

# ACADEMIC REGULATIONS COURSE STRUCTURE AND DETAILED SYLLABUS

**COMPUTER  
SCIENCE AND  
ENGINEERING**

**For**

COMPUTER SCIENCE AND ENGINEERING FOUR DEGREE COURSE

*(Applicable for batches admitted from 2013-2014)*



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**

**KAKINADA - 533 003, Andhra Pradesh, India**

## COURSE STRUCTURE

### I Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	English – I	3+1	--	3
2	Mathematics - I	3+1	--	3
3	Engineering Chemistry	3+1	--	3
4	Engineering Mechanics	3+1	--	3
5	Computer Programming	3+1	--	3
6	Environmental Studies	3+1	--	3
7	Engineering Chemistry Laboratory	--	3	2
8	English - Communication Skills Lab - I	--	3	2
9	C Programming Lab	--	3	2
<b>Total Credits</b>				<b>24</b>

### I Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	English – II	3+1	--	3
2	Mathematics – II (Mathematical Methods)	3+1	--	3
3	Mathematics – III	3+1	--	3
4	Engineering Physics	3+1	--	3
5	Professional Ethics and Human Values	3+1	--	3
6	Engineering Drawing	3+1	--	3
7	English - Communication Skills Lab - II	--	3	2
8	Engineering Physics Lab	--	3	2
9	Engineering Physics – Virtual Labs - Assignments	--	2	--
10	Engg. Workshop & IT Workshop	--	3	2
<b>Total Credits</b>				<b>24</b>

### II Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Managerial Economics and Financial Analysis	4	--	3
2	Object Oriented Programming through C++	4	--	3
3	Mathematical Foundations of Computer Science	4	--	3
4	Digital Logic Design	4	--	3
5	Data Structures	4	--	3
6	Object Oriented Programming Lab	--	3	2
7	Data Structures Lab	--	3	2
8	Digital Logic Design Lab	--	3	2
9	Seminar	--	--	1
<b>Total Credits</b>				<b>22</b>

## II Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	Probability and statistics	4	--	3
2	Java Programming	4	--	3
3	Advanced Data Structures	4	--	3
4	Computer Organization	4	--	3
5	Formal Languages and Automata Theory	4	--	3
6	Advanced Data Structures Lab	--	3	2
7	Java Programming Lab	--	3	2
8	Free Open Source Software(FOSS) Lab	--	3	2
<b>Total Credits</b>				<b>21</b>

## III Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Compiler Design	4	-	3
2	Data Communication	4	-	3
3	Principles of Programming Languages	4	-	3
4	Database Management Systems	4	-	3
5	Operating Systems	4	-	3
6	Compiler Design Lab	-	3	2
7	Operating System Lab	-	3	2
8	Database Management Systems Lab		3	2
9	Linux Programming Lab	-	3	2
10	IPR and Patents- 1	2	-	-
11	Seminar	--	--	1
<b>Total Credits</b>				<b>24</b>

## III Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	Computer Networks	4	-	3
2	Data Ware housing and Mining	4	-	3
3	Design and Analysis of Algorithms	4	-	3
4	Software Engineering	4	-	3
5	Web Technologies	4	-	3
6	Computer Networks Lab	-	3	2
7	Software Engineering Lab	-	3	2
8	Web Technologies Lab	-	3	2
9	IPR and Patents- II	2	--	--
<b>Total Credits</b>				<b>21</b>

## IV Year – I SEMESTER

S. No.	Subject	T	P	Credits
1	Cryptography and Network Security	4	-	3
2	UML & Design Patterns	4	-	3
3	Mobile Computing	4	-	3
4	<b>Elective –I</b>	4	-	3
5	<b>Elective – II</b>	4	-	3
6	UML & Design Patterns Lab	-	3	2
7	Mobile Application Development Lab	-	3	2

8	Software Testing Lab	-	3	2
9	Hadoop & BigData Lab	-	3	2
<b>Total Credits</b>				<b>23</b>

#### IV Year – II SEMESTER

S. No.	Subject	T	P	Credits
1	<b>Elective – III</b>	4	-	3
2	<b>Elective – IV</b>	4	-	3
3	Distributed Systems	4	-	3
4	Management Science	4	-	3
5	Project	-	-	9
<b>Total Credits</b>				<b>21</b>

#### Elective – I:

- i) Software Testing Methodologies
- ii) Simulation Modeling
- iii) Information Retrieval Systems
- iv) Artificial Intelligence
- v) Multimedia Computing
- vi) High Performance Computing

#### Elective – II:

- i. Digital Forensics
- ii. Hadoop and Big Data
- iii. Software Project Management
- iv. Machine Learning
- v. Advanced Databases

#### Elective – III:

- i) Human Computer Interaction
- ii) Advanced Operating Systems
- iii) Mobile Adhoc & Sensor Networks
- iv) Pattern Recognition
- v) Digital Image Processing
- vi) Micro processors and Multi Core Systems

#### Elective-IV:

- i) Embedded and Real Time Systems
- ii) Neural Networks & Soft Computing
- iii) Social Networks and the Semantic Web
- iv) Cloud Computing

# SYLLABUS

I Year – I SEMESTER

T	P	C
3+1	0	3

## ENGLISH –I (Common to All Branches)

### DETAILED TEXT-I English Essentials: Recommended Topics:

#### 1. IN LONDON: M.K.GANDHI

**OBJECTIVE:** To apprise the learner how Gandhi spent a period of three years in London as a student.

**OUTCOME:** The learner will understand how Gandhi grew in introspection and maturity.

#### 2. THE KNOWLEDGE SOCIETY- APJ KALAM

**OBJECTIVE:** To make the learners rediscover India as a land of Knowledge.

**OUTCOME:** The learners will achieve a higher quality of life, strength and sovereignty of a developed nation.

#### 3. THE SCIENTIFIC POINT OF VIEW- J.B.S. HALDANE

**OBJECTIVE:** This essay discusses how scientific point of view seeks to arrive at the truth without being biased by emotion.

**OUTCOME:** This develops in the student the scientific attitude to solve many problems which we find difficult to tackle.

#### 4. PRINCIPLES OF GOOD WRITING:

**OBJECTIVE:** To inform the learners how to write clearly and logically.

**OUTCOME:** The learner will be able to think clearly and logically and write clearly and logically.

#### 5. MAN'S PERIL

**OBJECTIVE:** To inform the learner that all men are in peril.

**OUTCOME:** The learner will understand that all men can come together and avert the peril.

#### 6. THE DYING SUN—SIR JAMES JEANS

**OBJECTIVE:** This excerpt from the book “The Mysterious Universe” presents the mysterious nature of the Universe and the stars which present numerous problems to the scientific mind. Sir James Jeans uses a poetic approach to discuss the scientific phenomena.

**OUTCOME:** This provides the students to think about the scientific phenomena from a different angle and also exposes the readers to poetic expressions.

#### 7. LUCK—MARK TWAIN

**OBJECTIVE:** This is a short story about a man's public image and his true nature. The theme of the story is that luck can be a factor of life, so that even if one is incompetent but lucky, one can still succeed.

**OUTCOME:** The story is humourous in that it contains a lot of irony. Thus this develops in the learner understand humourous texts and use of words for irony.

**Text Book:** ‘English Essentials’ by Ravindra Publications\_

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)  
(Common single Text book for two semesters)  
(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons))**

**1. G.D.Naidu**

**OBJECTIVE:** To inspire the learners by G.D.Naidu's example of inventions and contributions.

**OUTCOME:** The learner will be in a position to emulate G.D.Naidu and take to practical applications.

**2. G.R.Gopinath**

**OBJECTIVE:** To inspire the learners by his example of inventions.

**OUTCOME:** Like G.R.Gopinath, the learners will be able to achieve much at a low cost and help the common man.

**3. Sudhamurthy**

**OBJECTIVE:** To inspire the learners by the unique interests and contributions of Sudha Murthy.

**OUTCOME:** The learner will take interest in multiple fields of knowledge and make life worthwhile through social service.

**4. Vijay Bhatkar**

**OBJECTIVE:** To inspire the learner by his work and studies in different fields of engineering and science.

**OUTCOME:** The learner will emulate him and produce memorable things.

**Text Book:** 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

**MATHEMATICS – I (DIFFERENTIAL EQUATIONS)**  
(Common to All Branches)

**UNIT I: Differential equations of first order and first degree:**

Linear-Bernoulli-Exact-Reducible to exact.

Applications: Newton's Law of cooling-Law of natural growth and decay-orthogonal trajectories.

**Subject Category**

ABET Learning Objectives a d e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT II: Linear differential equations of higher order:**

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax} V(x)$ ,  $xV(x)$ .

Applications: LCR circuit, Simple Harmonic motion

**Subject Category**

ABET Learning Objectives a d e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT III Laplace transforms:**

Laplace transforms of standard functions-Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Application: Solutions of ordinary differential equations using Laplace transforms.

**Subject Category**

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT IV Partial differentiation:**

Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors and Mc Laurent's series for two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables with constraints and without constraints.

**Subject Category**

ABET Learning Objectives a c e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT V First order Partial differential equations:**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations

**Subject Category**

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT VI Higher order Partial differential equations:**

Solutions of Linear Partial differential equations with constant coefficients- Method of separation of Variables

Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

**Subject Category**

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation B E



**Books:**

1. **B.S.GREWAL**, Higher Engineering Mathematics, 42<sup>nd</sup> Edition, Khanna Publishers
2. **ERWIN KREYSZIG**, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, Wiley-India
3. **GREENBERG**, Advanced Engineering Mathematics, 2<sup>nd</sup> edition, Pearson edn
4. **DEAN G. DUFFY**, Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O’NEIL**, advanced Engineering Mathematics, Cengage Learning.

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks
Theory Design Analysis Algorithms Drawing Others	<ol style="list-style-type: none"> <li>a) Apply knowledge of math, science, &amp; engineering</li> <li>b) Design &amp; conduct experiments, analyze &amp; interpret data</li> <li>c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, &amp; sustainability constraints</li> <li>d) Function on multidisciplinary teams</li> <li>e) Identify, formulate, &amp; solve engineering problems</li> <li>f) Understand professional &amp; ethical responsibilities</li> <li>g) Communicate effectively</li> <li>h) Understand impact of engineering solutions in global, economic, environmental, &amp; societal context</li> <li>i) Recognize need for &amp; be able to engage in lifelong learning</li> <li>j) Know contemporary issues</li> <li>k) Use techniques, skills, modern tools for engineering practices</li> </ol>	<ol style="list-style-type: none"> <li>1. Objective tests</li> <li>2. Essay questions tests</li> <li>3. Peer tutoring based</li> <li>4. Simulation based</li> <li>5. Design oriented</li> <li>6. Problem based</li> <li>7. Experiential (project based) based</li> <li>8. Lab work or field work based</li> <li>9. Presentation based</li> <li>10. Case Studies based</li> <li>11. Role-play based</li> <li>12. Portfolio based</li> </ol>	<ol style="list-style-type: none"> <li>A. Questions should have:</li> <li>B. Definitions, Principle of operation or philosophy of concept.</li> <li>C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference.</li> <li>D. Design oriented problems</li> <li>E. Trouble shooting type of questions</li> <li>F. Applications related questions</li> <li>G. Brain storming questions</li> </ol>	

**ENGINEERING CHEMISTRY****UNIT-I: WATER TECHNOLOGY**

Hard Water – Estimation of hardness by EDTA method – Potable water- Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and foaming, scale formation, corrosion, caustic embrittlement, turbine deposits – Softening of water – Lime soda, Zeolite processes – Reverse osmosis – Electro Dialysis, Ion exchange process

**Objectives :** For prospective engineers knowledge about water used in industries (boilers etc.) and for drinking purposes is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water is introduced.

**UNIT-II : ELECTROCHEMISTRY**

Concept of Ionic conductance – Ionic Mobilities – Applications of Kohlrausch law – Conductometric titrations – Galvanic cells – Electrode potentials – Nernst equation – Electrochemical series – Potentiometric titrations – Concentration cells – Ion selective electrode –Glass electrodes – Fluoride electrode; Batteries and Fuel cells

**Objectives :** Knowledge of galvanic cells, electrode potentials, concentration cells is necessary for engineers to understand corrosion problem and its control ; also this knowledge helps in understanding modern biosensors, fuel cells and improve them.

**UNIT-III : CORROSION**

Causes and effects of corrosion – theories of corrosion (dry, chemical and electrochemical corrosion) – Factors affecting corrosion – Corrosion control methods – Cathodic protection –Sacrificial Anodic, Impressed current methods – Surface coatings – Methods of application on metals (Hot dipping, Galvanizing, tinning, Cladding, Electroplating, Electroless plating) – Organic surface coatings – Paints – Their constituents and their functions.

**Objectives :** the problems associated with corrosion are well known and the engineers must be aware of these problems and also how to counter them

**UNIT-IV : HIGH POLYMERS**

Types of Polymerization – Stereo regular Polymers – Physical and Mechanical properties of polymers – Plastics – Thermoplastics and thermo setting plastics – Compounding and Fabrication of plastics – Preparation and properties of Polyethylene, PVC and Bakelite – Elastomers – Rubber and Vulcanization – Synthetic rubbers – Styrene butadiene rubber – Thiokol – applications.

**Objectives :** Plastics are materials used very widely as engineering materials. An understanding of properties particularly physical and mechanical properties of polymers / plastics / elastomers helps in selecting suitable materials for different purposes.

**UNIT-V : FUELS**

Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific value – HCV and LCV – Problems based on calorific values; petroleum – Refining – Cracking – Petrol – Diesel knocking; Gaseous fuels – Natural gas – LPG, CNG – Combustion – Problems on air requirements.

**Objectives :** A board understanding of the more important fuels employed on a large scale is necessary for all engineer to understand energy – related problems and solve them.

**UNIT-VI : CHEMISTRY OF ADVANCED MATERIALS**

Nanomaterials (Preparation of carbon nanotubes and fullerenes – Properties of nanomaterials – Engineering applications) – Liquid crystals (Types – Application in LCD and Engineering Applications) – Fiber reinforced plastics – Biodegradable polymers – Conducting polymers – Solar cells (Solar heaters – Photo voltaic cells – Solar reflectors – Green house concepts – Green chemistry (Methods for green synthesis and Applications) – Cement – Hardening and setting – Deterioration of cement concrete

**Objectives :** With the knowledge available now, future engineers should know at least some of the advanced materials that are becoming available. Hence some of them are introduced here.

### **TEXT BOOKS**

1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd,
2. N.Y.S.Murthy, V.Anuradha, KRamaRao "A Text Book of Engineering Chemistry", Maruthi Publications
3. C.Parameswara Murthy, C.V.Agarwal, Adhra Naidu (2006) Text Book of Engineering Chemistry, B.S.Publications
4. B.Sivasankar (2010), Engineering Chemistry, McGraw-Hill companies.
5. Ch.Venkata Ramana Reddy and Ramadevi (2013) , Engineering Chemistry, Cengage Learning

### **REFERENCES**

1. S.S. Dara (2013) Text Book of Engineering Chemistry, S.Chand Technical Series
2. K.Sesha Maheswaramma and Mridula Chugh (2013), Engineering Chemistry, Pearson Publications.
3. R.Gopalan, D.Venkatappayya, Sulochana Nagarajan (2011), Text Book of Engineering Chemistry, Vikas Publications.
4. B.Viswanathan and M.Aulice Scibioh (2009), Fuel Cells, Principals and applications, University Press.

## ENGINEERING MECHANICS

**Objectives:** The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

### UNIT – I

**Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.**

Introduction to Engg. Mechanics – Basic Concepts.

**Systems of Forces :** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

### UNIT II

**Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.**

**Equilibrium of Systems of Forces :** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorem, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium.

### UNIT – III

**Objectives : The students are to be exposed to concepts of centre of gravity.**

**Centroid :** Centroids of simple figures (from basic principles) – Centroids of Composite Figures

**Centre of Gravity :** Centre of gravity of simple body (from basis principles), centre of gravity of composite bodies, pappus theorem.

### UNIT IV

**Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.**

**Area moments of Inertia :** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia :** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

### UNIT – V

**Objectives : The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.**

**Kinematics :** Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics :** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

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### UNIT – VI

**Objectives: The students are to be exposed to concepts of work, energy and particle motion**

**Work – Energy Method :** Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

### TEXT BOOKS:

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4<sup>th</sup> Edn - , Mc Graw Hill publications.
2. Engineering Mechanics: Statics and Dynamics 3<sup>rd</sup> edition, Andrew Pytel and Jaan Kiusalaas; Cengage Learning publishers.

### REFERENCES:

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11<sup>th</sup> Edn – Pearson Publ.
2. Engineering Mechanics, statics – J.L.Meriam, 6<sup>th</sup> Edn – Wiley India Pvt Ltd.

3. Engineering Mechanics , dynamics – J.L.Meriam, 6<sup>th</sup> Edn – Wiley India Pvt Ltd.
4. Engineering Mechanics , statics and dynamics – I.H.Shames, – Pearson Publ.
5. Mechanics For Engineers , statics - F.P.Beer & E.R.Johnston – 5<sup>th</sup> Edn Mc Graw Hill Publ.
6. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston – 5<sup>th</sup> Edn Mc Graw Hill Publ.
7. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5<sup>th</sup> Edn – Schaum's outline series - Mc Graw Hill Publ.
8. Engineering Mechanics , Ferdinand . L. Singer , Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson, Mc Graw Hill publications
10. Engineering Mechanics, Tayal. Umesh Publ.

## COMPUTER PROGRAMMING

**Objectives:** Formulating algorithmic solutions to problems and implementing algorithms in C

### UNIT I:

**Unit objective: Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux**

**Introduction:** Computer systems, Hardware and Software Concepts,

**Problem Solving:** Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and highlevel languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling( gcc), Linking and Executing in under Linux.

**BASICS OF C:** Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arithmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

### UNIT II:

**Unit objective: understanding branching, iteration and data representation using arrays**

**SELECTION – MAKING DECISION: TWO WAY SELECTION:** if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.

**ITERATIVE:** loops- while, do-while and for statements , break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.

**ARRAYS:** Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.

**STRINGS: concepts, c strings.**

### UNIT III:

**Objective: Modular programming and recursive solution formulation**

**FUNCTIONS- MODULAR PROGRAMMING:** functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

### UNIT IV:

**Objective: Understanding pointers and dynamic memory allocation**

**POINTERS:** pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

### UNIT V:

**Objective: Understanding miscellaneous aspects of C**

**ENUMERATED, STRUCTURE AND UNION TYPES:** Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program applications

**BIT-WISE OPERATORS: logical, shift, rotation, masks.**

### UNIT VI:

**Objective: Comprehension of file operations**

**FILE HANDLING:** Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

**Text Books:**

1. Problem Solving and Program Design in C, Hanly, Koffman, 7<sup>th</sup> ed, PERSON
2. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education
3. Programming in C, A practical approach Ajay Mittal PEARSON
4. The C programming Language by Dennis Richie and Brian Kernighan
5. Programming in C, B. L. Juneja, Anith Seth, Cengage Learning.

**Reference Books and web links:**

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE
2. Programming with C, Bichkar, Universities Press
3. Programming in C, Reema Thareja, OXFORD
4. C by Example, Noel Kalicharan, Cambridge

## ENVIRONMENTAL STUDIES

### Course Learning Objectives:

The objectives of the course is to impart

1. Overall understanding of the natural resources
2. Basic understanding of the ecosystem and its diversity
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
4. An understanding of the environmental impact of developmental activities
5. Awareness on the social issues, environmental legislation and global treaties

### Course Outcomes:

The student should have knowledge on

1. The natural resources and their importance for the sustenance of the life and recognise the need to conserve the natural resources
2. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
3. The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
4. Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
5. Social issues both rural and urban environment and the possible means to combat the challenges
6. The environmental legislations of India and the first global initiatives towards sustainable development.
7. About environmental assessment and the stages involved in EIA and the environmental audit

### Syllabus:

#### UNIT - I

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**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 Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

#### UNIT - II

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people



Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources.

Land resources: Land as a resource, land degradation, Wasteland reclamation, 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

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

### UNIT - IV

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

### UNIT - V

**Social Issues and the Environment:** Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

### UNIT - VI

**Environmental Management:** Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism

The student should submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

#### Text Books:

1. Environmental Studies by R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi
3. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

#### Reference:

1. Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada
3. Environmental Studies by Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Environmental Studies by Piyush Malaviya, Pratibha Singh, Anoop Singh: Acme Learning, New Delhi

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**ENGINEERING CHEMISTRY LABORATORY****List of Experiments**

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard  $\text{Na}_2\text{CO}_3$  solutions
3. Estimation of  $\text{KMnO}_4$  using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution.
5. Estimation of Copper using standard  $\text{K}_2\text{Cr}_2\text{O}_7$  solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimation of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

**TEXT BOOKS**

1. Dr. Jyotsna Cherukui (2012) Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. Chemistry Practical Manual, Lorven Publications
3. K. Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication

**ENGLISH – COMMUNICATION SKILLS LAB – I****Suggested Lab Manuals:**

**OBJECTIVE:** To impart to the learner the skills of grammar as well as communication through listening, speaking, reading, and writing including soft, that is life skills.

**BASIC COMMUNICATION SKILLS**

UNIT 1	A. Greeting and Introductions B. Pure Vowels
UNIT 2	A. Asking for information and Requests B. Diphthongs
UNIT 3	A. Invitations B. Consonants
UNIT 4	A. Commands and Instructions B. Accent and Rhythm
UNIT 5	A. Suggestions and Opinions B. Intonation

**Text Book:**

‘Strengthen your Communication Skills’ Part-A by Maruthi Publications

**Reference Books:**

1. INFOTECH English (Maruthi Publications)
2. Personality Development and Soft Skills ( Oxford University Press, New Delhi)

**C PROGRAMMING LAB****Exercise 1**

- a) Write a C Program to calculate the area of triangle using the formula  
$$\text{area} = (s(s-a)(s-b)(s-c))^{1/2}$$
 where  $s = (a+b+c)/2$
- b) Write a C program to find the largest of three numbers using ternary operator.
- c) Write a C Program to swap two numbers without using a temporary variable.

**Exercise 2**

- a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.
- b) Write a C program to find the roots of a quadratic equation.
- c) Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, \*, /, % and use Switch Statement)

**Exercise 3**

- a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
- b) A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
- c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

**Exercise 4**

- a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
- b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
- c) Write a C Program to check whether the given number is Armstrong number or not.

**Exercise 5**

- a) Write a C program to interchange the largest and smallest numbers in the array.
- b) Write a C program to implement a liner search.
- c) Write a C program to implement binary search

**Exercise 6**

- a) Write a C program to implement sorting of an array of elements .
- b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them

**Exercise 7**

Write a C program that uses functions to perform the following operations:

- i. To insert a sub-string in to given main string from a given position.
- ii. To delete n Characters from a given position in a given string.
- iii. To replace a character of string either from beginning or ending or at a specified location

**Exercise 8**

Write a C program that uses functions to perform the following operations using Structure:

- i) Reading a complex number
- ii) Writing a complex number
- iii) Addition of two complex numbers
- iv) Multiplication of two complex numbers

**Exercise 9**

Write C Programs for the following string operations without using the built in functions

- to concatenate two strings
- to append a string to another string
- to compare two strings

**Exercise 10**

Write C Programs for the following string operations without using the built in functions

- to find t he length of a string

- to find whether a given string is palindrome or not

### **Exercise 11**

- a) Write a C functions to find both the largest and smallest number of an array of integers.
- b) Write C programs illustrating call by value and call by reference cncpts.

### **Exercise 12**

Write C programs that use both recursive and non-recursive functions for the following

- i) To find the factorial of a given integer.
- ii) To find the GCD (greatest common divisor) of two given integers.
- iii) To find Fibonacci sequence

### **Exercise 13**

- a) Write C Program to reverse a string using pointers
- b) Write a C Program to compare two arrays using pointers

### **Exercise 14**

- a) Write a C program consisting of Pointer based function to exchange value of two integers using passing by address.
- b) Write a C program to swap two numbers using pointers

### **Exercise 15**

Examples which explores the use of structures, union and other user defined variables

### **Exercise 16**

- a) Write a C program which copies one file to another.
- b) Write a C program to count the number of characters and number of lines in a file.
- c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

**ENGLISH –II**  
**(Common to All Branches)**

**DETAILED TEXT-II : Sure Outcomes: English for Engineers and Technologists Recommended Topics**

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1. **TECHNOLOGY WITH A HUMAN FACE**  
**OBJECTIVE:** To make the learner understand how modern life has been shaped by technology.  
**OUTCOME:** The proposed technology is people's technology. It serves the human person instead of making him the servant of machines.
  2. **CLIMATE CHANGE AND HUMAN STRATEGY**  
**OBJECTIVE:** To make the learner understand how the unequal heating of earth's surface by the Sun, an atmospheric circulation pattern is developed and maintained.  
**OUTCOME:** The learner's understand that climate must be preserved.
  3. **EMERGING TECHNOLOGIES**  
**OBJECTIVE:** To introduce the technologies of the 20<sup>th</sup> century and 21<sup>st</sup> centuries to the learners.  
**OUTCOME:** The learner will adopt the applications of modern technologies such as nanotechnology.
  4. **WATER- THE ELIXIR OF LIFE**  
**OBJECTIVE:** To inform the learner of the various advantages and characteristics of water.  
**OUTCOME:** The learners will understand that water is the elixir of life.
  5. **THE SECRET OF WORK**  
**OBJECTIVE: :** In this lesson, Swami Vivekananda highlights the importance of work for any development.  
**OUTCOME:** The students will learn to work hard with devotion and dedication.
  6. **WORK BRINGS SOLACE**  
**OBJECTIVE:** In this lesson Abdul Kalam highlights the advantage of work.  
**OUTCOME:** The students will understand the advantages of work. They will overcome their personal problems and address themselves to national and other problems.

**Text Book :** 'Sure Outcomes' by Orient Black Swan Pvt. Ltd. Publishers

**NON-DETAILED TEXT:**

**(From Modern Trailblazers of Orient Blackswan)**  
**(Common single Text book for two semesters)**  
**(Semester I (1 to 4 lessons)/ Semester II (5 to 8 lessons))**

5. **J.C. Bose**  
**OBJECTIVE:** To apprise of J.C.Bose's original contributions.  
**OUTCOME:** The learner will be inspired by Bose's achievements so that he may start his own original work.
6. **Homi Jehangir Bhabha**  
**OBJECTIVE:** To show Bhabha as the originator of nuclear experiments in India.  
**OUTCOME:** The learner will be inspired by Bhabha's achievements so as to make his own experiments.
7. **Vikram Sarabhai**  
**OBJECTIVE:** To inform the learner of the pioneering experiments conducted by Sarabhai in nuclear energy and relevance of space programmes.  
**OUTCOME:** The learner will realize that development is impossible without scientific research.
8. **A Shadow- R.K.Narayan**  
**OBJECTIVE:** To expose the reader to the pleasure of the humorous story  
**OUTCOME:** The learner will be in a position to appreciate the art of writing a short story and try his hand at it.

**Text Book :** 'Trail Blazers' by Orient Black Swan Pvt. Ltd. Publishers

## MATHEMATICS – II (MATHEMATICAL METHODS)

(Common to All Branches)

### UNIT I Solution of Algebraic and Transcendental Equations:

Introduction- Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method (One variable and Simultaneous Equations)

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

### UNIT II Interpolation:

Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unevenly spaced points - Lagrange's Interpolation formula

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

### UNIT III Numerical solution of Ordinary Differential equations:

Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 4 6

JNTUK External Evaluation A B E

### UNIT IV Fourier Series:

Introduction- Determination of Fourier coefficients – even and odd functions –change of interval– Half-range sine and cosine series

application: Amplitude, spectrum of a periodic function

Subject Category

ABET Learning Objectives a e d

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

### UNIT V Fourier Transforms:

Fourier integral theorem (only statement) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms

Subject Category

ABET Learning Objectives a d e k

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

### UNIT VI Z-transform:

Introduction– properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z transform- -Convolution theorem – Solution of difference equation by Z -transforms.

Subject Category

ABET Learning Objectives a b e k

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E



**BOOKS:**

1. **B.S. GREWAL**, Higher Engineering Mathematics, 42<sup>nd</sup> Edition, Khanna Publishers
2. **DEAN G. DUFFY**, Advanced Engineering Mathematics with MATLAB, CRC Press
3. **V.RAVINDRANATH and P. VIJAYALAXMI**, Mathematical Methods, Himalaya Publishing House
4. **ERWYN KREYSZIG**, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, Wiley-India

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks
Theory Design Analysis Algorithms Drawing Others	a) Apply knowledge of math, science, & engineering b) Design & conduct experiments, analyze & interpret data c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints d) Function on multidisciplinary teams e) Identify, formulate, & solve engineering problems f) Understand professional & ethical responsibilities g) Communicate effectively h) Understand impact of engineering solutions in global, economic, environmental, & societal context i) Recognize need for & be able to engage in lifelong learning j) Know contemporary issues k) Use techniques, skills, modern tools for engineering practices	1. Objective tests 2. Essay questions tests 3. Peer tutoring based 4. Simulation based 5. Design oriented 6. Problem based 7. Experiential (project based) based 8. Lab work or field work based 9. Presentation based 10. Case Studies based 11. Role-play based 12. Portfolio based	A. Questions should have: B. Definitions, Principle of operation or philosophy of concept. C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. D. Design oriented problems E. Trouble shooting type of questions F. Applications related questions G. Brain storming questions	