY REQUIREMENTS IN PHARMACEUTICAL INDUSTRIES  L T P C
3 0 0 3

UNIT I  REGULATORY CONCEPTS  9
Quality assurance – Quality control – Practice of cGMP – Schedule M – USFDA.

UNIT II  REGULATORY ASPECTS  9
Pharmaceuticals – Bulk drug manufacture – Biotechnology derived products.

UNIT III  INTELLECTUAL PROPERTY RIGHTS  9
UNIT IV ICH GUIDELINES

Quality guidelines – Impurities in new drug substances (Q3A R) – Impurities in new drug products – Validation of analytical procedures text and methodology (Q2 R1).

UNIT V QUALITY AUDIT AND SELF INSPECTIONS

SOPs – Documentation – Loan license auditing – Common technical documentation (CTD) – Drug master file (DMF).

TOTAL: 45 PERIODS

TEXT BOOKS


REFERENCES


CH3226 HEAT TRANSFER

UNIT I FUNDAMENTAL CONCEPTS AND CONDUCTIVE HEAT TRANSFER


UNIT II CONVECTIVE HEAT TRANSFER AND BOUNDARY LAYER THEORY

Heat transfer coefficient – Forced convection – Free convection – Dimensional analysis and empirical correlation – Physical significance of dimensionless groups – Concept of hydrodynamic and thermal boundary layers.
UNIT III  THERMAL RADIATION  12


UNIT IV  DESIGN OF HEAT EXCHANGERS  12

Heat exchangers – Types and variation in design – Overall heat transfer coefficient – LMTD – Correction factors for multiple pass heat exchanger – Illustrative examples – Number of transfer units and effectiveness of heat exchangers.

UNIT V  HEAT TRANSFER IN EVAPORATORS  12


TEXT BOOKS


REFERENCES

UNIT IV SETTLING AND SEDIMENTATION  12

UNIT V AGITATION AND MIXING  12
Introduction to agitation and mixing of liquids - agitation equipment – Axial and radial flow impellers and flow patterns in agitated vessels - prevention of swirling – Power consumption in agitated vessels – Blending and mixing – Dispersion operations – Mixing of solids and pastes and types of mixers.

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

PY3216 MICROBIOLOGY LABORATORY  L T P C
0 0 3 2

1. Sterilization techniques (lecture / demonstration)
2. Preparation of various culture media.
3. Culturing of micro-organisms
   (a) Isolation of specific group of microbes symbiotic – asymbiotic, chemolithotrophs, organotrophs
   (b) Pure culture techniques – Streak plate, pour plate, isolation and preservation of bacterial culture, single spore isolation.
4. Identification of microorganisms by staining techniques
5. Identification of microorganisms by biochemical testing.
6. Quantification of microorganisms by turbidimetry
7. Quantification of microorganisms by serial dilution, MPM.
8. Preservation of cells, slants stabs, use of mineral oil, liquid paraffin, whey, glycerol, sterile water, lyophilization.
10. Food microbiology  – Milk – Fermented food – Yogurt, meat, ice cream
12. Determination of MIC of antimicrobial agents

TOTAL: 45 PERIODS
1. Study of units for volume, weight, measurements and concentration. sensitivity, specificity, precision and accuracy.
2. Preparation of buffers and pH measurements.
3. Qualitative tests for carbohydrates.
4. Qualitative tests for amino acids.
5. Estimation of Reducing sugars by the Benedict’s method.
7. Protein estimation by various methods.
8. Acid hydrolysis of proteins
10. Extraction of lipids.

TOTAL: 45 PERIODS

CH3228  HEAT TRANSFER LABORATORY

To determine the conductivity of metal rod.
1. To determine the conduction parameters using composite wall.
2. To determine individual heat transfer film coefficient in forced convection.
3. To determine individual heat transfer film coefficient in free convection.
4. To determine Stefan Boltzmann law constant.
5. To determine condensing heat transfer coefficient in vertical condenser.
6. To determine condensing heat transfer coefficient in horizontal condenser.
7. To determine rate of evaporation in open pan evaporator.
8. To determine overall heat transfer coefficient of double pipe heat exchanger by parallel flow.
9. To determine overall heat transfer coefficient of double pipe heat exchanger by counter flow.
10. To determine overall heat transfer coefficient of shell and tube heat exchanger.
11. To determine overall heat transfer coefficient of plate type heat exchanger by parallel flow.
12. Apparatus for determination of emissivity.
13. To determine the thermal conductivity of insulating powder.

TOTAL: 45 PERIODS
UNIT I PHYSICO-CHEMICAL PROPERTIES ON BIOLOGICAL ACTION OF DRUGS


UNIT II AUTONOMIC AND CENTRAL NERVOUS SYSTEM ACTING DRUGS


UNIT III CARDIOVASCULAR AND RESPIRATORY SYSTEM ACTING DRUGS


UNIT IV ANTIMICROBIAL AGENTS


UNIT V PERIPHERAL NERVOUS SYSTEM AND GASTROINTESTINAL DRUGS


TEXTBOOKS


REFERENCES

UNIT I  PREFORMULATION  12

UNIT II  LIQUID DOSAGE FORMS  12

UNIT III  SEMISOLID DOSAGE FORMS  12

UNIT IV  PARENTERAL DOSAGE FORMS  12

UNIT V  AEROSOLS  12
Advantage and disadvantage of aerosols – Components of aerosol package – Aerosol systems – Aerosol formulations – Selection of components – Aerosol filling – Quality control of pharmaceutical aerosol.

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
UNIT I  GENERAL PHARMACOLOGY  9
Routes of administration – Pharmacokinetics – Pharmacodynamics – Receptors –
Theories of receptors – Occupational theory – Affinity theory – Mechanism of action of
drugs – Agonist – Antagonist – Factors modifying drug action – Dosage calculations.

UNIT II  SYSTEMIC PHARMACOLOGY  9
Mechanism of action – Pharmacology – Acetylcholine – Atropine – Adrenaline –
Prazosin – Propranolol – Barbiturates – Benzodiazepine – Chlorpromazine – Imipramine

UNIT III  CARDIOVASCULAR PHARMACOLOGY  9
Classification – Mechanism of action – Pharmacology – Digoxin – Glyceryl trinitrate –
Verapamil – Clonidine – Hydralazine – Quinidine – Statins

UNIT IV  ANTIMICROBIAL PHARMACOLOGY  9
Mode of action – Pharmacology – Sulphonamides – Ciprofloxacin – Penicillin G –
Erythromycin – Rifampicin – Amphotericin B – Acyclovir – Chloroquine – Alkylating
agents – Paclitaxel

UNIT V  PERIPHERAL NERVOUS SYSTEM AND GASTROINTESTINAL
PHARMACOLOGY  9
Classification – Mechanism of action – d-Tubocurarine – Succinyl choline – Cimetidine –
Metoclopramide – Amoxicillin – Ondansetron – Lactulose.

TOTAL: 45 PERIODS

TEXT BOOKS
1. Satoskar, R.S., Bhandarkar, S.D. and Rege, N.N., “Pharmacology and

REFERENCES
2. Lawrence, D.R., Bennett, P.N. and Brown, M.J., “Clinical Pharmacology” 8th
UNIT I  FUNDAMENTAL CONCEPTS AND FIRST LAW OF THERMODYNAMICS  12

UNIT II  ENTROPY AND THE SECOND LAW OF THERMODYNAMICS  12

UNIT III  REFRIGERATION, VAPOR and COMBINED POWER CYCLES  12

UNIT IV  PVT RELATIONS AND THERMODYNAMIC RELATIONS  12

UNIT V  PHASE EQUILIBRIA AND CHEMICAL REACTION EQUILIBRIA  12

TOTAL: 60 PERIODS
TEXT BOOKS

REFERENCES

CH3325 CHEMICAL REACTION ENGINEERING L T P C
4 0 0 4

UNIT I REACTION KINETICS 12
Chemical kinetics – Classification of chemical reactions – Concentration and temperature dependent term of rate equation – Arrhenius collision and transition state theory – Searching for a mechanism.

UNIT II INTERPRETATION OF BATCH REACTOR DATA 12
Integral and differential methods of analysis – Half-life method – Zero order reaction – Empirical rate equation of n<sup>th</sup> order – Irreversible first and second order reactions for variable and constant volume systems.

UNIT III REACTOR DESIGN 12

UNIT IV HEAT EFFECTS 12
Temperature and pressure effects on single and multiple reactions – Adiabatic – Non-adiabatic – Isothermal and non-isothermal operations.

UNIT V DESIGN OF REACTOR FOR SINGLE AND MULTIPLE REACTIONS 12

TOTAL: 60 PERIODS
TEXT BOOKS

REFERENCES

CH3306 PROCESS INTRUMENTATION

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**TOTAL: 60 PERIODS**
TEXT BOOKS

REFERENCES

PY3307 PHARMACEUTICAL CHEMISTRY LABORATORY L T P C
0 0 3 2

1. Determination of percentage purity given drug sample.
2. Estimation of amount of active ingredient present in the given sample.
3. Chromatographic identification of organic compounds.
5. Analysis of impurities in fine chemicals / pharmaceutical substances by conventional chemical methods.
7. Determination of physical constants – melting point, boiling point, weight per ml, refractive index and viscosity.
8. Purification techniques for bulk drugs.

TOTAL: 45 PERIODS
1. Preparation of three official solutions.
2. Preparation of two official syrups.
3. Preparation of three official lotions.
4. Preparation of two official liniments.
5. Preparation of official ointments with different classes of bases.
6. Preparation of two creams.
7. Preparation of two pastes.
8. Preparation of two suspensions.
11. Preparation of granules and effervescent granules.

TOTAL: 45 PERIODS

1. Determination of reaction rate constant for a saponification reaction in batch reactor.
2. Determination of reaction rate constant for a saponification reaction in plug flow reactor.
3. Determination of reaction rate constant for a saponification reaction in mixed flow reactor.
4. Determination of mean residence time by RTD studies in plug flow reactor.
5. Determination of mean residence time by RTD studies in mixed flow reactor.

TOTAL: 45 PERIODS
UNIT I  UV – VISIBLE SPECTROSCOPY  9

UNIT II  INFRARED AND NMR SPECTROSCOPY  9
Principles of vibrational spectroscopy – Instrumentation and sampling techniques – Applications in pharmaceutical sciences – NMR principles – Instrumentation – Applications.

UNIT III  MASS AND ATOMIC SPECTROSCOPY  9

UNIT IV  CHROMATOGRAPHIC TECHNIQUES  9

UNIT V  ELECTROCHEMICAL METHODS OF ANALYSIS  9

L: 45 T: 15 TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES
UNIT I BIO-SEPARATION
Characterization of biomolecules – Fermentation broths – Role of downstream processing in biotechnology – Broad strategies for design of bio-separation processes.

UNIT II DOWNSTREAM PROCESSING

UNIT III LIQUID-LIQUID SEPARATIONS AND PROTEIN SEPARATIONS
Solvent extraction of small molecules – Aqueous two-phase extraction of proteins – PEG/Dextran separation – Precipitation of proteins with salts and organic solvents – Salting out method – Electrostatic interaction – Protein solvation with polyelectrolytes – Polyvalent metal ions – Sorption.

UNIT IV CHROMATOGRAPHIC SEPARATIONS

UNIT V PRODUCT PURIFICATION

TOTAL: 45 PERIODS

TEXTBOOKS
REFERENCES

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UNIT I    HEAT EXCHANGERS  
Design of shell and tube heat exchangers- Double pipe heat exchangers

UNIT II   EVAPORATORS  
Design of single and multiple effect evaporators.

UNIT III  DISTILLATION  
Design of distillation columns – sieve and bubble cap towers.

UNIT IV   ABSORPTION COLUMNS  
Design of absorption columns – plate & packed columns

UNIT V    DRYERS  
Design of batch and continuous dryers.

TOTAL: 60 PERIODS

TEXT BOOKS
REFERENCES


Note: Necessary Data Book is to be issued while conducting Practical Examination

CH3314 MASS TRANSFER OPERATIONS

UNIT I DIFFUSION

Diffusion in fluids: Molecular and eddy diffusion measurement and calculation of diffusivities – Ordinary diffusion in multi component gaseous mixtures – Interphase mass transfer – Mass transfer coefficients – Theories of mass transfer.

UNIT II ABSORPTION


UNIT III DISTILLATION


UNIT IV LEACHING

Solid-liquid extraction – Description of leaching operations and technologies – Applications of leaching – Preparation of solid – Methods of operation and classification of equipment – Solid-liquid equilibrium in leaching – Multi stage cross current and counter current leaching – Calculation of composition and number of stages.
UNIT V  DRYING

Drying – Principle and definitions – Estimation of drying rates – Drying rate curve – Critical and equilibrium moisture content – Calculation of drying time under constant drying conditions – Different types of dryers.

TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES


CS3315  OBJECT ORIENTED PROGRAMMING

UNIT I  FUNDAMENTALS

UNIT II  IMPLEMENTING ADTS AND ENCAPSULATION
Aggregate type structure – Structure pointer operators – Unions – Bit fields – Data handling and member functions – Classes – Constructors and destructors – Static member – This pointer – Reference semantics – Implementation of simple ADTs.

UNIT III  POLYMORPHISM

UNIT IV  INHERITANCE
UNIT V  TEMPLATES AND FILE HANDLING


TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PY3316  INSTRUMENTAL METHODS OF PHARMACEUTICAL ANALYSIS LABORATORY

1. Determination of impurities by limit test.
2. Determination of $\lambda_{\text{max}}$.
3. Determination of isobestic point.
4. Determination of the percentage purity of a drug using colorimetry.
5. Determination of percentage purity of drug in marketed tablets and capsules using UV spectrophotometer by $E^{1\%}$ method.
6. Determination of percentage purity of marketed or formulated tablets using UV spectrophotometer using calibration method.
7. Separation of mixtures of drugs by TLC.
8. Determination of $R_f$ values of drugs using paper chromatography.
10. Effect of pH on absorbance spectrum of phenolic compounds (Paracetamol).

TOTAL: 45 PERIODS
CH3317  MASS TRANSFER LABORATORY  

1. Determination of the critical moisture content and drying rate.
2. Determination of the critical moisture content and drying rate under vacuum.
3. Verification of Rayleigh equation.
4. Determination of the efficiency of steam distillation.
5. Determination of diffusion coefficient.
6. Determination of HETP.
7. Optimization of the number of leaching stages.
8. Determination of the break point for adsorption.
10. Verification of adsorption isotherms

TOTAL: 45 PERIODS

GE3318  COMMUNICATION SKILLS LABORATORY  

Globalisation has brought in numerous opportunities for the teeming millions, with more focus on the students’ overall capability apart from academic competence. Many students, particularly those from non-English medium schools, find that they are not preferred due to their inadequacy of communication skills and soft skills, despite possessing sound knowledge in their subject area along with technical capability. Keeping in view their pre-employment needs and career requirements, this course on Communication Skills Laboratory will prepare students to adapt themselves with ease to the industry environment, thus rendering them as prospective assets to industries. The course will equip the students with the necessary communication skills that would go a long way in helping them in their profession.

OBJECTIVES:

- To equip students of engineering and technology with effective speaking and listening skills in English.
- To help them develop their soft skills and interpersonal skills, which will make the transition from college to workplace smoother and help them excel in their job.
- To enhance the performance of students at Placement Interviews, Group Discussions and other recruitment exercises.

I. PC based session (Weightage 40%)  

<table>
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53
A. ENGLISH LANGUAGE LAB (18 Periods)

1. LISTENING COMPREHENSION: (6)
   Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions.

2. READING COMPREHENSION: (6)
   Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.

3. SPEAKING: (6)
   Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation)

B. DISCUSSION OF AUDIO-VISUAL MATERIALS (6 PERIODS)
   (Samples are available to learn and practice)

1. RESUME / REPORT PREPARATION / LETTER WRITING (1)
   Structuring the resume / report - Letter writing / Email Communication - Samples.

2. PRESENTATION SKILLS: (1)
   Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples

3. SOFT SKILLS: (2)
   Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management & Poise - Video Samples

4. GROUP DISCUSSION: (1)
   Why is GD part of selection process ? - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD -Video samples

5. INTERVIEW SKILLS: (1)
   Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews-Video samples.

II. Practice Session (Weightage – 60%) 24

1. Resume / Report Preparation / Letter writing: Students prepare their own resume and report. (2)

2. Presentation Skills: Students make presentations on given topics. (8)
3. **Group Discussion**: Students participate in group discussions.  

4. **Interview Skills**: Students participate in Mock Interviews

**TEXT BOOKS:**


**REFERENCES**


**LAB REQUIREMENT**

1. Teacher console and systems for students.
2. English Language Lab Software
3. Career Lab Software

**Requirement for a batch of 60 students**

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<th>Sl.No.</th>
<th>Description of Equipment</th>
<th>Quantity required</th>
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<td>2.</td>
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3. Handicam Video Camera (with video lights and mic input) & 1 No.

4. Television - 29" & 1 No.

5. Collar mike & 1 No.

6. Cordless mikes & 1 No.

7. Audio Mixer & 1 No.

8. DVD Recorder / Player & 1 No.

9. LCD Projector with MP3 /CD /DVD provision for audio / video facility - **Desirable** & 1 No.

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PY3401  ADVANCED MEDICINAL CHEMISTRY  L  T  P  C

3  1  0  4

**UNIT I  QUANTITATIVE DESCRIPTION OF PHYSICOCHEMICAL PROPERTIES**


**UNIT II  QUANTITATIVE STRUCTURE ACTIVITY RELATIONSHIP**

History and development of QSAR – Classification of QSAR methodology – Hansch analysis – Free Wilson analysis – Applications advantages and pitfalls of QSAR.

**UNIT III  DESIGN OF ENZYME INHIBITORS**

Forces involved information of enzyme substrate and enzyme inhibitor complexes – Design of rapid reversible inhibitors – Multisubstrate inhibitors – Mechanism based inhibitors – Application with recent examples from literature.
UNIT IV  DOCKING OF FLEXIBLE MOLECULES
Docking of flexible molecules in protein/enzyme active sites – Docking by energy minimization superimposition – Molecular dynamic – Monte Carlo – Distance geometry and build-up methods – Applications with recent examples from literature.

UNIT V  COMPUTER-AIDED DEVELOPMENT OF THREE-DIMENSIONAL PHARMACOPHORE MODES
Direct and indirect ligand design – The pharmacophore concept – Steps in 3-D-pharmacophore identification – Selection of pharmacophore elements – Representation of pharmacophore elements as ligand points or site points – Receptor exclude and receptor essential volumes.

TEXT BOOKS

REFERENCES

PY3402  NOVEL DRUG DELIVERY SYSTEM

UNIT I  POLYMERS
Polymers used in controlled drug delivery modules – Classification – Advantages and disadvantages of polymers – Polymerization mechanisms – Degradation mechanism – Polymer characterization.

UNIT II  SUSTAINED RELEASE DRUG DELIVERY SYSTEMS

UNIT III  TARGETED DRUG DELIVERY SYSTEM
UNIT IV  MODULE FOR GASTRO INTESTINAL TRACTS  12
Approaches to increase gastric retention – Factors affecting gastric retention – Formulation development of floating drug delivery system – Expanding systems – Systems for colon specific delivery – Targeting approaches to colon.

UNIT V  MUCOADHESIVE DRUG DELIVERY SYSTEMS  12

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

PY3403  PHARMACEUTICAL BIOTECHNOLOGY
        L   T   P   C
        4   0   0   4

UNIT I  FERMENTATION TECHNOLOGY  12

UNIT II  RAW MATERIALS FOR FERMENTATION PROCESS  12
Isolation of microorganisms – Preservation and improvement of industrial microorganisms for overproduction of primary and secondary metabolites – Medium requirements for fermentation process – Carbon, nitrogen, minerals, vitamins, and other nutrients – Simple and complex media.
UNIT III PRIMARY METABOLITES

UNIT IV SECONDARY METABOLITES

UNIT V PRODUCTION AND CONTROL OF BIOTECH DERIVED PRODUCTS

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

CH3404 PROCESS DYNAMICS AND CONTROL L T P C
4 0 0 4

UNIT I FIRST ORDER SYSTEMS

UNIT II HIGHER ORDER SYSTEMS
UNIT III  CLOSED LOOP CONTROL SYSTEMS


UNIT IV  FREQUENCY RESPONSE

Introduction to frequency response of closed-loop systems – Routh analysis – Control system design by frequency – Bode diagram – Stability criterion – Tuning of controller settings.

UNIT V  SPECIAL CONTROLS

Cascade – Feed forward and ratio control – Dead time compensation – Internal model control – Control valves – Process identification.

TOTAL: 60 PERIODS

TEXT BOOKS


REFERENCES


CH3405  TECHNOLOGY OF FINE CHEMICALS AND BULK DRUGS

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UNIT I  INTRODUCTION OF FINE CHEMICALS AND BULK DRUGS

Concept of fine and Bulk drugs and their salient features – Evolution of process – Process chemistry – Research and development strategies in pharmaceutical industries.

UNIT II  PRODUCTION, PLANNING AND CONTROL

UNIT III   BASE CHEMICAL PRODUCTION  12
Industrial Production of following base chemicals – Mineral acids (sulphuric acid, nitric acid, phosphoric acid) – Naphthalene – Ammonia – Caustic soda – Industrial alcohol – Butyl alcohol – Benzene – Phenol.

UNIT IV   DRUG INTERMEDIATES AND FINE CHEMICAL PRODUCTION  12

UNIT V   BULK DRUGS  12

TOTAL: 60 PERIODS

TEXT BOOKS

REFERENCES

PY3406   ADVANCED MEDICINAL CHEMISTRY

LABORATORY

1. Design of structures using chemsketch
2. Finding C log P value for drug structures
3. Determination of pKa value of drugs and drugs intermediates
4. Determination of partition co-efficient and calculation of partition co-efficient values of various drugs
5. Determination of physicochemical properties of synthesized drugs
6. Determination of electronic properties of drug molecules using simulation softwares
7. Finding potential lead molecules using docking software
8. Studies on QSAR for the synthesized drugs

TOTAL: 45 PERIODS

PY3407 NOVEL DRUG DELIVERY SYSTEM LABORATORY

1. Preparation and evaluation of liposomes
2. Formulation and evaluation of egg albumin microspheres by single emulsion technique
3. Formulation and evaluation of microspheres by emulsion solvent evaporation method
4. Formulation and evaluation of microcapsules through coacervation phase separation by solvent evaporation method
5. Formulation and evaluation of solid dispersion by fusion method
6. Formulation and evaluation of solid dispersion by melting point solvent technique
7. Preparation and evaluation of magnetic microsphere
8. Formulation and evaluation of transdermal films
9. Formulation and evaluation of sustained release matrix tablets
10. Comparison of in vitro release studies of marketed sustained release tablets
11. In vitro release studies of marketed enteric coated tablets

TOTAL: 45 PERIODS

CH3408 PROCESS DYNAMICS AND CONTROL LABORATORY

1. ON-OFF control of thermal process
2. Flow control loop and Flow Transmitter
3. Level Control loop and Level Transmitter
4. Pressure control loop and Pressure Transmitter
5. Control valve characteristics
6. Verifying the response of Non-Interacting and interacting level System
7. Optimum controller setting using Ziegler’s Nichols Methods
8. Optimum Controller Tuning on Level Process Station
9. pH control system
10. First order and second order system

62
11. Computer controlled heat exchanger (Shell and tube and Double pipe)
12. Pneumatic control valve positioned trainer
13. Cascade control trainer
14. I/P and P/I converter

*Minimum 10 experiments shall be offered.

TOTAL: 45 PERIODS

CH3411 UNIT PROCESSES IN ORGANIC SYNTHESIS

UNIT I SULFONATION AND SULFATION 12
Sulfitating – Sulfonating agents – Applications – Chemical and physical factors in sulfonation and sulfation – Thermodynamics mechanism – Kinetic considerations – Industrial equipments and techniques – Sulfonation of benzene – Aniline.

UNIT II NITRATION 12

UNIT III AMINATION BY REDUCTION 12

UNIT IV HALOGENATION 12

UNIT V OXIDATION 12

TOTAL: 60 PERIODS
TEXT BOOKS

REFERENCES

GE2022 TOTAL QUALITY MANAGEMENT

UNIT I INTRODUCTION
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM - TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II TQM PRINCIPLES
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III TQM TOOLS & TECHNIQUES I

UNIT IV TQM TOOLS & TECHNIQUES II

UNIT V QUALITY SYSTEMS

TOTAL: 45 PERIODS
TEXT BOOK:

REFERENCES:

PY3412 PROJECT WORK

The project may be considered as the ultimate exercise presented to the final semester student before graduation to measure accumulated technical knowledge and experience. At the same time, the project itself should provide the students with some new skills, innovation and information, and strengthen the acquired ones.

The project programme consists of different assignment, allotted time, submission of report under internal faculty guidance and evaluation by external member along with internal faculty.

The activities performed during a project may cover one or more of the following:
- Data collection
- Critical literature review
- Laboratory experience and tests
- Mathematical modeling
- Software application
- Industrial visits
- Design and/or assembly
- Process analysis

The major project may be assigned to a group of three students. The project topic allotted may be of theoretical, experimental or industrial projects to be carried out under the supervision of internal guide and external guide (in case of industrial projects).

Major projects are to be executed strictly as per the project schedule prepared during VIII semester. A committee of departmental faculty members comprising the project guide, one more faculty member and the head of department will monitor and review the progress achieved by the student at various stages. The internal assessment will be done by the committee based on the progress achieved on completion of the project work.
On completion of the project work, each student has to prepare a project report and submit the same in triplicate to the department. The project work and the report will be evaluated by the internal assessment committee for a total of 100 marks. The external university examination, which carries a total of 300 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the university.

**PY3001  SOLID DOSAGE FORM TECHNOLOGY  L T P C**
**3 0 0 3**

**UNIT I  POWDERS AND GRANULES**

**UNIT II  TABLETS AND COATING**

**UNIT III  CAPSULES**

**UNIT IV  MICROENCAPSULATION**

**UNIT V  ADVANCES IN TABLETING TECHNIQUES**
Compression coating – Inlay tablets – Layer tablets – Mouth dissolving tablets – Tablets in tablets.

**TOTAL: 45 PERIODS**

**TEXT BOOKS**
REFERENCES

PY3002 HERBAL TECHNOLOGY

UNIT I INDIAN SYSTEMS OF MEDICINE

UNIT II IN-VITRO CULTURE OF MEDICINAL PLANTS
Requirements – Setting up a tissue culture lab – Basic laboratory procedure – Processing of plat tissue culture – Growth profile – Growth measurement – Plant tissue culture methods – Callus culture – Types of tissue culture – Tissue culture of medicinal plants – Applications of plant tissue culture.

UNIT III EXTRACTION, ISOLATION AND ANALYSIS OF PHYTOPHARMACEUTICALS

UNIT IV SCREENING METHODS FOR HERBAL DRUGS
Screening methods for anti-fertility agents – Antidiabetic drugs – Anti anginal drugs – Cardiac glycosides – Analgesic activity – Antipyretic activity – Anti cancer activity – Evaluation of hepatoprotective agents – Anti ulcer drugs.

UNIT V STANDARDIZATION AND CONSERVATION OF HERBAL DRUGS

TOTAL: 45 PERIODS
TEXT BOOKS

REFERENCES

PY3003 PHARMACEUTICAL PRODUCTION MANAGEMENT  
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UNIT I PILOT PLANT AND SCALE-UP TECHNIQUES  

UNIT II PRODUCTION, PLANNING, SCHEDULING AND FORECASTING  
Production systems – Production department – Production process routing and loading – Scheduling – Despatching of records – Production control.

UNIT III FORMULATION PRODUCTION MANAGEMENT  
Plant site selection and layout – Material handling for various pharmaceutical products – Service facilities – Preventive maintenance in pharmaceutical companies – Group and individual replacement.

UNIT IV MATERIAL MANAGEMENT  
UNIT V  HUMAN RESOURCE DEVELOPMENT  9
Human resource planning – Job analysis and design – Recruitment – Personnel
selection – Orientation and placement – Training and development – Supervision –
Performance appraisal – Remuneration and salaries – Compensation – Industrial
relations – Motivation – Labour welfare.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PC3006  INDUSTRIAL MANAGEMENT  

UNIT I  PERSONNEL MANAGEMENT  9
Principles and functions – Handling union – Negotiation process – Labour legislation in
India – Managerial decision making process, tools and techniques – Role of employee
through empowerment – Industrial management program – Public relation.

UNIT II  TQM TOOLS AND TECHNIQUES  9
Bench marking process – Concept, reason, application – Quality function deployment
and its benefits – Study of manufacturing costs and techniques for financial control –
Tools and techniques for six sigma philosophy – Tacuchi law functions – Statistical
process control.

UNIT III  QUALITY AND ENVIRONMENTAL MANAGEMENT SYSTEMS  9
Philosophy of Total Quality Management – ISO registration procedure and benefits –
Concepts of ISO 9000, 14000, 18000 standards – Internal quality audit – Quality
improvement and customer satisfaction – Importance of documentation procedure –
Plant safety and industrial hygiene.
UNIT IV  ENGINEERING ECONOMICS  9

UNIT V  PROCESS ECONOMICS  9

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PY3005  WATER TREATMENT AND MANAGEMENT  L  T  P  C
UNIT I  INTERNAL TREATMENT PROCESS  3  0  0  3

UNIT II  EXTERNAL TREATMENT PROCESS  9

UNIT III  BOILER WATER AND COOLING WATER  9
UNIT IV WASTE WATER TREATMENT

UNIT V WATER MANAGEMENT IN INDIA

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PY3006 VALIDATION IN PHARMACEUTICAL INDUSTRIES L T P C
3 0 0 3

UNIT I DRUGS AND COSMETICS ACT AND GMP FOR API

UNIT II IMPURITIES IN DRUG SUBSTANCES AND DRUG PRODUCTS
Quality USP description of impurities – Validation and impurity issue related to manufacturing – Processing of drug substances – Enantiomers as impurities – Polymorphs as unwanted components.
UNIT III CLEANING FOR API MANUFACTURING FACILITIES
Regulatory requirements – Multiple vs dedicated equipment – Unique nature of API – Multiple level approach to cleaning – Nature of contaminants – Selection of a worst case – Cleaning techniques – Sampling – Analytical methods – Limits and acceptance criteria, documentation.

UNIT IV STABILITY TESTING
Reasons for stability testing – Modes of degradation – Shelf lives and expiration dates – Possible strategies to improve shelf lives – Stability testing of new drug substances and products (Q1A) – Photo stability testing of new substances and products (Q1B) – Validation on analytical procedures (Q2A).

UNIT V GMP FOR BIOLOGICAL PRODUCTS

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PY3007 NATURAL PRODUCTS CHEMISTRY L T P C
3 0 0 3

UNIT I PROTEINS AND AMINO ACIDS

UNIT II TERPENOIDS
UNIT III  ALKALOIDS

UNIT IV  GLYCOSIDES
Basic ring system – Nomenclature and stereochemistry of steroid nucleus – Chemistry of digitoxin, digoxin, lanatosides, diosgenin and sarasapogenin, hecogenin and sennosides.

UNIT V  VITAMINS
Chemistry and pharmaceutical uses of vitamin A, D, E, K, B1, B2, B6, B12 and folic acid.

TEXT BOOKS

REFERENCES

PY3008  MATERIAL SCIENCE AND TECHNOLOGY  L  T  P  C
3  0  0  3

UNIT I  BONDING IN SOLIDS

UNIT II  CRYSTAL STRUCTURE AND IMPERFECTIONS
UNIT III PROPERTIES AND CORROSION 9
Electrical and magnetic properties of materials – Chemical, thermal and technological properties of materials – Corrosion – Theories of corrosion – Control and prevention of corrosion.

UNIT IV ENGINEERING METALS 9

UNIT V INORGANIC AND ORGANIC MATERIALS 9

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PY3009 PHARMACEUTICAL PACKAGING TECHNOLOGY L T P C 3 0 0 3

UNIT I PHARMACEUTICAL PACKAGING 9
Status – Scope in pharmaceutical industry – Classification of packaging material – Primary and secondary packaging – Functions of packaging.

UNIT II PRIMARY PACKAGING MATERIAL 9
Glass containers – Metals containers – Fiber and paper board for bulk – Films and foils for lamination – Equipments used in strip and blister packaging.
UNIT III  SECONDARY PACKAGING MATERIALS  9
Folding cartons and sets of boxes – Materials of construction – Design – Specifications –
Packaging inserts – Specifications – Test methods – Quality control – Cushioning
materials – Applications – Tapes and adhesives – Cap threads – Cap liners – Bands –
Shrink bands – Stoppers and plugs.

UNIT IV  QUALITY CONTROL OF PACKAGING MATERIALS  9
Specifications – Quality control tests – Methods and evaluation of packaging of materials
– Labels and labeling – Sterilization of containers.

UNIT V  STABILITY AND REGULATIONS  9
Stability of Packaging materials – Law and regulations governing packaging.

TOTAL: 45 PERIODS

TEXT BOOKS
2. Harburn, K., “Quality Control of Packaging Materials in the Pharmaceutical

REFERENCES
   Guidelines And Related Materials”, 2nd Edition, World Health Organization,
   2004.
2. Styres, L.K., “Modern Packaging Encyclopedia”, Packaging Catalog Corporation

PY3010  PILOT PLANT AND SCALE UP METHODS  L  T  P  C
            3  0  0  3

UNIT I  NECESSITY AND PURPOSE  9
Function – Size estimation – Location personnel requirements – Operation programming

UNIT II  PRINCIPLE  9
Principle of similarity – Dimensional analysis – Scale up equations – Extrapolations –
Analog models.
UNIT- III DESIGN
Pilot plant design for flow ducts – Mixing equipments – Heat transfer equipments.

UNIT- IV METHODS
Design methods for packed towers – Batch and continuous distillation columns.

UNIT- V EQUIPMENTS
Pilot plants for reactors – Furnaces – Filters and mechanical operations equipments.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

PY3011 DRUGS THROUGH BIOTECHNOLOGY L T P C
3 0 0 3

UNIT I GENETIC ENGINEERING

UNIT II VECTORS

UNIT III IMMUNOGLOBULINS
UNIT IV IMMUNOTHERAPY

UNIT V GENE THERAPY

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES

MG3012 SAFETY AND RISK MANAGEMENT

UNIT I INDUSTRIAL SAFETY
Concepts of safety – Hazard classification chemical, physical, mechanical, ergonomics, biological and noise hazards – Hazards from utilities like air, water, steam.

UNIT II HAZARD IDENTIFICATION AND CONTROL

UNIT III RISK MANAGEMENT
UNIT IV SAFETY PROCEDURES

UNIT V SAFETY IN HANDLING AND STORAGE OF CHEMICALS
Safety measures in handling and storage of chemicals – Fire chemistry and its control – Personnel protection – Safety color codes of chemicals.

TOTAL: 45 PERIODS

TEXT BOOKS

REFERENCES