SCHEME

OF

STUDIES AND EXAMINATIONS

B.Tech. (Chemical Engineering)
w.e.f. 2012-2013

Department of Chemical Engineering

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY
MURTHAL (SONEPAT)
## DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
### SCHEME OF STUDIES & EXAMINATIONS
#### B. Tech. 1st YEAR (SEMESTER – I) (Common for all branches)
##### Credit Based Scheme w.e.f. 2012-13

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### Note:
1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. All the branches are to be divided into group ‘A’ and ‘B’ as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.
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Note: 1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.
2. Each student has to undergo a workshop at least 4 weeks (80-100 hours) at the end of II semester during summer vacations. Out of the four weeks, two weeks would be dedicated to general skills and two weeks training for specialized discipline /department. The evaluation of this training shall be carried out in the III semester.
3. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
4. Electronics gadgets including Cellular phones are not allowed in the examination.
5. All the branches are to be divided into group ‘A’ and ‘B’ as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.
6. The elective course HUM 102B ORAL COMMUNICATION SKILLS is deleted with effect from the session 21013-14.
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Note: 1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.
2. The Environmental studies (GES-201B) & Environmental studies field work (GES-203B) are compulsory & qualifying courses only.
3. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
4. Electronics gadgets including Cellular phones are not allowed in the examination.
5. All the branches are to be divided into group ‘A’ and ‘B’ as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.
6. Assessment of Workshop undergone at the end of II semester, will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from in-house Workshop.
### DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
#### SCHEME OF STUDIES & EXAMINATIONS

**B. Tech. 2nd YEAR (SEMESTER – IV) (CHEMICAL ENGINEERING)**

Credit Based Scheme w.e.f. 2013-14

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**Note:**
1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.
2. The Environmental studies (GES-201B) & Environmental studies field work (GES-203B) are compulsory & qualifying courses only.
3. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
4. Electronics gadgets including Cellular phones are not allowed in the examination.
5. All the branches are to be divided into group ‘A’ and ‘B’ as per the suitability of the institute/college, so that there is an equitable distribution of teaching load in odd and even semesters.
6. Each student has to undergo Professional training of at least 4 weeks from the industry, institute, research lab, training center etc during summer vacation and its evaluation shall be carried out in the V semester.
### DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)

**SCHEME OF STUDIES & EXAMINATIONS**

**B. Tech. 3rd YEAR (SEMESTER – V) (CHEMICAL ENGINEERING)**

Credit Based Scheme w.e.f. 2014-15

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**TOTAL** | 18 6 8 260 450 90 800 29

**Note:**
1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency & Ethics Syllabus.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. Assessment of Professional Training-I undergone at the end of IV semester, will be based on seminar, viva-voce, report and certificate of professional training obtained by the student from the industry, institute, research lab, training centre etc.
<table>
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<th>Duration of Exam</th>
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<td>500 255</td>
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**Note:**
1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Proficiency & Ethics Syllabus.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. Each student has to undergo Professional training of 4 weeks from the industry, institute, research lab, training center etc during summer vacation and its evaluation shall be carried out in the VII semester.
### DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE & TECHNOLOGY, MURTHAL (SONEPAT)
### SCHEME OF STUDIES & EXAMINATIONS
### B. Tech. 4th YEAR (SEMESTER – VII) (CHEMICAL ENGINEERING)
### Credit Based Scheme w.e.f. 2015-16

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*LIST OF OPEN ELECTIVES:

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Note: 1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Fitness for the Profession Syllabus.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. Students will be permitted to opt for any one elective run by the other department. However, the departments will offer those elective for which they have expertise. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise. The minimum strength of the students should be 20 to run an elective course.
5. Assessment of Professional Training-II undergone at the end of VI semester will be based on seminar, viva-vocie, report and certificate of professional training obtained by the student from the industry, institute, research lab, training centre etc.
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<td>Practical</td>
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**Departmental Elective-I**
1. CHE451B ENVIRONMENTAL POLLUTION CONTROL
2. CHE453B INTRODUCTION TO BIO-CHEMICAL ENGINEERING.

**Departmental Elective-II**
1. CHE452B NOVEL SEPARATION TECHNIQUES
2. CHE454B DESIGN OF PIPING SYSTEMS.

**Note:**
1. Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of sports is given in General Fitness for the Profession Syllabus.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
4. For the course CHE-408 Seminar, a student will select a topic from emerging areas of Engineering and Technology and study it independently. Student will give a seminar talk on the topic.
5. The evaluation of the students for his/her General Fitness for the Profession shall be carried out by a team consisting Dean of Faculty, Chairperson of Department and external examiner appointed by University.
6. The choice of the students for any elective shall not be a binding for the department to offer, if the department does not have expertise. The minimum strength of the students should be 20 to run an elective course.
Objective
The course aims at developing the desired language (English) skills of students of engineering and technology so that they become proficient in communication to excel in their professional lives. The course has been designed so as to enhance their linguistic and communicative competence.

Course Content

UNIT I
Communicative Grammar:
A) Spotting the errors pertaining to tenses, conditional sentences, Concord – grammatical concord, notional concord and the principle of proximity b/w subject and verb
B) Voice, Reported Speech.

UNIT II
Language through Literature:
Linguistic Reading of the following texts
A) ‘Kabuliwallah’ by Rabindranath Tagore*
B) ‘Am I Blue?’ by Alice Walker*
C) ‘If You are Wrong, Admit It’ by Dale Carnegie*
D) ‘Engine Trouble’ by R.K. Narayan*

The prescribed texts will be used as case studies for various components of the syllabus. * the Source is given in the list of Texts Books given below.

UNIT III
Group Communication:
A) Communication: concept, Process and Barriers
B) Communicating using Standard Pronunciation with the help of IPA
C) Formal Speaking with peers (e.g. discussion, talks on current issues in a class)
B) Writing official letters on issues concerning students and social life
C) Writing small reports on scientific issues, IT issues, University fests/programmes
C) E-mail writing and writing for web

UNIT IV
Communicative Creativity:
A) Comprehension: Extracting, interpreting, summarizing, reviewing and analyzing the prescribed texts.
B) Composition: Developing themes and situations through role play activities or dialogue writing.

TEXT BOOKS
2. Communicative English for Engineers and Professionals by Nitin Bhatnagar & Mamta Bhatnagar New Delhi: Pearson / Longman

SUGGESTED READING
1. Pink, M.A. and S.E. Thomas. *English Grammar, Composition and Correspondence*. Delhi: S. Chand and Sons

SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST)

Theory

1. The duration of the exam will be 3 hours.
2. The Question Paper for this theory course shall have seven questions in all covering all the units of the syllabus.
3. The student is required to attempt all the seven questions.
4. Questions No. 1 based on Unit I is of 15 marks. It may be in the form of ‘Do as directed: trace the error, choose the correct alternative, supply the correct alternative/s, change the voice, convert the speech from direct to indirect or vice-versa’.
5. Question no 2 and 3 based on prescribed texts in Unit II. Question no 2 of 10 marks is to evaluate the comprehension of the text through short answer questions or a long answer question to assess the students’ reading comprehension, interpretative and analytical abilities. Question no 3 of 15 marks will judge the linguistic aspect of the text such as using a particular word in its various syntactic forms like noun, adjective, verb etc.; matching the lists of words and their explanation; providing opposite/similar meanings and other grammar components prescribed in Unit I of the syllabus.
6. Question no 4 based on Unit III is of 10 marks. It may be in the form of transcription of words given, describe an event, classmate, discuss an issue etc.
7. Question no 5 based on Unit III is of 10 marks. It requires the student to frame either a small report on a topic given or write the given official letter, or e-mail a message.
8. Question no 6 based on unit IV is of 10 marks. It evaluates the Comprehension and Interpretation of the texts prescribed in Unit II. The vocabulary, general understanding and interpretation of the content may be evaluated in the form of question answer exercise, culling out important points, suggesting a suitable topic/title, summarising and interpreting.
9. Question No. 7 based on unit IV is of 5 marks. It requires the student to develop a hypothetical situation in a dialogue form, or to develop an outline, key expression, for role play activity.

MATH 101B : MATHEMATICS - I
B. Tech. Semester - I (Common for all Branches)

<table>
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<th>L</th>
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<td>75 Marks</td>
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UNIT-I

**Infinite series** : Convergence and divergence, Comparison, D' Alembert's ratio, Integral, Raabe's, Logarithmic and Cauchy root tests, Alternating series, Absolute and conditional convergence.

Applications of Differentiation : Taylor's and Maclaurin's series, Asymptotes, Curvature Asymptotes.

UNIT-II

**Partial Differentiation & its Applications** : Functions of two or more variables; partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobians, Higher order partial derivatives.

Homogeneous functions, Euler's theorem, Taylor's series for functions of two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, Differentiation under integral sign.

UNIT-III

**Applications of Single & Multiple Integration** : Applications of single integration to find volume of solids and surface area of solids of revolution. Double integral, change of order of integration, Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves and volume of solids of revolution.

Triple integral, volume of solids, change of variables, Beta and gamma functions and relationship between them.

UNIT-IV

**Vector Calculus** : Differentiation of vectors, scalar and vector point functions Gradient of a scalar field and directional derivative, divergence and curl of a vector field and their physical interpretations.

Integration of vectors, line integral, surface integral, volume integral, Green, Stoke's and Gauss theorems (without proof) and their simple applications.

TEXT BOOKS :

REFERENCE BOOKS :

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

PHY 101B : ENGINEERING PHYSICS - I
B. Tech. Semester - I (Common for all Branches)

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UNIT-I

PHYSICAL OPTICS:

Interference: Division of wave front-Fresnel’s Biprism, Division of amplitude – Newton’s rings, Michelson interferometer, applications.

Diffraction: Difference between Fraunhofer and Fresnel diffraction, Fraunhofer diffraction through a slit, Plane transmission diffraction grating and its spectra, dispersive and resolving powers.

Polarization: Polarised and unpolarized light, double refraction, Nicol prism, quarter and half wave plates, Plane, Elliptically & circularly polarised light, Polarimetry: Biquartz and Laurent's half-shade polarimeters.

UNIT-II


Introduction, Propagation of light in fibres, Types of fiber (pulse & continuous), numerical aperture, Modes of propagation in optical fibre, application of optical fibre.

ACOUSTIC OF BUILDINGS: Introduction, Reverberation, Sabine's formula for reverberation time, Absorption coefficient and its measurements, factors affecting the architectural acoustics and their remedy, Sound absorbing materials.

UNIT-III

TRANSMISSION OF HEAT AND THERMAL RADIATION

Modes of transmission of heat, Thermal conductivity, Rectilinear flow of heat through a rod, Radial flow of heat through a spherical shell, determination of Thermal conductivity of good and bad conductors.

Black body, Emissive and Absorptive Powers, Wein’s Displacement Law, Kirchhoff’s Law, Stefan’s Law, Determination of Stefan’s Constant.

UNIT-IV

NUCLEAR & ELEMENTARY IDEA OF PARTICLE PHYSICS

Outline of interaction of charged particles and of Gamma-rays with matter. Counters: Gas filled counters (Ionization Chamber, Proportional Counter and G M Counter). Detector: Scintillation detector, Semiconductor detectors (p-n junction detector), Biological effects of nuclear radiation.

Introduction to elementary particles, Interaction in particle physics: strong, electromagnetic, weak and gravitational.

TEXT BOOKS:

1. A text book of Optics – Brij Lal and Subramanyam
2. Perspectives of Modern Physics - Arthur Beiser (TMH)
3. Modern Engineering Physics – A.S. Vasudeva (S. Chand)
6. Engineering Physics by S.P. Taneja (Chand Pub.)

REFERENCE BOOKS:

**NOTE:**

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.

2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
B. Tech. Semester – I/II (Common for all Branches)

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UNIT-I

**Introduction:** Introduction to Manufacturing Processes and their Classification, automation in manufacturing, Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accidents, Methods of Safety, Electric Safety Measures, First Aid.

Plant Layout, Principles of Plant Layout, Objectives of Layout, Types of Plant and shop layouts and their Advantages.

UNIT-II


**Foundry:** Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern allowances, Risers, Runners, Gates, Molding Sand and its composition, Sand Preparation, Molding Methods, Core Sands and Core Making, Core Assembly, Mold Assembly, Melting (Cupola) and Pouring, Fettling, Casting Defects and Remedies. Testing of Castings

UNIT-III


**Introduction to Machine Tools:** Specifications and Uses of commonly used Machine Tools in a Workshop such as Lathe, Shaper, Planer, Milling, Drilling, Slotter, Introduction to Metal Cutting. Nomenclature of a Single Points Cutting Tool and Tool Wear, Mechanics of Chips Formation, Type of Chips, Use of Coolants in machining.

UNIT-IV

**Welding:** Introduction to Welding, Classification of Welding Processes, Gas Welding: Oxy-Acetylene Welding, Resistance Welding; Spot and Seam Welding, Arc Welding: Metal Arc, TIG & MIG Welding, Welding Defects and Remedies, Soldering & Brazing, Comparisons among Welding, Brazing and Soldering


TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

CH 101B : ENGINEERING CHEMISTRY
UNIT-I
Thermodynamics –Second law, concept of entropy, entropy change for ideal gas, free energy and work functions, free energy change, chemical potential, Gibb’s Helmholtz equation, Clausius –Clapeyron equation. Related numerical problems with above topics.  

Phase-rule- Terminology, Derivation of Gibb’s Phase Rule equation, One component system (water system), Two components system, system with Eutectic point (Pb-Ag), system with congruent melting point (Zn-Mg), system with incongruent melting point (Na-K), Applications of above systems. Elementary idea of Zone refining and Zone levelling

UNIT-II
Water and its treatment- Hardness of water and its determination, units of hardness, alkalinity of water and its determination, related numerical problems, water softening, ion-exchange process, mixed bed demineralisation, desalination of water by using different methods. 

Corrosion and its prevention: Galvanic & concentration cell, dry and wet corrosion, Electrochemical theory of corrosion, Galvanic corrosion, Pitting corrosion, differential aeration corrosion, water line corrosion, stress corrosion, factor effecting corrosion, Preventing measures, electroless Plating of Ni and Cu.

UNIT-III
Polymers and Polymerization: Organic polymers, polymerisation, various types of polymerisation, effect of structure on properties of polymers, preparation properties and technical applications of thermoplastics (PE, PVC, PVA, Teflon), thermosets (PF, UF & MF) and elastomers (Synthetic Rubber including SBR, Buna-S, Buna-N, Thiokol & Polyurethanes), Inorganic polymers (general properties), Glass transition temperature, silicones

Composite Materials & their application: optical fibres, Fullerenes, organic electronic material, composite materials & their classification, constituents of composites, role of interface in composite performance and durability, fiber-reinforced composite, advantage and applications of composites.

UNIT-IV
Lubricants and fuels: Friction, mechanism of lubrication, classification and properties of lubricants and selection of Lubricants, Definition and classification of fuel, Calorific value and methods of its determination.

Analytical methods: Thermal methods; Principle, method and application of TGA, DTA & DSC, interaction of E.M radiation with a molecule and origin of spectrum, Vibrational & electronic spectra (Experimental details are excluded), spectrophotometry, conductometric titrations, elementary discussion on Flame-photometery.

TEXT/REFERENCE BOOKS:
4. Chemistry in Engineering & Tech., Vol.1 & II, Rajaram, Kuriacose (TMH)
5. Engineering Chemistry, ShashiChawla (DhanpatRai and co.)
7. Engineering chemistry, S.S Dara (S.chand &co.)

NOTE:
In the semester examination, the Examiners will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

EE101B : PRINCIPLES OF ELECTRICAL ENGINEERING
B. Tech. Semester – I/II (Common for all Branches)

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UNIT-1

D.C. Circuit Analysis: Basic concepts of electric circuits, Ohm’s Law, Independent energy sources, Dependent energy sources, passive elements, circuit properties, Kirchoff’s laws, applications of Kirchoff’s laws, Nodal and Loop methods of Analysis, Superposition Theorem, Thevenin’s Theorem, Norton’s Theorem, Reciprocity Theorem, Maximum Power Transfer Theorem, Millman’s Theorem, Star-Delta or delta-star transformation, Applications of network theorems P-spice for DC circuit analysis.

UNIT-2

A.C. Circuits: Sinusoidal signal, Phasors, polar & rectangular, exponential & trigonometric representations, Resistance, Inductance & Capacitance components, behavior of these components in A.C. circuits, Phasor relationship for circuit elements, Impedance & Admittance, instantaneous & peak values, average and RMS values, active power, reactive power, apparent power, power factor, complex power, behavior of AC series, parallel circuits, RL, RC & RLC A.C. circuits (series and parallel), Resonance-series and parallel R-L-C Circuits, Q-factor, cut-off frequencies & bandwidth.

UNIT-3

Three Phase Circuits: Phase and line voltages and currents, balanced star and delta circuits, power equation, measurement of power by two wattmeter method.

Measuring Instruments: Principle, Construction & working of moving coil type voltmeter & ammeter, moving iron type voltmeter & ammeter, Electrodynamics type wattmeter, single-phase induction type energy meter.

UNIT-4


TEXT BOOKS:
1. Basic Electrical Engg (2nd Edition) : Kothari & Nagarath, TMH
2. Electrical Technology (Vol-I): B.L Theraja & A K Theraja, S.Chand
5. Basic Electrical Engineering, S.N. Singh, PHI

REFERENCE BOOKS:
1. Electrical Engineering Fundamentals: Deltoro, PHI
2. Basic Electrical Engineering (TMH WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH
4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH

NOTE: In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

CSE 101B : INTRODUCTION TO COMPUTERS AND PROGRAMMING
B. Tech. Semester – I/II (Common for all Branches)

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Class Work : 25 Marks  
Examination : 75 Marks  
Total : 100 Marks  
Duration of Examination : 3 Hours

UNIT-I


UNIT-II

Programming Languages and algorithms: Machine, Assembly and High Level Language; Assembler, Linker, Loader, Compiler, Interpreter, debuggers, Programming fundamentals: problem definition, algorithms, flowcharts and their symbols

Computer Networks: Basic concepts of Computer Networks, Working of Internet and its Major features. Network Topologies: Bus, Star, Ring, Hybrid, Tree, Complete, Irregular; Types of Networks: LAN, MAN and WAN. Electronic Mail: advantages and disadvantages, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, Newsgroups, mailing lists, chat rooms.

UNIT-III

Basics of ‘C’ Language

C Fundamentals, Basic data types, local and external variables and scope, formatted input/ output, expressions, selection statements, loops and their applications; arrays, functions, recursive functions, pointers and arrays. Strings literals, arrays of strings; applications, Structures, Unions and Enumerations.

Advanced Features of ‘C’ Language

preprocessor directives, macro definition, conditional compilation, storage classes, type’s qualifiers, Low level programming (Bitwise operators, Bit fields in structures, other low level techniques), error handling, file operations(low level/high level).

BOOKS

1. The C Programming Language by Dennis M Ritchie, Brian W. Kernigham, 1988, PHI.
3. Information technology, Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, 1998, TMH
4. Theory and problem of programming with C, Byron C Gottfried, TMH

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed

ME 103 B : ENGINEERING GRAPHICS AND DRAWING
B. Tech. Semester – I/II (Common for all Branches)

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**UNIT I**


**Projections of Straight Lines** – Contained by both Reference Planes, Contained by one and inclined to other Reference Plane, Contained by one and Parallel to other Reference Plane, Parallel to both Reference Plane, Perpendicular to one of the Reference Planes, Inclined to one Plane but Parallel to the other Reference Planes, Inclined to both the Reference Planes, True Length of a Line and its Inclination with Reference Planes, Traces of a Line.

**UNIT II**

**Projections of Planes** – Parallel to one Reference Plane, Inclined to one Plane but Perpendicular to the other, Inclined to both Reference Planes.

**Projections of Polyhedral Solids and Solids of Revolution** – in simple positions with axis perpendicular to a Reference Plane, with axis parallel to both Reference Planes, with axis parallel to one Reference Plane and inclined to the other Reference Plane, Projections of sections of Prisms, Pyramids, Cylinders and Cones. True Shape of Sections of Solids.

**UNIT III**

**Development** - Development of Surfaces of various Solids objects.

**Free Hand Sketching** - Orthographic Views from Isometric, Views of Simple Machine Components such as Brackets, Bearing Blocks, Guiding Blocks and Simple Couplings and Pipe Joints.

**UNIT IV**

**Isometric Projections** - Introduction, Isometric Scale, Isometric Views and Drawing of various Plane and Solids objects. Perspective drawing and oblique view.

**Orthographic Drawings** - Screw Threads, Bolts, Nuts and Washers, Bolted, Riveted and Welded Joints

**TEXT BOOKS:**
1. Engineering Drawing: MB Shah and BC Rana, Pearsons
2. Engineering Graphics and Drafting: P.S. Gill, S.K. Kataria and Sons

**REFERENCE BOOKS:**
1. A Text Book of Engineering Drawing: RK Dhawan, S Chand & Company

**NOTE:**
1. For class work, the students shall be assigned to prepare at least ten drawing sheets covering all units and each topic of the syllabus.
2. For practical examination, the examiner will set a question paper containing total eight questions, two questions from each unit covering each topic of the syllabus; students are required to attempt five questions at least one from each unit.
UNIT-I

Thermodynamics- Elementary definitions in thermodynamics, fundamentals of first and 2nd law of thermodynamic- concept of internal energy, enthalpy and entropy, heat pump and refrigerator, elementary numerical problems.

Properties of Steam & Boilers: properties of steam, use of steam tables and mollier diagram, measurement of dryness fraction of steam, Carnot and Rankin cycle, elementary numerical problems. Classification of boilers, Comparison of water and fire tube boilers mounting and accessories with their functions, Constructional and operational details of Cochran and Babcock and Wilcox boilers, elementary numerical problems.

Steam Turbines and Condensers: Classification of turbines and their working principles, Types of condensers and their uses.

UNIT-II


Refrigeration and air conditioning- rating of refrigeration machine, coefficient of performance, simple vapor compression cycle, fundamentals of air conditioning, use of Psychrometric charts.

UNIT-III

Water Turbines and Pumps : Introduction, Classification, Construction details and working principle of Pelton, Francis and Kaplan turbines, Classification of water pumps and construction detail & working principle of centrifugal pump.

Simple Lifting Machines: Definition of machine, Velocity ratio, Mechanical advantage, Efficiency, Laws of machines, Reversibility of machine, Wheel and axle, Differential pulley block, Single, double and triple start worm and worm wheel, Single and double purchase winch crabs, Simple and compound screw jacks, elementary numerical problems.

UNIT-IV

Introduction to Power transmission and Devices: Belt drive, Rope drive, Chain drive, Types of gear and Gear train, Types and function of clutches, Types and function of brakes.

Stresses and Strains: Introduction, Concept & types of Stresses and strains, Poison’s ratio, stresses and strains in simple and compound bars under axial loading, Stress-strain diagrams, Hooks law, Elastic constants & their relationships. Concept of shear force and bending moments in beams, elementary numerical problems.

TEXT BOOKS:

2. Engineering Thermodynamics – C.P. Arora, Pub. - TMH, New Delhi

REFERENCE BOOKS:


NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed
LIST OF EXPERIMENTS

1. To find the wavelength of sodium light by using Newton's rings experimental setup.
2. To find the wavelength of sodium light by Fresnel's biprism experimental setup.
3. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
4. To find the refractive index and Cauchy's constants of a prism by using spectrometer.
5. To find the wavelength of sodium light by using Michelson interferometer.
6. To find the resolving power of a telescope.
7. To find the pitch of a screw using He-Ne laser.
8. To find the specific rotation of sugar solution by using a polarimeter.
9. To compare the capacitances of two capacitors by De'sauty bridge.
10. To find the flashing and quenching potentials of Argon and also to find the capacitance of unknown capacitor.
11. To study the photo conducting cell and hence to verify the inverse square law.
12. To find the temperature co-efficient of resistance by using platinum resistance thermometer and Callender and Griffith bridge.
13. To find the frequency of A.C. mains by using sonometer.
14. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
15. To determine the value of Stefan’s constant.
16. To find the coefficient of thermal conductivity of a good conductor by Searle’s method.
17. To determine the coefficient of thermal conductivity of a bad conductor by Lee and Charlton method.

RECOMMENDED BOOKS:

1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)

NOTE: Students will be required to perform 10 experiments in a semester.
LIST OF EXPERIMENTS / JOBS

1. To study different types of measuring tools/instruments used in metrology and determine least counts of vernier calipers, micrometers and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, slotter, milling, drilling machines).

3. To prepare a job on a lathe involving facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.

6. To prepare joints for welding suitable for butt welding and lap welding.

7. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

8. To prepare simple engineering components/shapes by forging.

9. To prepare mold and core assembly, to put metal in the mold and fettle the casting.

10. To prepare horizontal surface/vertical surface/curved surface/slots or V-grooves on a shaper/planner.

11. To prepare a job involving side and face milling on a milling machine.

12. To study of CNC lathe, CNC Milling and EDM Machines.

NOTE:

1. At least ten experiments/jobs are to be performed/prepared by students in the semester.

2. At least 8 experiments/jobs should be performed/prepared from the above list, remaining two may either be performed/prepared from the above list or designed and set as per the scope of the syllabus of Manufacturing Processes.
LIST OF EXPERIMENTS

1. Determination of Ca++ and Mg++ hardness of water sample using EDTA solution.
2. Determination of alkalinity of water sample.
3. Determination of dissolved oxygen (DO) in the given water sample.
4. To find the melting and eutectic point for a two component system by using method of cooling curve.
5. Determination of viscosity of lubricant by red wood viscometer (No. 1 & No. 2).
6. To determine Flash point & Fire point of an oil by Pensky-Marten’s flash point apparatus and by Abel’s closed cup apparatus.
7. To prepare Phenol-formaldehyde and urea- formaldehyde resin.
8. To find out saponification No. of an oil..
9. Determination of concentration of KMnO4 solution spectrophotometrically.
10. Determination of strength of HCl solution by titrating it against NaOH solution conductometrically.
11. To determine amount of sodium and potassium in a given water sample by flame photometer
12. Estimation of total iron in an iron alloy.

SUGGESTED BOOKS:
2. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.

NOTE:
1. The student will be required to perform 10 experiments/exercises from the above list and any other two experiments designed by the department based on the theory course (course code 101B Course Name Chemistry)
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronic gadgets including Cellular phones are not allowed in the examination.
EE 103B : PRINCIPLES OF ELECTRICAL ENGINEERING LAB  
B. Tech. Semester – I/II (Common for all Branches)

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Class Work : 20 Marks  
Examination : 30 Marks  
Total : 50 Marks  
Duration of Examination : 3 Hours

LIST OF EXPERIMENTS

1. To verify KCL and KVL.
2. To verify Thevenin’s & Norton's Theorems.
3. To verify maximum power transfer theorem in D.C. Circuit.
4. To verify reciprocity theorem.
5. To verify Superposition theorem.
6. To study frequency response of a series R-L-C circuit and determine resonant frequency & Q-factor for various values of R, L, C.
7. To study frequency response of a parallel R-L-C circuit and determine resonant frequency & Q-factor for various values of R, L, C.
8. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
9. To perform direct load test of a D.C. shunt generator and plot load voltage Vs load current curve.
10. To study various type of meters.
11. Measurement of power by three voltmeters / three ammeters method.
12. Measurement of power in a three phase system by two watt meter method.

NOTE:

1. At least 10 experiments are to be performed by students in the semester.
2. At least 8 experiments should be performed from the above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of EE101B.
LIST OF PRACTICAL PROBLEMS

1. Write a program to find the largest of three numbers. (if-then-else)
2. Write a program to find the largest number out of ten numbers (for-statement)
3. Write a program to find the average mail height & average female heights in the class (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch statements.
5. Write a program using arrays to find the largest and second largest no. out of given 50 nos.
6. Write a program to multiply two matrices.
7. Write a program to sort numbers using the Quicksort Algorithm.
9. Write a program to check that the input string is a palindrome or not.
10. Write a program to read a string and write it in reverse order.
11. Write a program to concatenate two strings.
12. Write a program which manipulates structures (write, read, and update records).
13. Write a program which creates a file and writes into it supplied input.
14. Write a program which manipulates structures into files (write, read, and update records).

NOTE: At least 5 to 10 more exercises to be given by the teacher concerned.
ME109B : ELEMENTS OF MECHANICAL ENGINEERING LAB.
B. Tech. Semester – I/II (Common for all Branches)

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Class Work : 20 Marks
Examination : 30 Marks
Total : 50 Marks
Duration of Examination : 3 Hours

LIST OF EXPERIMENTS

1. To study Cochran & Babcock & Wilcox boilers.
2. To study the working & function of mountings & accessories in boilers.
3. To study 2-Stroke & 4-Stroke diesel engines.
4. To study 2-Stroke & 4-Stroke petrol engines.
5. To calculate the V.R., M.A. & efficiency of single, double & triple start worm & worm wheel.
6. To calculate the V.R., M.A. & efficiency of single & double purchase winch crabs.
7. To draw the SF & BM diagrams of a simply supported beam with concentrated loads.
8. To study the simple & compound screw jacks and find their MA, VR & efficiency.
9. To study the constructional features & working of Pelton Turbine.
10. To prepare stress-strain diagram for mild steel & cast iron specimens under tension and compression respectively on a Universal testing machine.

NOTE: 1. Total ten experiments are to be performed in the Semester.
2. At least eight experiments should be performed from the above list. Remaining three experiments should be performed as designed & set as per the scope of the syllabus of ME – 101: Elements of Mechanical Engineering.
MATH 102B : MATHEMATICS - II
B. Tech. Semester - II (Common for all Branches)

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UNIT-I


**Linear differential equations of second and higher order** : Complete solution, complementary function and particular integral, method of variation of parameters to find particular integral, Cauchy’s and Legendre’s linear equations, simultaneous linear equations with constant co-efficients.

UNIT-II

**Laplace Transforms and its Applications** : Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivatives, transforms of integrals, multiplication by \( t^n \), division by \( t \). Evaluation of integrals by Laplace transforms. Laplace transform of Unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application to linear differential equations and simultaneous linear differential equations with constant coefficients.

UNIT-III

**Functions of Complex Variable** : Definition, Exponential function, Trigonometric and Hyperbolic functions, Logarithmic functions. Limit and Continuity of a function, Differentiability and Analyticity. Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations. Harmonic functions, application to flow problems. Integration of complex functions. Cauchy-Integral theorem and formula.

Power series, radius and circle of convergence, Taylor’s Maclaurin’s and Laurent’s series. Zeroes and singularities of complex functions, Residues

UNIT-IV

**Fourier Series and Fourier Transforms** : Euler’s formulae, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes). Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

TEXT BOOKS:
1. Advanced Engg. Mathematics F Kreyszig

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
PHY 102B: ENGINEERING PHYSICS – II
B. Tech. Semester - II (Common for all Branches)

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UNIT-I

ELECTRODYNAMICS & QUANTUM PHYSICS
Introduction, Displacement current, Equation of continuity, Gauss’s Law in dielectric, applications of Gauss’s law, Maxwell’s equations (both differential and integral form), plane e.m. wave equations in free space, dielectric and conducting medium; Poynting vector.

UNIT-II

CRYSTAL STRUCTURE
Space Lattice, unit cell and translation vectors, Miller indices, Bravis lattice structure in 3D, simple crystal structure (NaCl, ZnS and CsCl2), Elementary idea of reciprocal lattice, Ewald Construction, Experimental x-ray diffraction method, Laue method, powder Method.

FREE ELECTION THEORY
Elements of classical free electron theory, Drude’s Theory of Conduction and its limitations, quantum theory of free electrons, Fermi level, Density of states, Fermi-Dirac distribution function, Thermionic emission, Richardson's equation.

UNIT-III

BAND THEORY OF SOLIDS
Origin of energy bands, Kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Concept of effective mass and holes, Classification of solids into metals, Semiconductors and insulators, Fermi energy and its variation with temperature, Conduction in Intrinsic and Extrinsic Semiconductors. Hall Effect and its Applications.

UNIT-IV

SUPERCONDUCTIVITY & NANOSCIENCE
Introduction to superconductivity, Critical temperature, Meissner Effect, Types of Superconductor, London Equations, penetration depth and coherence length, BCS Theory(qualitative ideas), High temperature superconductors.

Concept of Nano-materials, Size dependence of band gap, Top-down and bottom-up approach for preparing nano-materials, MEMS & NEMS, Properties and applications of Fullerene, Graphene, CNT, Nanowires, Nano-composites, Quantum dots..

TEXT BOOKS:
2. Quantum Mechanics – Ghatak & Loknathan.
6. Engineering Physics by S.P. Taneja (Chand Pub.)

REFERENCE BOOKS:
1. Introduction to Solid State Physics (VII Ed.) - Charles Kittel (John Wiley).
2. Quantum Mechanics – Powell and Crasemann (Oxford & IBH)
3. Classical Electrodynamics by S.P. Puri (Narosa)

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed
ECE102B : BASICS OF ELECTRONICS ENGINEERING
B. Tech. Semester – II (OPTIONAL- Common for all Branches)

L T P Credits Class Work : 25 Marks
3 1 -- 4 Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

UNIT I
Semiconductor Physics, Diodes and Applications: Basic concepts, intrinsic and extrinsic semiconductors, diffusion and drift currents, Hall effect and its applications, pn junction under open circuit, reverse bias and forward bias conditions, p-n junction in the breakdown region, ideal diode, types of diodes – zener diode, varactor diode, LED and photodiode. Rectifier (half wave and full wave).

Amplifiers: Introduction of different types of BJT amplifiers & their characteristics.

UNIT II
Operational Amplifiers: OP-amps, its characteristics, inverting, non-inverting, summing, averaging, scaling, difference, integrator and differentiator amplifiers.

Power Supplies: Introduction and working of switched mode power supply (SMPS), voltage regulator.

UNIT III
Digital Electronics: Binary, Octal and Hexadecimal number system and conversion, Boolean algebra, truth tables of logic gates AND, OR, NOT, EX-OR, EX-NOR, NAND, NOR AND their implementation using diodes transistors, switches and lamps, Universal gates.

Electronic Instruments: Transducers, Role, importance and applications of general purpose test instruments viz. multi meter (digital and analog), cathode ray oscilloscope (CRO), function/ signal generator.

UNIT IV
Communication System: Modulation, need of modulation, Block diagram of basic communication system, overview of AM, FM and PM.


REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
BT102B : BASICS OF BIOTECHNOLOGY
B. Tech. Semester – II (OPTIONAL - Common for all Branches)

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<td>3 Hours</td>
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UNIT – I

**Introduction:** Nature and scope of Biotechnology.

**Cell Structure and Function:** Prokaryotes and Eukaryotes- cell wall, cell membrane, nucleus, mitochondria, chloroplast, ribosome, vacuoles, bacteria and viruses: brief descriptions.

Biomolecules: A brief account of structure and functions of carbohydrates, lipids, proteins.

UNIT – II

**Cell Division:** Mitosis and meiosis

**Genes and chromosomes:** Classical- Mendel’s laws and chromosomes, nature of genetic material, DNA and RNA as genetic material, concept of organization of genetic material into chromosomes.

DNA replication: DNA polymerases, replication mechanism.

UNIT-III

**Gene Expression:** Central dogma, genetic code, gene expression-a brief account of transcription and translation, housekeeping genes, mutations and their molecular basis.

**Genetic Engineering:** An introduction to genetic engineering: cloning (vectors, enzymes), DNA and genomic libraries, transgenics, DNA fingerprinting, genomics.

UNIT – IV

**Applications of Biotechnology:** Bioprocess and fermentation technology, cell culture, enzyme technology, biological fuel generation, single cell protein, sewage treatment, environmental biotechnology, biotechnology and medicine, biotechnology in agriculture & forestry industry, food and beverage technology, production of biological inventions, safety in biotechnology.

TEXT/REFERENCE BOOKS:

- Biotechnology, Smith, Cambridge Press.
- Modern Concepts of Biotechnology, H. D. Kumar, Vikas Publishing House (P) Ltd.
- Elements of Biotechnology, P. K. Gupta, Rastogi Publications.

NOTE:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
OBJECTIVE
To train students to have proficiency in oral communication through interpersonal communicative situations.

COURSE CONTENT

UNIT I
Essentials of Speaking Skills:
Familiarity with phonetic sound symbols; Transcription of simple words using International Phonetic Alphabet; Use of dictionary to cultivate standard pronunciation and develop phonetic discrimination

UNIT II
Speaking Skills:
Need and Significance of Effective Oral Communication; Practice of Conversation – Interpersonal and Telephonic Conversation; Formal Group Discussion

UNIT III
Non-Verbal Elements in Oral Communication Skills:
Reading Face, eyes, gesture and body posture, time, space and culture in communicative situations; practicing verbal and non-verbal communication (Body Language) to acquire effective Oral communication;

UNIT IV
Listening Skills:
Essentials of Good Listening, Types of Listening, Barriers in Effective listening, Exercises in Listening to Talk Shows, Speech Reviews; Practice in English Sounds and Speech using RP/MRP

RECOMMENDED READING
UNIT - I
Materials for Construction: Stones, Sands, Lime, Bricks, Timber, Steel their Classification and Properties. Different Types of Cement and their Properties, manufacturing of Cement, Concrete, and properties of Concrete, Ingredient of Concrete and Their Functions
Component parts of a Building, Foundation, Masonry Works, Doors and Windows, Floors, Roofs, DPC, Building Services

UNIT - II
Surveying , Introduction to Surveying: Definition, importance, classification of surveys, Principle, Leveling: definitions of terms used in leveling, different types of levels, Contours, Definition, representation of reliefs, horizontal equivalent, contour interval, characteristics of contours, methods of contouring, contour gradient, uses of contour maps, Introduction to GIS, GPS and Remote sensing.

UNIT - III
Transportation: Various modes and means of transportation, Different types of transport systems, Importance of road transport, History of Road Development, Indian Road Congress. Main features of 20 years road development plans in India, PMGSY
Sources of power, estimation of water power, water budget equation, necessity and importance of harnessing small hydro power plants, Dams, Types of Dams, Location and Impact assessment of a Dam project.

UNIT - IV
Geotechnical Engineering: History and its applications, Soil Properties, Classification of Soil, Geotechnical and Geophysical investigation of Soil.
Irrigation Engineering: Necessity, advantages, disadvantages, impact of irrigation on human environment, need and development of irrigation in India.

TEXT BOOKS:
1. Basic Civil Engineering, Satheesh Gopi, Pearson.
2. Basic Civil Engineering, Dr. B.C. Punmia, Ashok Kumar Jain, Arun Kr. Jain, Firewall Medi

REFERENCE BOOKS:
1. Surveying by Prof. N. Singh, Tata McGraw Hill, New Delhi
2. Basic Civil Engineering, Rakesh Beohar, Firewall Media
4. Water Resources Engineering by Linseley and Franzini

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
LIST OF EXPERIMENTS

1. To find the low resistance by Carey - Foster's bridge.
2. To find the resistance of a galvanometer by Thomson’s constant deflection method using a post office box.
3. To find the value of high resistances by Substitution method.
4. To find the value of high resistances by Leakage method.
5. To study the characteristics of a solar cell and to find the fill factor.
6. To find the value of e/m for electrons by Helical method.
7. To find the ionisation potential of Argon/Mercury using a thyratron tube.
8. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
9. To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
10. To find the value of Planck's constant by using a photoelectric cell.
11. To find the value of co-efficient of self-inductance by using a Rayleigh bridge.
12. To find the value of Hall Co-efficient of semi-conductor.
13. To study the V-I characteristics of a p-n diode.
14. To find the band gap of intrinsic semi-conductor using four probe method.
15. To calculate the hysteresis loss by tracing a B-H curve.
16. To verify the Truth Table of various Logic Gates.

RECOMMENDED BOOKS:
1. Advanced Practical Physics – B.L. Worshnop and H.T. Flint (KPH)

NOTE: Students will be required to perform 10 experiments in a semester.
The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him /her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him / her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I. Academic Performance

II. Extra Curricular Activities / Community Service, Hostel Activities (8 Marks)

III. Technical Activities / Industrial, Educational tour (8 Marks)

IV. Sports/games (4 Marks)

V. Moral values & Ethics (10 Marks)

NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/ her achievement and verbal & communicative skill through presentation before the committee. (20 Marks)

C. Moral values & Ethics

Syllabus - Introduction to Value Education. Understanding ethics, value system, happiness, prosperity

A minor test / Quiz will be conducted and It will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

The evaluation of this course will be made by the following Committee.

University Departments:
1. Chairperson of the Department Chairman
2. Senior Most Faculty Counselor Member
3. Vice- Chancellor’s Nominee Member

Affiliated Colleges:
1. Director/Principal Chairman
2. Head of the Department/Sr. Faculty Member
3. External Examiners to be appointed by the University Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).
UNIT – I  
The Multidisciplinary nature of environmental studies, Definition, scope and importance. 
Need for Public awareness

UNIT – II  NATURAL RESOURCES: 
Renewable and non-renewable resources: 
Natural resources and associated problems.

a) Forest resources: Use and over-exploitation: deforestation, case studies, Timber exploitation, mining, dams and their effects and forests tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes, caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources; case studies.

f) 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.

UNIT- III  ECOSYSTEMS:
- 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 following eco-system:
  a) Forest ecosystem, Grassland ecosystem, Desert ecosystem.
  b) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT- IV  BIODIVERSITY AND ITS CONSERVATIONS:
- Introduction – Definition: Genetic, species and ecosystem diversity.
- Biogeographically 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.

UNIT – V  ENVIRONMENTAL POLLUTION:
Definition, causes, effects and control, measures of:
Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal Pollution, Nuclear hazards
- Solid waste management: Causes effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management: Floods, earthquake, cyclone and landslides.

UNIT – VI  SOCIAL ISSUES AND THE ENVIRONMENT:
 a) From unsustainable to sustainable development
 b) Urban problems related to energy
 c) Water conservation, rain water harvesting, watershed management
 d) Resettlement and rehabilitation of people; its problems and concerns, case studies
e) Environmental ethics: Issues and possible solutions
f) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, Case studies
g) Wasteland reclamation, Consumerism and waste products
h) Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act
i) Issues involved in enforcement of environmental legislation, Public awareness

UNIT – VII

Role of Information Technology in Environment and human health.
Case Studies.

REFERENCES:
7. Down to Earth, Centre for Science and Environment ®.

NOTE: 1. Examiner will set eight questions. Students will be required to attempt five Questions.
2. The awards of this paper shall not be counted in the award of the Degree/DMC.
CH201B: ORGANIC AND ANALYTICAL CHEMISTRY
B. Tech. Semester - III (Chemical Engineering)

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<td>75 Marks</td>
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Unit-I

Organic reactions:
Types of reactions, Reaction intermediates, the mechanism of the following types of reactions: Substitution-Electrophilic, nucleophilic, Free radical. Addition- Electrophilic, Nucleophilic, Free radical. Elimination- E₁, E₂, E₃. Rearrangements: Migration with one electron pair (nucleophilic), Migration with one electron (free radical), migration without electron (electrophilic).

Chemistry of Hydrocarbons:
Sources, preparation and uses of cycloalkanes, dienes, alkynes, cracking & reforming, aromatic hydrocarbons, concept of aromaticity (Hückel rule, 4n+2 rule) and directive effect.

Unit-II

Chemistry of Functional Groups:
Preparation, general properties and uses of organic halides, Grignard reagents and organolithium, alcohols, poly alcohol (glycols) aldehydes, ketones, carboxylic acids and their derivatives (acyl chloride & anhydride).
Amines, diazonium salts, heterocyclic compound (pyridine).

Unit-III

Infrared Spectroscopy:
Introduction–Basic theory and instrumentation including FT-IR spectrum. Functional group and finger print regions, fundamental vibrations, overtones and Fermi resonance. Spectral features of major functional groups: alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols, ketones, aldehydes, carboxylic acids, and amines.

Ultraviolet and Visible Spectroscopy:

Unit-IV

Purification Techniques:

TEXT BOOKS/ REFERENCE BOOKS:
2. Text Book of organic Chemistry by R.K. Bansal, T.M.H
3. Organic chemistry by Morrison, Bayd (P.H.L)

NOTE:
1. In the semester examination, the examiners will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronic gadgets including Cellular phones are not allowed in the examination.
CHE201B: INTRODUCTION TO UNIT OPERATIONS
B. Tech. Semester - III (Chemical Engineering)

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Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

UNIT-I: Dimensional Analysis: Rayleigh method; Buckingham method; dimensionless groups; geometric, Kinematic and dynamic similarity.

UNIT-II: Heat Transfer: Introduction to conduction, convection and radiation. Flow patterns: parallel, counter and cross flow; LMTD.


UNIT-IV: Fluid Flow: Types and Properties; Newton’s law of viscosity; Laminar and Turbulent flow; Bernoulli’s equation.

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: Properties of fluids, Classification of fluid-forces, Normal forces on fluids, Pressure-depth relation for compressible and incompressible fluids, Forces on submerged bodies, Rigid body motion, Pressure measurement, Kinematics of flow, Description of velocity fields, Angular velocity circulation, Stream function, Irrotational flow, Types of flow.

UNIT-II: Conservation of mass, momentum and energy, Euler’s equation, Bernoulli’s equation, Navier-Stoke’s equation. Hagen-Poiseuille equation, Friction factor, Friction factor equations, Reynolds number and its significance, Dimensional analysis to fluid flow problems.


UNIT-IV: Compressible fluid flow in pipes, Flow measuring devices, Mixing of fluids, Power requirements, Pumps, Blowers, Valves and their characteristics, Selection and specification.

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE205B : CHEMICAL ENGINEERING PROCESS CALCULATIONS
B. Tech. Semester - III (Chemical Engineering)

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Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

UNIT-I: Brief introduction of chemical engineering unit processes and unit operations, Units and dimensions, Dimensional groups and constants, Stoichiometric relationships, Conservation of mass in chemical reactions, Excess reactants, Degree of completion, Behaviour of ideal gases, Gaseous mixtures, Vapour pressure, Clausius Clapeyron equation, Cox Chart, Duhring’s plot, Raoult’s law.


Case study of selected problems, Aid of Computer in solving problems.

UNIT-III: Crystallization, Dissolution, Solving material balance problems with and without simultaneous equations, Recycle, Bypass and Purge calculations.


TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: General principles of measurement, Static and Dynamic characteristics of instruments, sensors & transducers. Process instruments, Recording instruments, indicator and signaling instruments transmission of instrument reading, control centre, instrumentation diagram, online instrumentation in modern plants.

UNIT-II: Temperature measurement, Thermocouples, resistance thermometers, bimetallic thermometers, thermistors, optical and radiation pyrometer.

Pressure measurement, Use of manometer, Bourdon gauge, Bellows type gauge, measurement of vacumm, pressure transducers.

UNIT-III: Flow measurement, Use of obstruction type meters, variable area meters, pressure probes, positive displacement type meters, electromagnetic flowmeters and mass flow meters.

Liquid level measurement, Direct and differential method for the measurement in open pressure vessels

UNIT-IV: Miscellaneous measurements, Composition measurement, measurement of viscosity, conductivity, humidity, pH and nuclear radiations. Instrument for gas analysis, gas chromatography mass spectroscopy.

TEXT BOOKS:
1. Industrial Instrumentation: D.P. Eckmen - John Wiley.

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
ECE205B: ELECTRONICS ENGINEERING
B. Tech. Semester - III (Chemical Engineering)

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

UNIT I
SEMICONDUCTOR PHYSICS, DIODES AND APPLICATIONS:
Basic concepts, intrinsic and extrinsic semiconductors, diffusion and drift currents, Hall effect and its applications-pn junction under open circuit, reverse bias and forward bias conditions, p-n junction in the breakdown region, ideal diode, types of diodes – zener diode, varactor diode, LED and photodiode. Rectifier (half wave and full wave).
AMPLIFIERS:
Introduction of different types of BJT amplifiers & their characteristics.

UNIT II
OPERATIONAL AMPLIFIERS:
OP-amps, its characteristics, inverting, non-inverting, summing, averaging, scaling, difference, integrator and differentiator amplifiers.
POWER SUPPLIES:
Introduction and working of switched mode power supply (SMPS), voltage regulator.

UNIT III
DIGITAL ELECTRONICS:
Binary, Octal and Hexadecimal number system and conversion, Boolean algebra, truth tables of logic gates AND, OR, NOT, EX-OR, EX-NOR, NAND, NOR AND their implementation using diodes, transistors, switches and lamps, Universal gates.
ELECTRONIC INSTRUMENTS:
Transducers, Role, importance and applications of general purpose test instruments viz. multi meter (digital and analog), cathode ray oscilloscope (CRO), function/signal generator.

UNIT IV
COMMUNICATION SYSTEM:
Modulation, need of modulation, Block diagram of basic communication system, overview of AM, FM and PM.
MICROPROCESSOR:

REFERENCE BOOKS:

NOTE:
1. In the Semester examination, the examiner will set 08 questions in all selecting two from each Section & one from each unit. The candidates will be required to attempt five questions in all at least one from each section. All questions carry equal marks.
LIST OF EXPERIMENTS:

1. **Identification of Organic Compounds:**
   Preliminary tests (elemental analysis, ignition, color, odor etc.), functional group analysis, and by the use of IR and UV spectroscopy.
   
   *List of compounds for identification and analysis:*
   1. Carboxylic acids - benzoic or oxalic acid.
   2. Aldehydes - acetaldehyde or benzaldehyde
   3. Ketones - acetophenone or benzophenone.
   4. Amides - Acetamide or benzamide
   5. Phenols - Phenol or Resorcinol.
   6. Amines - Aniline or p-naphthyl-amine
   7. Carbohydrates - Glucose or maltose.
   8. Hydrocarbons - Naphthalene or anthracene

2. **Quantitative organic analysis:**
   9. Estimation of phenol
   10. Estimation of aniline

3. **Chromatographic separation:**
   11. To separate a mixture of fluorescein and methylene blue by column chromatography.

4. **Preparation of organic Compounds:**
   12. Preparation of aspirin
   13. Preparation of p-nitro aniline

Purification should preferably be done by using recrystallization, extraction or column chromatography to ensure purity by TLC or HPLC.

**BOOKS:**
1. Qualitative organic analysis by A.I. Vogel (ELBS) Longmans
2. Quantitative Organic Analysis by A.I. Vogel (ELBS) Longmans
3. Advanced practical organic analysis by N K Vishnoi (Vikas Prakashan)
4. Practical organic chemistry by G. Mann, Longmans.

**NOTE:**
1. The student will be required to perform 10-12 experiments/exercises from the above list and any other two experiments designed by the department based on the theory course (Course Code 201B, Course Name Organic and Analytical Chemistry).

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronic gadgets including Cellular phones are not allowed in the examination.
LIST OF PRACTICALS / DEMONSTRATIONS:

1. Flow measurement by Venturimeter.
2. Flow measurement by Orificemeter.
3. Calibration of Rotameter.
4. Flow measurement by V-notch.
5. Pressure drop in pipe flow.
6. Verification of Bernoulli’s Theorem.
7. Centrifugal pump test rig.
8. Flow measurement by Pitot tube

NOTE:

1. The students will be required to perform the 06 experiments from above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE203B.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
EE231B: ELECTRICAL WIRING & INSTALLATION LAB
B. Tech. Semester - III (EE, EEE, IC, CHE)

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<th>Class Work</th>
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<td>Examination</td>
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<td>Duration of Examination</td>
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LIST OF EXPERIMENTS:
1. Introduction of tools, electrical materials, safety procedure, symbols and abbreviations.
2. To study and make stair case wiring connections.
3. To study house wiring i.e., batten, cleat, casing-caping and conduit wirings.
4. To study & make fluorescent tube light connections, CFL & LED lights.
5. To study high pressure mercury vapour lamp (H.P.M.V) & Sodium Lamp.
6. To study circuit & working of SMPS, UPS & Inverter.
7. To study repairing of home appliances such as heater, electric iron, fans etc.
8. To study construction of moving iron, moving coil, electrodynamic & induction type meters.
9. To design & fabricate single phase transformer.
10. To study fuses, relays, contactors, MCBs and circuit breakers.
11. Insulation testing of electrical equipments.
12. To design and fabricate a PCB for a circuit, wire-up and test.
13. Drilling & mounting of components on above PCB.

NOTE:
1. The students will be required to perform the 8 experiments/exercises from the above list and any other experiments designed on the basis course
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/ex-change of calculator is prohibited in the examinations.
3. Electronic gadgets including cellular phones are not allowed in the examination.
LIST OF EXPERIMENTS:

1. Study of half wave and full wave rectifiers.
2. Study of zener diode as a voltage regulator.
4. Study of CC amplifier as a buffer.
5. To Study three terminal IC voltage regulator.
6. To study SMPS power supply.
7. Study of TTL gates – AND, OR, NOT, NAND, NOR, EX-OR, EX-NOR
8. To measure temperature using thermocouple.
9. To measure temperature using Thermister
10. To measure displacement using LDR.
11. To study Pulse width Modulation (PWM).
12. To study Pulse Position Modulation (PPM)
13. To study 8085 microprocessor.

NOTE:

1. Total ten experiments are to be performed in the semester
2. At least seven experiments should be performed from the above list. Remaining three experiments should be performed as designed and set by the concerned institution as per the scope of the syllabus.
GED203B: ENVIRONMENTAL STUDIES FIELD WORK
B. Tech. Semester – III/IV (Common for all Branches)

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FIELD WORK:

- Visit to a local area to document environmental assets – river/ forest/ grassland/ hill/ mountain.
- Visit to a local polluted site-Urban/ Rural/ Industrial/ Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems – pond, river, hill slopes, etc. (Field work equal to 5 lectures hours).

NOTE: The awards of this paper shall not be counted in the award of the Degree/DMC.
Each student has to undergo a workshop at least 4 weeks (80-100 hours) at the end of II semester during summer vacations. **Out of the four weeks, two weeks would be dedicated to general skills and two weeks training for specialized discipline/department.** The evaluation of this training shall be carried out in the III semester.

**LIST OF JOBS TO BE CARRIED OUT DURING THIS PERIOD**

1. To study and prepare different types of jobs on machine tools (lathe, shaper, planer, slotter, milling, drilling machines).
2. To prepare lay out on a metal sheet by making and prepare rectangular tray, pipe shaped components e.g. funnel.
3. To prepare joints for welding suitable for butt welding and lap welding.
4. To study various types of carpentry tools and prepare simple types of wooden joints.
5. To prepare simple engineering components/ shapes by forging.
6. To prepare mold and core assembly, to put metal in the mold and fettle the casting.
7. To study of CNC lathe, CNC Milling and EDM Machines.
8. Any work assigned in electrical workshop, computer hardware/language lab, electronics workshop, biomedical hardware, automobile workshop etc.

**This student will prepare job(s)/project as an individual or in a group using workshop in house infrastructure.**

The student shall submit a typed report.

Training will be evaluated on the spot out of 20 marks.

The report will be evaluated in the III Semester by a Committee consisting of two teachers.

The student will interact with the committee through presentation to demonstrate his/her learning. The basis of evaluation will primarily be the knowledge and exposure of students on different kinds of Machines/ instruments/ tools/ skills etc. The committee will evaluate out of 30 marks.

The committee shall submit the awards out of 50 marks.
COURSE OBJECTIVE: The aims of this course are to:
1. Acquaint the student with the basic economic concepts and their operational significance
2. Stimulate him to think systematically and objectively about contemporary economic problems.

UNIT I


UNIT II

Meaning of Demand, Individual and Market demand schedule, Law of demand, shape of demand curve. Elasticity of demand, measurement of elasticity of demand, factors effecting elasticity of demand, practical importance & application of the concept of elasticity of demand. Various concepts of cost- Fixed cost, variable cost, average cost, marginal cost, money cost, real cost, opportunity cost. Shape of average cost, marginal cost, total cost etc. in short run and long run.

UNIT III

Meaning of production and factors of production; Law of variable proportions, Law of Return to Scale, Internet and External economics and diseconomies of scale. Meaning of Market, Type of Marker– perfect Competition, Monopoly, Oligopoly, Monopolistic competition (Main features of these markers).

UNIT IV


TEXT BOOKS:
1. Ahuja H.L”Micro Economic Theory” S. Chand Publication, New Delhi
2. Dewett K.K “Modern Economic Theory” S. Chand Publication, New Delhi

SUGGESTED BOOKS:
2. Chopra P.N “Principle of Economics” Kalyani Publishers, Delhi

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
UNIT I
Interpolation and Curve Fitting:
Interpolation problem, Lagrangian polynomials, Divided differences, Interpolating with a cubic spline, Bezier curves and B-spline curves, Least Square Approximations.

Non-Linear Equations:
Bisection Method, Linear Interpolation methods, Newton’s method, Muller’s method, fixed point method.

UNIT II
Simultaneous Linear Equations:
Elimination Method, Gauss and Gauss-Jordan method, Jacobi’s method, Gauss-Seidal method, Relaxation Method.

Numerical Differentiation and Integration:
Derivatives from differences tables, Higher order derivatives, Extrapolation techniques, Newton-cotes integration formula, Trapezoidal rule, Simpson’s rule, Boole’s rule and Weddle’s rule, Romberg’s integration

UNIT III
Numerical Solution of Ordinary Differential Equations:

UNIT IV
Numerical Solution of Partial Differential Equations:
Finite difference approximations of partial derivatives, solution of Laplace equation (Standard 5-point formula only), one-dimensional heat equation( Schmidt method, Crank-Nicolson method, Dufort and Frankel method) and wave equation.

TEXT BOOKS:

REFERENCE BOOKS:
2. Introductory Methods of Numerical Analysis S.S Sastry, PHI

NOTE:
In the Semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all, at least one from each unit. All questions carry equal marks.
UNIT-I: Basics of thermodynamics - enthalpy, equilibrium, phase rule, heat capacity, ideal gas, real gas, heat effects, P-V-T Behaviour of Pure Fluids, Virial equations, cubic equations, generalised correlations and acentric factor, behaviour of liquids.

UNIT-II: Laws of Thermodynamics - Review, their applications to real processes, concept of entropy macroscopically and microscopically.


UNIT-IV: Refrigeration & Liquefaction - Ideal refrigeration cycle, air, vapor compression and absorption refrigeration cycles, C.O.P., choice of refrigerants, Liquefaction processes and estimation of minimum work requirements.

TEXT BOOKS:
2. Chemical Engineering Thermodynamics: Y.V.C. Rao Universities Press (India) Ltd., Hyderabad, India

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: Particle size and shape, Size and shape distributions, Measurement and analysis, Concept of average diameter; Size reduction, Laws of grinding; Agglomeration and compaction; Screening, Design of screens.

UNIT-II: Flow around a single particle, Drag force and drag coefficient, Settling velocity of a particle in a fluid, Concept of relative velocity; Packed beds, Bed porosity, Flow through a bed of particles, Ergun's equation; Hindered & free settling of particles.

UNIT-III: Filtration, principle of filtration and types of filters; Thickeners; Gravity separation; Cyclones.

UNIT-IV: Fluidised beds and transport of particles; Storage of Solids, Flow of solids by gravity. Transport of solids by screw/ belt conveyors; Bag filters, Electrostatic precipitators, Elutriation, Particle collection systems, Mixing & agitation.

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: Factors affecting the selection of material for constructional purposes in chemical industries, Metallic and Non-Metallic materials of construction, Ferrous and Non-Ferrous metals. Corrosion, Various types, Mechanism, Methods of prevention and control

UNIT-II: Mechanical properties of various materials, Various modes of deformation, Crystal defects, Cold and hot working of metals and their effects on mechanical properties, Structure of solid phases, Different types of structure B.C.C., F.C.C. and H.C.P., Binary equilibria involving solid solution, Eutectic and peritectic systems, Cu-Ni, Cu-Zn, Fe-C diagrams, Heat treatment, General principles, TTT-curves, Annealing, normalizing, hardening, tempering and age hardening.

UNIT-III: Ferrous Metals, Grey and white cast iron, Malleable, Mechanite and nodular cast iron, Plain Carbon Steels: Classification, properties and applications, Alloy Steels: Stainless steels, ferritic, austenitic and martensitic, applications of stainless steels in chemical industries, Alloy tool steels, ultra high strength steels, cryogenic steel, bearing Metals (Babbits), Heat resisting alloys. Non-Ferrous metals, Copper Brass, Bronze, Aluminium and their mechanical properties, Workability and applications.

UNIT-IV: Non-Metallic materials of construction: (a) Ceramics: Various types, Speciality glasses and refractories, properties and applications. (b) Polymers: Classifications, Comparison and properties of various polymers and their relationship with chain structure, Some application in chemical industries.

TEXT BOOKS:

REFERENCE BOOK:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
Unit I

Halogenation: Products derived by halogenations, types of halogenations, survey of halogenations, substitution and addition halogenations reactions, Chlorination of propane, photo-halogenations, mechanism of dehydrohalogenation, design and construction of equipment for halogenations, flow sheets for manufacture of Chloroacetic acid, monochloroacetic acid and chloral.

Unit II

Hydrogenation: Products derived from Hydrogenation, types of hydrogenation factors controlling hydrogenation, equipment for hydrogenation, apparatus and material of construction, high pressure autoclave, shaking autoclave, flow sheet for synthesis of methanol from carbon monoxide and hydrogen, hydrogenation of oil, hardening of fats, petroleum hydrogenation-hydroforming.

Unit III

Nitration: Products derived from nitration, types of nitration, process equipment for nitration, batch nitration, continuous nitration, Schmidt nitrator, nitration of propane.

Oxidation: Types of oxidative reactions, oxidizing agents, liquid phase oxidation of xylenes, oxidation of methanol, oxidation of low molecular weight paraffin hydrocarbons, styrene from ethyl benzene, mechanism of oxidation, apparatus for oxidations.

Unit IV

Sulfonation: Sulfonation & sulfonating agents, physical and chemical factors in sulfonation, mechanism of de-sulfonation, industrial equipment and techniques, batch sulfonation kettle, ball mill sulfonator, flowsheet for manufacturer of anthraquinone sulfonate, ethanol from ethylene.

Alkylation: Products derived from alkylation, types of alkylation, factors controlling alkylation, flow sheet for alkyl aryl sulfonates, sulfuric acid alkylation for petroleum industry, equipment for alkylation-kellogg cascade alkylator.

TEXT BOOKS/ REFERENCE BOOKS:

1. Unit process in organic synthesis by P.H. Groggins (MGH)
2. Chemical Technology by Merk and Hahn (MGH)
3. Chemical Technology., IIT, Madras (Organic)- II centre.

NOTE:

1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
MATH204B : NUMERICAL METHODS LAB
B. Tech. Semester - IV (CHE, AEI)

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Class Work : 20 Marks
Examination : 30 Marks
Total : 50 Marks
Duration of Examination : 3 Hours

LIST OF EXPERIMENTS:
Write down and execute the following programs using c/c++/matlab
1. To find the roots of non-linear equation using Bisection method
2. To find roots of non-linear equation using Newton’s method
3. Curve fitting by least square approximations
4. To solve system of linear equations using Gauss-Elimination method
5. To solve system of linear equations using Gauss-Seidal iteration method
6. To solve system of linear equations using Gauss-Jordan method
7. To integrate numerically using Trapezoidal rule
8. To integrate numerically using Simpson’s rule
9. To find largest Eigen value of a matrix by power-method
10. To find numerical solution of ordinary differential equations by Euler’s method
11. To find numerical solution of ordinary differential equations by Runge-Kutta method
12. To find numerical solution of ordinary differential equations by Milne’s method
13. To find numerical solution of Laplace equation
14. To find numerical solution of wave equation
15. To find numerical solution of heat equation

Books Suggested
2. Numerical Methods: E.Balaguruswamy T.M.H

Note: Ten experiments are to be performed out of which at least seven experiments should be performed from the above list. Remaining three experiments should be performed from the above list or designed and set by the concerned department as per the scope of the syllabus.
List of Practicals / Demonstrations:

1. Settling of single particle.
2. Sedimentation.
4. Grinding in a Ball Mill.
5. Screen analysis.
6. Separation of dust particles from air.
7. Determination of pressure drop across a fluidized bed and a packed bed.
8. Filtration of slurry.

NOTE:

1. The students will be required to perform the 06 experiments from above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE204B.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/her performance/achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him/her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him/her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I. Academic Performance
II. Extra Curricular Activities/Community Service, Hostel Activities (8 Marks)
III. Technical Activities/Industrial, Educational tour (8 Marks)
IV. Sports/games (14 Marks)
V. Moral values & Ethics (15 Marks)

NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the committee. (30 Marks)

C. Syllabus - Process for Value Education, self-evaluation concept and process.

A minor test will be conducted during the semester and it will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department/Director/Principal.

The evaluation of this course will be made by the following Committee.

University Departments:
1 Chairperson of the Department Chairman
2 Senior Most Faculty Counselor Member
3 Vice-Chancellor’s Nominee Member

Affiliated Colleges:
1 Director/Principal Chairman
2 Head of the Department/Sr. Faculty Member
3 External Examiner to be appointed by the University Member

Note: Remuneration will be paid to the external examiner only (at par with the other practical examinations).
CHE301B : CHEMICAL REACTION ENGINEERING-I  
B. Tech. Semester - V (Chemical Engineering)  

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<td>: 75 Marks</td>
<td>: 100 Marks</td>
<td>: 3 Hours</td>
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Unit-I: Kinetics of homogeneous reaction: concepts of rate equation, order and molecularity, Elementary and Non-elementary Reactions Kinetic Models for Non-elementary Reactions. Interpretation of Batch Reactor Data, Constant and Variable volume Batch Reactor; Introduction to reactor design.

Unit-II: Ideal Reactors: Batch, CSTR and PFR, Design or performance equation for Ideal Reactors; Design for Single Reactions: Size Comparison of Single Reactors, Multiple-Reactor Systems, Recycle Reactor, Autocatalytic Reactions.

Unit-III: Design for Multiple Reaction: Parallel and Series reactions, Qualitative and Quantitative discussion about product Distribution. Temperature and Pressure Effects in single reactions: General Graphical Design Procedure, Optimum Temperature Progression, Adiabatic and Nonadiabatic operations, Exothermic reaction in Mixed Flow Reactors; Multiple reactions.


TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
# CHE303B: CHEMICAL TECHNOLOGY -I

**B. Tech. Semester - V (Chemical Engineering)**

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- **Class Work**: 25 Marks
- **Examination**: 75 Marks
- **Total**: 100 Marks
- **Duration of Examination**: 3 Hours

## UNIT-I:

## UNIT-II:
Nitrogen industries: Ammonia, nitric acid, nitrogenous and mixed fertilizers Chlor-Alkali industries: Common salt, caustic soda, chlorine, hydrochloric acid, soda ash and bleaching powder.

## UNIT-III:

## UNIT-IV:
Miscellaneous topics: Water, air, steam, nuclear materials, photographic products, fuel gases, cryogenics and electrochemistry.

## TEXT BOOKS:

## REFERENCE BOOKS:

## NOTE:
- **a.** In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
- **b.** The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- **c.** Electronics gadgets including Cellular phones are not allowed in the examination.
CHE305B : EQUIPMENT DESIGN  
B. Tech. Semester - V (Chemical Engineering)  

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Class Work : 25 Marks  
Examination : 75 Marks  
Total : 100 Marks  
Duration of Examination : 3 Hours  

Unit-I:  
Mechanics of Materials: Stress, strain, Biaxial and tri-axial stress, Stress-strain relationship for elastic bodies, Theories of failure, Thermal stresses, Torsion of solid and hollow cylindrical shafts, Thin and thick cylinders.

Unit-II:  
Pressure Vessel: Introduction of codes for pressure vessel design, classification of pressure vessels, Design of cylindrical and spherical shells under internal and external pressure, selection and design of closures, optimum length of diameter ratio of pressure vessel using common types of closures.

Unit-III:  
Design of jacketed portion of vessels, Selection and design of nozzles, Elementary idea of compensation for openings, Selection of gaskets, selection and design of flanges, pipe thickness calculation under internal and external pressure. Complete design calculations and shop drawing for at least one pressure vessel using heads and flanges as per code specifications.

Unit-IV:  
Tall Tower Design: Design of shell, skirt, bearing plate and anchor bolts used at high wind and seismic conditions. Supports: Design of lug support and saddle support including bearing plates and anchor bolts. Storage Tanks: Filling and breathing losses, classification of storage tanks, Design of liquid and gas storage tanks.

TEXT BOOKS:  
2. Introduction of Chemical Equipment Design: B.C. Bhattacharya - Chemical Engineering Education Development Centre, IIT, Madras  
3. Process Equipment Design: M.V. Joshi and V.V. Mahagani Macmillan India Ltd.

REFERENCE BOOKS:  

NOTE:  
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
Unit-I: Diffusion in gases and liquids, Equation of continuity. Theories of mass transfer, Individual and overall mass transfer coefficients, Mass, heat and momentum transfer analogies, simultaneous heat and mass transfer.


Unit-IV: Drying: Principles of Drying, Rate of drying curves, Time of Drying, Batch Drying, Cross-circulation drying Through-circulation drying, Continuous drying, Drying Equipment

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: Conduction: Basic equation-one dimensional, two dimensional and three dimensional, Steady-state conduction in slab, cylinder and sphere, Critical thickness of insulation. Finned surfaces, Transient conduction Analytical solution for slabs, Use of transient temperature charts for slabs, cylinders and spheres and lumped system analysis.

UNIT-II: Convection: Equation of motion, Equation of energy, Solution of Boundary layer flow over flat plate, Forced convection inside tubes under laminar and turbulent flow conditions, Forced convection over cylinders and spheres. Natural convection: dimensionless parameters of natural convections, Empirical correlations for free convection for various shapes.


UNIT-IV: Radiation: Black body radiation, Concept of shape factor, Methods of determination of shape factor, Radiation exchange in enclosure with black surface. Evaporators: Types of Evaporators, Single and multiple effect evaporators, Calculations for surface area requirements.

TEXT BOOKS:

REFERENCE BOOKS:
2. Heat Transfer: J. P. Holman- Mcgraw Hill Book Company

NOTE:
4. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
5. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
6. Electronics gadgets including Cellular phones are not allowed in the examination.


UNIT-IV: Chemical Reaction Equilibrium - Reaction coordinate, application of equilibrium criteria to chemical reactions, standard Gibbs free energy change and the equilibrium constant, effect of Temperature on equilibrium constant, evaluation of equilibrium constants and composition, calculation of equilibrium compositions for single reactions, phase rule and Duhem’s theorem for reacting systems, introduction of multi reaction equilibria.

TEXT BOOKS:
2. Chemical Engineering Thermodynamics: Y.V.C. Rao Universities Press (India) Ltd., Hyderabad, India

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE313B : COMPUTER AIDED DESIGN LAB
B. Tech. Semester - V (Chemical Engineering)

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Class Work : 20 Marks
Examination : 30 Marks
Total : 50 Marks
Duration of Examination : 3 Hours

Module 1
Introduction to computer aided design - use of computers for physical property evaluation - thermodynamic properties of gases and binary mixtures - methods of calculating vapour-liquid equilibrium data for ideal and non-ideal mixture - bubble point and dew point – flash calculations.

Module 2
Design of pressure vessels - vessels under internal pressure - heads and closures - compensation requirements for openings and flanges - vessels under external pressure – tall vessels - development of CAD modules for design of pressure vessels.

Module 3
Computer aided design of heat exchanger systems - double pipe and shell and tube heat exchanger design - computer aided design of evaporators - design of single effect evaporator and multiple effect evaporator systems.

Module 4
Computer aided design of packed bed absorbers and strippers - computer aided mechanical design of bubble-cap distillation column.

NOTE:

1. The students will be required to perform the 06 experiments from above modules and two experiments may either be performed from the above modules or designed and set by the Dept. as per the scope of the syllabus of CHE305B.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE315B : MASS TRANSFER-I LAB
B. Tech. Semester - V (Chemical Engineering)

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Class Work : 20 Marks
Examination : 30 Marks
Total : 50 Marks
Duration of Examination : 3 Hours

List of Practicals / Demonstrations:

1. Mass Transfer of vapor in air from solid surface.
2. Diffusion of vapor in air from liquid surface.
3. Drying of solids.
5. Liquid hold up.
6. Wetted wall column.
8. Air-water absorption.

NOTE:

1. The students will be required to perform the 06 experiments from above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE307B.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE317B : HEAT TRANSFER LAB  
B. Tech. Semester - V (Chemical Engineering) 

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<td>2</td>
<td>1</td>
<td>: 20 Marks</td>
<td>: 30 Marks</td>
<td>: 50 Marks</td>
<td>: 3 Hours</td>
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List of Experiments / Exercises:

1. Determination of overall heat transfer coefficient.
2. Filmwise & dropwise condensation.
3. Efficiency of a long tube evaporator.
4. Effectiveness of pin-fin.
5. Determination of LMTD.
6. Natural Convection heat transfer.
7. Forced convection heat transfer.
8. Thermal conductivity of insulating powder.

NOTE:

1. The students will be required to perform the 06 experiments from above list and 02 experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE309B.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
At the end of 4th semester each student would undergo four weeks Professional Training in an Industry/Institute/Professional Organization/Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format.

The report will be evaluated in the V Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.
CHE302B : CHEMICAL REACTION ENGINEERING-II
B. Tech. Semester - VI (Chemical Engineering)

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Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

UNIT-I: Introduction to catalysis, classification of catalysts, preparation and physical characteristics of solid catalysts, Concepts of physical adsorption and chemisorption. Kinetics of Fluid-Solid Catalytic Reactions, Rate of Adsorption, Desorption, Surface Reaction, Rate equation in terms of Fluid-Phase Concentrations at the catalyst surface.


UNIT-III: Diffusion and reaction in porous catalyst: Diffusion and reaction in spherical catalyst pellets, Internal and Overall Effectiveness factors, mass-transfer and reaction in packed bed, multiphase reactor.

UNIT-IV: Design of Heterogeneous Catalytic reactors: Isothermal & Adiabatic reactors; Non-Isothermal, Non-adiabatic Fixed Bed Reactors; Fluidized Bed Reactors.

TEXT BOOKS:

REFERENCE BOOK:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.

UNIT-II:  Leather Industry- Leather chemistry, manufacturing processes, and uses of leather. Food Industries : Food processing, food additives, oil & fats : Soap & detergents, glycerin, waxes.


TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: Heat Transfer Media-Characeristic properties, classification, selection & their industrial applications. Utilities, Referigation, Steam System - Applications, design of efficient steam heating systems, condensate utilization and flash steam, steam Traps.

UNIT-II: Air, Reciprocating air compressors, vacuum pumps, air receivers, different types of ejectors and barometric condensers, piping networks for water, steam condensate and air Utilisation. Water, its characteristics and conditioning for process industries, e.g. boiler feed, cooling etc. Recycling aspects of water.

UNIT-III: Hazards - Introduction, hazards due to fire explosion, toxicity and radiation, chemical hazards, maximum allowable concentration and threshold limiting values, protective and preventive measures in hazard control.

UNIT-IV: Disaster management - Scale of disaster, vapour cloud explosion, relief system emergency plans, standard safety programmes for disaster control, HAZOP analysis of plants. Indian legislation for safety and hazards, safety codes.

TEXT BOOK:

REFERENCE BOOKS:
4. Heat Transfer principles & Applications : B K Dutta, PHI

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: Distillation: Raoult's Law, ideal solutions, x-y and T-x-y diagrams, Flash vaporization and condensation, Batch distillation, Steam distillation, Azeotropes.

UNIT-II: Binary distillation, McCabe Thiele and Ponchon_Savarit Method, Total reflux, Minimum and Optimum reflux ratios, Fenske equation, Multicomponent distillation.

UNIT-III: Liquid-Liquid extraction: Application of liquid-liquid extraction, Liquid Equilibria, Equilateral-Triangular Coordinates, Systems of Three Liquids-One pair partially soluble, Systems of Three Liquids-Two pairs partially soluble, Choice of Solvent, Single stage extraction, Multistage extraction. Extraction Equipment


TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE310B: TRANSPORT PHENOMENA
B. Tech. Semester - VI (Chemical Engineering)

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**Class Work**: 50 Marks  
**Examination**: 75 Marks  
**Total**: 125 Marks  
**Duration of Examination**: 3 Hours


**UNIT-II**: Boundary conditions, Shell balance approach for stress distribution and velocity profile, Equation of continuity and equation of motion and their application in fluid flow problems, unsteady state momentum transport, Flow near a wall suddenly set in motion, Momentum transport phenomena in turbulent flows.


**UNIT-IV**: Concentration, velocities and mass fluxes, Fick's law of diffusion, Boundary conditions, Shell balance approach for mass transfer problems, Problems of diffusion with chemical reaction in porous catalyst, The effectiveness factor, Equation of continuity for multicomponent mixtures.

**TEXT BOOKS**:

**REFERENCE BOOKS**:

**NOTE**:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.

UNIT-II: Evaporators - Sizing of drum, central core pipe size and number of tubes for short-and long-tube evaporators.


UNIT-IV: Gas-Liquid Contact systems - Distillation column, Tray hydraulics of sieve and valve trays, Design of packed bed columns.

TEXT BOOKS:
2. Process Equipment Design: M.V. Joshi and V.V. Mahajani - Macmillan India Ltd.

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
List of Experiments / Exercises:

1. Estimation of calcium in lime stone.
2. Determination of percentage of available chlorine in a given sample of bleaching powder.
3. Determination of Potassium in a given sample of fertilizer by cobaltinitrite method OR by Flame photometry.
4. To estimate the percentage of sucrose in a given sample of cane sugar.
5. Estimation of non-reducing sugar.
6. To extract Caffiene from tea leaves.
7. To prepare fluorescein dye and Eosin dye.
8. To prepare soap.
9. To prepare urea formaldehyde resin.
10. To prepare cold cream.
11. To compare cleansing powers of two samples of detergent.
12. Determination of Tannin in fruit juice.

NOTE:

1. The students will be required to perform the 08 experiments from above list and 02 experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE303B & CHE304B.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
List of Practicals / Demonstrations:

1. Batch distillation.
2. Solid liquid extraction.
3. Vapour liquid equilibrium.
4. Liquid - Liquid extraction.
5. Batch distillation with reflux.
6. Adsorption isotherms.

NOTE:

1. The students will be required to perform the 05 experiments from above list and three experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE308B.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE318B : CHEMICAL REACTION ENGINEERING LAB  
B. Tech. Semester - VI (Chemical Engineering)  

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<td>3</td>
<td>1.5</td>
<td>: 40 Marks</td>
<td>: 60 Marks</td>
<td>: 100 Marks</td>
<td>: 3 Hours</td>
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List of Practicals / Demonstrations:

1. Adsorption isotherms.
2. Inversion of cane sugar.
3. Flow analogy for series and parallel reactions.
4. Rate constant of saponification reaction in PFR.
5. Rate constant of esterification reaction in batch reactor.
6. Rate constant of saponification reaction in batch reactor.
7. Rate constant of saponification reaction in CSTR.

NOTE:

1. The students will be required to perform the 06 experiments from above list and two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE301B & CHE302B.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
HUM302B : REPORT WRITING SKILLS
B. Tech. Semester - VI (Common for all branches)

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<td>1</td>
<td>25 Marks</td>
<td>50 Marks</td>
<td>75 Marks</td>
<td>2 Hours</td>
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OBJECTIVE
The course aims at developing competence for report writing with a focus on its complex writing techniques and procedures.

COURSE CONTENT

UNIT I
Report Writing
Reports: meaning, their importance and types, Structure of reports, Formats of reports, Use of illustrations

UNIT II
Writing of Business and Technical Reports:
Preliminary steps and procedure of writing report, writing various types of reports on technical, business related topics

RECOMMENDED READING

SCHEME OF END SEMESTER EXAMINATION (MAJOR TEST) AND INSTRUCTIONS FOR THE EXAMINER

1. The duration of the exam will be 2 hours.
2. The Question Paper for this theory course shall have three questions in all covering both the units. All will be compulsory with internal choice.
3. Question no. 1 will be of 10 marks. The question may have two/three parts with enough internal choice, covering various components of both the Units.
4. Question no 2 with internal choice will be of 10 marks covering contents of the Unit I. It will be theoretical in nature.
5. Question no 3 will have two parts of 15 marks each. The student will be asked to write reports on business and technical subject/ issue covering contents of Unit II. The emphasis would be on testing the actual report writing on a given business and technical situation/ subject in letter format.
HUM304B : ORAL PRESENTATION SKILLS
B. Tech. Semester - VI (Common for all branches)

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| Class Work | 20 Marks |
| Examination | 30 Marks |
| Total | 50 Marks |
| Duration of Examination | 2 Hours |

OBJECTIVE
To enable students to develop their speaking skills with professional proficiency

COURSE CONTENT

Oral Presentations:
Group Discussion; Mock interviews

Note for the Teacher:
The teacher concerned, by devising her/his method, must preview and review the student’s spoken proficiency at the beginning and end of the semester respectively to find the efficacy of the course and degree of improvement in the student.

RECOMMENDED READING


SCHEME OF END SEMESTER EXAMINATION (Practical)

An external Practical exam of 30 marks of 2 hour duration for the course will be conducted by an external examiner appointed by the competent authority of the University’s.

NOTE: Students will be tested for their oral communication competence making them participate in Group discussion, mock situations for interview. Students may also be evaluated through a viva conducted by an external examiner.
The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/her performance / achievements in different walks of life.

A Faculty Counselor will be attached to a group of students which will remain associated with him/her during the entire period of the degree program in the University. Each faculty member will serve as a faculty counselor. They will act like a local guardian for the students associated with him/her and will help them in terms of career guidance, personal difficulties.

A. The student will present a written report before the committee with following in view:

   The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

   I. Academic Performance

   II. Extra Curricular Activities / Community Service, Hostel Activities (8 Marks)

   III. Technical Activities / Industrial, Educational tour (8 Marks)

   IV. Sports/games (14 Marks)

   V. Moral values & Ethics (15 Marks)

   NOTE: Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the committee. (30 Marks)

C. Moral values & Ethics

   Syllabus - A few topics from the below mentioned books


   A minor test/Quiz will be conducted during the semester and it will be the duty of the concerned teacher assigned to teach Moral values & Ethics to submit the awards to respective chairman of the department / Director/Principal.

   The evaluation of this course will be made by the following Committee.

   **University Departments:**
   1. Chairperson of the Department Chairman
   2. Senior Most Faculty Counselor Member
   3. Vice- Chancellor’s Nominee Member

   **Affiliated Colleges:**
   1. Director/Principal Chairman
   2. Head of the Department/St. Faculty Member
   3. External Examiner to be appointed by the University Member

   **Note:** Remuneration will be paid to the external examiner only (at par with the other practical examinations).
CHE401B: PETROLEUM ENGINEERING
B. Tech. Semester - VII (Chemical Engineering)

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<td>4</td>
<td>25 Marks</td>
<td>75 Marks</td>
<td>100 Marks</td>
<td>3 Hours</td>
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Unit-I: Origin, composition, classification and constituents of petroleum, processing of crude oil - distillation. Pretreatment of crude oil, fractional distillation, refinery products, applications of petroleum products.

Unit-II: Cracking – types of cracking, Thermal & catalytic, Commercial processes, Pyrolysis, Fluid catalytic cracking
Reforming – Types, Thermal & catalytic, Hydrocracking, naptha reforming process, visbreaking, coking

Unit-III: Purification of Petroleum products - Sweetening processes, Dewaxing, Deasphalting etc.
Polymerization, Alkylation and Isomerization, commercial processes.

Unit-IV: Properties of Petroleum products - Viscosity index, flash and fire point, cloud and pour point, octane and cetane number etc. Gasoline, diesel and fuel oil, storage and handling of fuel oils.

TEXT BOOK:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE403B : PROCESS DYNAMICS & CONTROL
B. Tech. Semester - VII (Chemical Engineering)

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<td>25 Marks</td>
<td>75 Marks</td>
<td>100 Marks</td>
<td>3 Hours</td>
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Unit-I: Laplace Transform, Properties of Transform; First-order systems and its response, Linearization, First-order systems in series.

Unit-II: Higher-order systems and Transportation Lag. Linear closed-loop systems, Control systems, Controllers & Final Control Elements, Closed-loop Transfer Functions, Transient Response of Simple Control Systems.

Unit-III: Stability, Routh Test for stability, Root Locus. Control valve, construction, valve sizing, characteristics, and valve positioner.


TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
Unit-I: Solid Fuels: Classification of coals, origin, composition, characteristics of coal, washing, storage of coal, pulverized fuel, coal carbonization, properties of coal.

Unit-II: Liquid Fuels: Origin, composition, classification of petroleum, processing of crude oil, cracking, reforming, octane & cetane number, purification of petroleum products, properties of petroleum products.


TEXT BOOKS:
2. Energy Technology: S.Rao, B.B. Parulekar- Khanna Publisher.

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: Chemistry of Polymerization Reactions- Functionality, Polymerization reactions, polycondensation, addition, free radical and chain polymerization. Copolymerization, block and graft polymerizations, stereospecific polymerization. Polymer Blends.

UNIT-II: Polymerization Kinetics- Kinetics of radical, Chain and ionic polymerisation and copolymerisation systems. Polymerisation Processes - Bulk, Solution, Emulsion and suspension polymerisation, Q-e Scheme, Spherulites, Additives.


Rheology:- simple rheological response, simple linear viscoelastic models- maxwell. voigt, material response time, temperature dependence of viscosity. Rheological studies.

UNIT-IV: Processing methods, Mixing including internal mixture, Calendering, Extrusion, Moulding Technique, Forming Technique, Casting, Thermoforming, Applications of polymers in different fields

TEXT BOOKS:
2. Polymer Science: Shreedhar & Gowarikar.
4 Polymer Chemistry An Introduction:-Malcolm P. Stevens

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT I


UNIT II


UNIT III

ENTREPRENEURSHIP DEVELOPMENT AND GOVERNMENT: Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available; Role of Central/State agencies in the Entrepreneurship Development - District Industries Centers (DIC), Small Industries Service Institute (SISI), Entrepreneurship Development Institute of India (EDII), National Institute of Entrepreneurship & Small Business Development (NIESBUD), National Entrepreneurship Development Board (NEDB).

UNIT IV

PROJECT MANAGEMENT AND CASE STUDIES
Technical, Financial, Marketing, Personnel and Management Feasibility, Estimating and Financing funds requirement - Schemes offered by various commercial banks and financial institutions like IDBI, ICICI, SIDBI, SFCs, Venture Capital Funding, Why do Entrepreneurs fail - The Four Entrepreneurial Pitfalls (Peter Drucker), Case studies of Successful Entrepreneurial Ventures, Failed Entrepreneurial Ventures and Turnaround Ventures.

TEXTS AND REFERENCES:
2. Entrepreneurship - Hisrich Peters.
3. The Culture of Entrepreneurship - Brigitte Berger.
5. Dynamics of Entrepreneurship Development - Vasant Desai.
7. Thought Leaders - Shrinivas Pandit.
8. Entrepreneurship, 3rd Ed. - Steven Brandt.
10. The Entrepreneurial Connection - Gurmit Narula.

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
UNIT-I


UNIT-II


UNIT-III


UNIT-IV


TEXT BOOKS

REFERENCE BOOKS
3. Biomedical Telemetry – Mackay, Stuart R., John Wiley, 1

Note:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
UNIT I


MONOCHROME TV (PICTURE AND CAMERA TUBES): Monochrome picture tube, beam reflection, Beam focussing, Screen Phosphor, Face plate, Picture tube characteristics, picture tube circuit controls, Monochrome Camera Tubes: Basic principle, Image Orthicon, Vidicon, Plumbicon

UNIT II

COLOUR TV ESSENTIALS: Compatibility, Colour perception, Three Colour theory, Luminance, Hue and Saturation, Dispersion and Recombination of light, Primary and secondary colours, luminance signal, Chrominance Signal, Colour picture tube, colour TV Camera, Colour TV display Tubes, Colour Signal Transmission, Bandwidth for colour signal transmission, Colour TV controls. Cable TV, Block Diagram and principle of working of cable TV.

PLASMA AND LCD: Introduction, liquid crystals, types of LCD’s, TN, STN, TFT, Power requirements, LCD working, Principle of operation of TN display, Construction of TN display, Behaviour of TN liquid crystals, Viewing angle, colour balance, colour TN display, limitations, advantages, disadvantages, applications.

UNIT III

LED AND DMD: Introduction to LED Television, comparison with LCD and Plasma TV’s, schematic of DMD, introduction to Digital MicroMirror device, Diagram of DMD, principle of working, emerging applications of DMD.

MICROWAVE OVENS AND AIR CONDITIONERS: Microwaves, Transit Time, Magnetron, Waveguides, Microwave Oven, Microwave Cooking, Air conditioning, Components of air conditioning systems, all water Air conditioning systems, all air air conditioning Systems, Split air conditioner.

UNIT IV

MICROPHONES: Introduction, characteristics of microphones, types of microphone: carbon, moving coil, wireless, crystal, introduction to tape recorder.

LOUDSPEAKER: Introduction to ideal and basic loudspeaker, loudspeaker construction types of loudspeaker: Dynamic and permanent magnet, woofers, tweeters, brief introduction to baffles, equalisers.

TEXT BOOKS:
1. Consumer Electronics by S. P. Bali (Pearson Education)
2. Complete Satellite and Cable T.V by R. R. Gulati (New Age International Publishers)

REFERENCE BOOKS:
1. Monochrome and Colour Television by R. R. Gulati

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
UNIT I
INTRODUCTION TO THE POWER DISTRIBUTION SYSTEM: Description of the power distribution system- voltage levels, Components of the distribution system- Substation, Transformer, feeders, distribution system planning, operation & maintenance objectives, activities involved in O&M, grid management, load scheduling & dispatch, load balancing, 66-33/11 KV substation equipment, 11/0.4 KV substation equipment, Distribution transformers- reasons for DT failures.

UNIT II
ENERGY ACCOUNTING & ENERGY AUDIT: Need for energy accounting, objectives & functions of energy accounting, Energy flow diagram in power distribution system, energy accounting procedure- Energy measurement, and problems in energy accounting & overcoming these problems in energy accounting, Definition, need and types of energy audit, energy audit instruments, procedure for conducting an energy audit.

UNIT III

UNIT IV
DEMAND SIDE MANAGEMENT: An introduction, Why DSM?, Benefits of DSM, DSM in power systems: load management, DSM techniques and emerging trends, EC Act 2001, DSM on consumer side – the industrial sector, the agricultural sector, the domestic & commercial sectors, ESCO-a route for DSM.

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
EEE457B: ENERGY RESOURCES & TECHNOLOGY (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

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<td>100 Marks</td>
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UNIT-I

ENERGY SOURCES & AVAILABILITY: World energy situation. Indian energy scenario. Comparative study of thermal, hydro, nuclear and gas power plants. Impact of thermal, gas, hydro and nuclear power stations on environment, air and water pollution, green house effect (global warming), Plasma confinement - magnetic confinement and inertial confinement, geothermal, hydrogen energy, fuel cells, Alkaline fuel cells (AFC), Solid oxide fuel cell (SOFC), Molten carbonate fuel cells (MCFC), thermo-electric power, MHD power generation OTEC & tidal waves.

UNIT-II


UNIT-III


UNIT-IV


TEXT BOOKS:
1. Electric Power Generation, B.R.Gupta
3. Power Plant Engg: G.D. Rai

REFERENCE BOOKS:
1. Renewable Energy Resources: John Twidell and Tony Weir

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
BT401B: BIOINFORMATICS (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

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</table>

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

UNIT-I
INTRODUCTION: Internet, intranet and extranet, networking, protocols, genomic data, organization, representation, database management systems.

SEQUENCING DATA BANK: Introduction, collecting and storing sequence in laboratory, nucleic acid data bank – GenBank, EMBL, AIDS and RNA, protein data bank (PDB), cambridge structural database CSD, genome data bank, hybridoma data bank structure and others.

UNIT-II
SEQUENCE ANALYSIS: Analysis tools for sequence data banks, pair wise alignment: NEEDLEMAN and WUNSCH algorithms, Smith Waterman, multiple alignment – CLUSTAL-W, BLAST, FASTA, sequence patterns and motifs and profiles.

PREDICTIONS: Secondary and tertiary structure: algorithms Chao-Fasman algorithm, hidden Markov model, neural networking, protein classification, fold libraries, fold recognition (threading), homology detection, SRS-access to biological data banks.

UNIT-III
PHYLOGENETIC ANALYSIS– Basic concepts in systematics, taxonomy and phylogeny, phylogenetic trees- various types and their construction, tree building methods, distance methods, multiple alignment character based method, phylogenetic software.

MANAGING SCIENTIFIC DATA: Introduction, challenges faced in integration of biological information, SRS, Kleisli Query System TAMBIS, P/FDM mediator for a bioinformatics database, federation, discovery link and data management.

UNIT-IV

TEXT / REFERENCE BOOKS:
- Developing Bioinformatics Computer Skill, ed. Gibes & Jombeck, Shroff Publication
- Bioinformatics, ed. David W. Mount

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
UNIT I

UNIT II

UNIT III
NOISE & POLLUTION: Reduction of noise – Internal & external pollution control through alternate fuels / power plants – Catalytic converters and filters for particulate emission.

UNIT IV

TEXT BOOKS

REFERENCES BOOKS

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
UNIT – I

WATER POLLUTION – Classification of water pollutants, water characteristics, effluent standards, primary treatment, secondary treatment – aerobic (activated sludge, aerated lagoons, trickling filter, roughing filter, rotating biological contactor) anaerobic (contact process, UASB).

UNIT – II

AIR POLLUTION: Classification of air pollutants, Particulates: Physical characteristics, mode of formation, settling properties, Control measures.

UNIT – III

SOLID WASTE: Types, sources and properties of solid waste, methods of solid waste treatment and disposal
SOLID WASTE MANAGEMENT – Generation, Collection and techniques for ultimate disposal, Elementary discussion on resource and energy recovery.

UNIT – IV

Elementary treatment of nuclear pollution, metal pollution, noise pollution their effects & control.
Trace element: Mechanism of distribution, essential and non essential elements, trace of element in marin environment, its ecological effects and biological effects.

SUGGESTED BOOKS:
2. Metacaf – EDDY – Waste-water engineering revised by George Teholonobus (TMH)

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
CSE411B: MANAGEMENT INFORMATION SYSTEM (Open Elective)
B. Tech. Semester - VII (Chemical Engineering)

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<td>75 Marks</td>
<td>100 Marks</td>
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UNIT I

**FOUNDATIONS:-**

**INFORMATION SYSTEM:** Introduction to Information System and MIS, Decision support and decision making systems, systems approach, the systems view of business, Managing the digital firm, Electronic Commerce and Electronic business, DBMS, RDBMS, introduction to Telecommunication and Networks

**I.T.INFRASTRUCTURE:** Managing Hardware Assets, Managing Software Assets, Managing Data Resources, Internet And New It Infrastructure.

UNIT II

**CONCEPTUAL SYSTEM DESIGN:** Define the problems, set systems objective, establish system constraints, determine information needs, determine information sources, develop alternative conceptual design and select one document the system concept, and prepare the conceptual design report. Information Systems Security and Control, Ethical and Social Impact of Information Systems.

UNIT III

**DETAILED SYSTEM DESIGN:** Inform and involve the organization, aim of detailed design, project management of MIS detailed design, identify dominant and trade of criteria, define the sub systems, sketch the detailed operating sub systems and information flow, determine the degree of automation of each operation, inform and involve the organization again, inputs outputs and processing, early system testing, software, hardware and tools propose an organization to operate the system, documentation of detailed design

UNIT IV

**IMPLEMENTATION, EVALUATION AND MAINTENANCE OF THE MIS:** Plan the implementation, acquire floor space and plan space layouts, organize for implementation, develop procedures for implementation, train the operating personnel, computer related acquisitions, develop forms for data collection and information dissemination, develop the files, test the system, cut-over, document the system, evaluate the MIS control and maintain the system. Pitfalls in MIS development, Redesigning the organization with Information systems, Managing Knowledge Work.

**TEXT BOOKS:**

**REFERENCE BOOKS:**
1. Management Information System; O Brian; TMH
2. Management Information System by Davis Olson Mac Graw Hill

**NOTE:**
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
INTRODUCTION TO CYBERCRIME: Cybercrime and Information Security, Classifications of Cybercrimes, The need for Cyberlaws, The Indian IT Act Challenges to Indian Law and Cybercrime Scenario in India, Weakness in Information Technology Act and it consequences, Digital Signatures and the Indian IT Act, Cybercrime and Punishment; Technology, Students and Cyberlaw; Survival tactics for the Netizens, Cyber-offenses: Cyberstalking, Cybercafe and Cybercrimes, Botnets, Attack Vector, Cloud Computing;


TEXT BOOKS:
- “Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Nina Godbole, Sunit Belapur, Wiley India Publications, April, 2011

NOTE:
1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.
CHE409B : PROCESS DYNAMICS & CONTROL LAB  
B. Tech. Semester - VII (Chemical Engineering) 

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<td>20 Marks</td>
<td>30 Marks</td>
<td>50 Marks</td>
<td>3 Hours</td>
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List of Practicals / Demonstrations:

1. Liquid Level Tank (Non-interacting system).
2. Liquid Level Tank (Interacting system).
3. Time constant of a Mercury Thermometer.
4. Pressure control system trainer.
5. Temperature control system trainer.
6. Level control system trainer.
7. Flow control system trainer.
8. Ratio control system trainer.

NOTE:

1. The students will be required to perform the 06 experiments from above list and two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE403B.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE411B : ENERGY TECHNOLOGY LAB
B. Tech. Semester - VII (Chemical Engineering)

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<td>: 20 Marks</td>
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<td>: 50 Marks</td>
<td>: 3 Hours</td>
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List of Practicals / Demonstrations:

1. Determination of Flash point and fire point.
2. Determination of Calorific value.
4. Cloud point and pour point.
5. Smoke point.

NOTE:

1. The students will be required to perform the 05 experiments from above list and three experiments may be performed from the list designed and set by the Dept. as per the scope of the syllabus of CHE405B.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
The primary objective of this course is to develop in students the professional quality of synthesis employing technical knowledge obtained in the field of Engineering & Technology through a project work involving design, analysis augmented with creativity, innovation and ingenuity.

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. which commences in the VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairman of Department : Chairperson
Project coordinator : Member Secretary
Respective project supervisor : Member

The student will be required to submit two copies of his/ her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.
CHE415B : PROFESSIONAL TRAINING-II
B. Tech. Semester – VII (Chemical Engineering)

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- At the end of 6th semester each student would undergo four weeks Professional Training in an Industry/ Institute/ Professional / Organization/ Research Laboratory etc. with the prior approval of the Training and Placement Officer of the University and submit in the department a typed report along with a certificate from the organization.

- The typed report should be in a prescribed format.

- The report will be evaluated in the VII Semester by a Committee consisting of three teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

- The student will interact with the committee through presentation to demonstrate his/her learning.

- Teachers associated with evaluation work will be assigned 2 periods per week load.

UNIT-II: Mathematical Models of Chemical Engineering System - Series of isothermal constant hold up CSTRs, Gravity flow tank, CSTRs with variable hold ups, Heated tanks, Gas phase pressurized CSTR, Isothermal and non-isothermal CSTRs systems. Single and Multi-component vaporizers. Reactor with mass transfer, Interacting and non interacting tanks, bioreactor.

UNIT-III: Batch reactor, semi batch reactor, Plug flow reactor, Ideal and non-ideal binary Distillation Column. Batch Distillation with hold up, pH systems, absorption column, liquid liquid extraction, double pipe heat exchanger.


TEXT BOOKS:

REFERENCE BOOKS:
2. Chemical Engineering Dynamics: E.J. Dunn- V.C.H.

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE404B : PROCESS ENGINEERING ECONOMICS
B. Tech. Semester - VIII (Chemical Engineering)

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Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

UNIT-I: Introduction, Flow-sheeting, Plant Location, Plant Layout, Health and Safety Hazards, Degree of freedom, Environmental Protection.

UNIT- II: Cost and Asset Accounting: Basic relationships in accounting, Balance Sheet Cost Estimation: Cash Flow, Capital Investments, Methods for estimating Capital Investments, Cost Indexes, Total Product Cost
Interest and Investment Costs: Types of Interest, Present Worth and Discount, Annuities, Perpetuities and Capitalized Costs


Optimum design: General Procedure for determining optimum conditions, Break-Even chart and its significance for optimum analysis, optimum conditions in cyclic operations, Examples of optimum design in a chemical process plant.

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: Causes of Environmental Pollution: Interaction of systems, Environmental disturbances, public awareness and action, population and economic growth, Industrialization, Energy growth, Man made disturbances, ozone layer depletion, global warming, Acid rain effect.

UNIT-II: Air Pollution: Types of air pollutants, Sources of air pollution, effects of air pollutants. Air sampling, Air pollution control equipments, Lapse rate, different plume patterns, air pollution legislation and regulations

UNIT-III: Water Pollution: types of water pollutants, sources of water pollution, Effects of water pollution, control of water pollution, Wastewater and sludge treatment methods, Sources and characteristics of wastewater, Primary treatment, Secondary treatment, Tertiary treatment, Adsorption, Disinfection, Sources and characteristics of sludge, Sludge treatment and disposal methods, wastewater reclamation and reuse, water pollution legislation and regulations

UNIT-IV: Solid waste management and disposal methods, Industrial pollution monitoring and control including treatment methods in various process industries (such as refineries, fertilizer, paper and pulp industries, sugar manufacturing units, textile, dairy waste, mining and metallurgical industries etc.)

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.

UNIT-II: Metabolism and Energetics - Assimilatory and dissimilatory process, The metabolic mechanism of the cells. Bio-Chemical Kinetics - Simple enzyme kinetics with one or two substrate, Modulation and regulation of enzymatic activity, enzyme reactions in heterogeneous systems. Microbial Fermentation Kinetics - Growth - cycle phases for batch cultivation, mathematical modeling of batch growth, product synthesis, Kinetics, overall kinetics and thermal death kinetics of cells and spores.


UNIT-IV: Design and Analysis of Bio-Reactors - Classification and characterization of different bioreactors, batch and continuous reactors, tubular, CSTR and tower reactors. Aerobic and anaerobic fermentation, process design and operation of typical aerobic and anaerobic fermentation processes, manufacture of microbial products, e.g. antibiotics, alcohol/wine etc. use of immobilized enzymes and whole cells for industrial process.

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
CHE452B : NOVEL SEPARATION TECHNIQUES (ELECTIVE-II)
B. Tech. Semester - VIII (Chemical Engineering)

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<td>4</td>
<td>25 Marks</td>
<td>75 Marks</td>
<td>100 Marks</td>
<td>3 Hours</td>
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UNIT-I: Separation processes in Chemical & Biochemical industries, categorization of separation processes, equilibrium and rate governed processes.

UNIT-II: Nature of bubbles and foams, stability of foams, foam fraction techniques, batch, continuous, single stage and multistage columns.


UNIT-IV: Theory of adsorption, application, adsorption isotherms, adsorption hysteresis, batch and continuous adsorption etc.

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
UNIT-I: FLOW OF FLUIDS- Frictional loss in pipe and ducts; Equivalent resistance of fittings, valve and bends; carrying capacity of pipes; piping networking; pressure drop and diameter calculations of pipe carrying steam, water, oil and gases. VAPOUR LIQUID PIPING-Flow pattern, piping design for two-phase flow; Design of piping for reboiler and condenser systems.

UNIT-II: HYDRAULIC TRANSPORT-Design of homogeneous and heterogeneous slurry transport line; correlations for various flow regimes. PNEUMATIC TRANSPORT-Conveying systems; solid gas flow pattern in vertical, horizontal and inclined pipe lines; concept of saltation and choking velocities. Pressure drop calculations in different pipe lines carrying gas solid mixture; Design of feeding systems for pneumatic transport of solids. Optimum pipe line diameter calculations and optimum pipe network design.

UNIT-III: PIPES AND FITTINGS-Standard sizes, wall thickness, tolerances, design of flanges and other fittings. STRENGTH AND FAILURE OF MATERIALS-Stable and unstable deformation, plasticity plastic instability, design assumptions, stress evaluation and design limits, codes and standards. Local components of pipe bends, branch connections and bolted flange connections.

Unit-IV: SIMPLIFIED METHODS FOR FLEXIBILITY ANALYSIS-Thermal expansion loops, code rules, approximate solutions and flexibility analysis by model tests. Approaches to reducing expansion effects, expansions joints. Piping layout consideration, elements of supporting system, fixtures and pipe attachments. Introduction to piping vibrations, their prevention and control.

TEXT BOOKS:

REFERENCE BOOKS:

NOTE:
1. In the semester examination, the examiner will set 08 questions in all selecting two from each unit. The candidates will be required to attempt five questions in all selecting at least one from each unit. All questions will carry equal marks.
2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
3. Electronics gadgets including Cellular phones are not allowed in the examination.
The objectives of the course remains

- To learn how to carry out literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/She will give a seminar talk on the same before a committee constituted by the chairperson of the department. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students’ seminar will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.
List of Experiments / Exercises:

1. Determination of pH and Temperature
2. Determination of dissolved oxygen
3. Determination of BOD
4. Determination of COD
5. Determination of Solids
6. Determination of Conductivity
7. Determination of Turbidity
8. Determination of Acidity and Alkalinity
9. Determination of Hardness
10. Determination of Chlorides, Fluorides and Nitrates
11. Determination of Heavy Metals.

NOTE:

1. The students will be required to perform the 08 experiments from above list and two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE451B.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
### CHE413B: PROJECT

B. Tech. Semester – VIII (Chemical Engineering)

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<td>8</td>
<td>8</td>
<td>75 Marks</td>
<td>125 Marks</td>
<td>200 Marks</td>
<td>3 Hours</td>
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The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

- Chairperson of Department: Chairperson
- Project coordinator: Member
- External expert: To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.
Modeling and Simulation of Chemical Engineering Systems like:

1. Isothermal CSTR
2. Non-Isothermal CSTR
3. Isothermal Batch Reactor
4. Non-Isothermal Batch Reactor
5. Ideal Binary Distillation Column
6. Flash Calculation
7. Gravity flow tank
8. Runge–Kutta method/Euler’s method

Software such as Aspen Plus/Chem-CAD, MATLAB, C++ etc. may be used in modeling above problems. Mathematical modeling of Chemical Engineering problems will be done on computers with the help of related software packages.

NOTE:

1. The students will be required to perform the 06 experiments from above list and two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus of CHE402B.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.

3. Electronics gadgets including Cellular phones are not allowed in the examination.
University Rules/ Regulation specifically related to students and academic ordinances. University Vision, Mission, Goals, objectives, code of conduct.

Introduction to Value Education. Understanding ethics, value system, happiness, prosperity.

BOOKS

NOTE:
1. A minor test will be conducted during the semester and its award out of ten will be forwarded to respective Chairperson of the Department.
2. Weightage of Ethics is given in General Proficiency Syllabus.
The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/her performance/achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

1. Dean, Faculty of Engineering & Technology/ Director
   /Principal of affiliated college : Chairperson
2. Chairperson of the department : Member
3. External expert : Appointed by the university

A. **The student will present a written report before the committee with following in view:**

   The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

   I. Academic Performance
   II. Extra Curricular Activities / Community Service, Hostel Activities (12 Marks)
   III. Technical Activities / Industrial, Educational tour (12 Marks)
   IV. Sports/games (16 Marks)

   **Note:** Report submitted by the students should be typed on both sides of the paper.

B. A student will support his/her achievement and verbal & communicative skill through presentation before the examiners. (40 Marks)

C. **Faculty Counselor Assignment** (20 Marks)

   It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

   A counselor will assess the student which reflects his/her learning graph including followings:
   1. Discipline throughout the year
   2. Sincerity towards study
   3. How quickly the student assimilates professional value system etc.
   4. Moral values & Ethics- Syllabus (one lecture/week on the topics of Human values/Ethics is to be delivered)