Chemistry Group (Sem-II)

COURSE WISE DETAILED CURRICULUM

24UG BSC-FY110 Engineering Chemistry

Lectures	:	3 Hrs/Week	**Evaluation Scheme**	
Credit	:	3	**ISE** :	40 Marks
			ESE :	60 Marks

Course Objectives: The objective of the course is to
1) Develop an interest among the students regarding applied and engineering chemistry.
2) Study the different water quality parameters and its applications in engineering field.
3) Apply the instrumental methods for analysis of different chemical substances.
4) Analyze characteristics of fuels and use proper material for engineering application.
5) Apply the appropriate method to prevent corrosion.
6) Understand basic concepts of phase.

Course Outcomes:

COs	At the end of successful completion of the course, the student will beable to
CO1	**Use** relevant water treatment process to solve industrial problems.
CO2	**Illustrate** the analytical instrumental techniques for chemical analysis.
CO3	**Select** relevant engineering materials for applications.
CO4	**Select** proper fuels for domestic and industrial use.
CO5	**Use** corrosion preventive measures in domestic and industrial application.
CO6	**Explain** phase and chemical equilibrium.

Description:
This course aims to impart fundamental knowledge of instrumental methods, engineering materials (composite, polymer), phase rule and applied knowledge of water purification methods, fuel and prevention techniques of corrosion, this will help the students to select and use relevant materials and methods which will be economical and eco-friendly.

Prerequisites:	1:	Students should have knowledge about basic chemistry related to periodic table, chemical bonding, metals and nonmetals.
	2:	Basic concepts of reaction mechanism and state of matter.
	3:	Basic concepts of fuel and corrosion.

Section – I		
Unit 1	**Water**	
	Introduction, Impurities in natural water, Water quality parameters, Hardness of water, Types of hardness, Units of hardness. Ill effects of hard water in steam generation in boilers – Sludge & Scale formation. Numerical on hardness, treatment of hard water - ion exchange and reverse osmosis.	**07 Hrs**
Unit 2	**Instrumental methods of chemical analysis**	
	Introduction of instrumental methods, Spectrometry: Introduction, Laws of spectrometry – Lamberts law and Beer–Lambert's law, Single beam spectrophotometer – schematic, working and applications. Chromatography: Introduction, types, gas – Liquid Chromatography (GLC) – basic principle, instrumentation and applications. Advantages and disadvantages of instrumental methods.	**06 Hrs**
Unit 3	**Engineering materials**	
	Macromolecules: Polymers: Introduction, Polymerization reactions – Addition and condensation polymerization, Plastics – industrially important plastics Poly vinyl chloride, Phenol formaldehyde, Urea formaldehyde & Epoxy resin, Conducting polymers Composite materials Introduction, Composition, Properties and Uses of Fiber reinforced plastics (FRP) and Glass reinforced plastic(GRP)	**07 Hrs**
Section – II		
Unit 4	**Fuels**	
	Introduction, Definition, Classification, Properties of fuels. Characteristics of good fuels, Comparison between solid, liquid and gaseous fuels, Calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numerical on Bomb and Boy's calorimeter Fuel Cells: Definition, Classification of fuel cells, Working of Solid oxide fuelcell (SOFC), Limitations and applications of fuel cells.	**07 Hrs**
Unit 5	**Corrosion and it's Prevention**	
	Introduction, Causes, Classification, Factors affecting rate of corrosion, Corrosion prevention methods – Proper design and material selection, Cathodic protection, Protective coatings – Metallic coatings such as Hot dipping – Galvanizing and Tinning , Electroplating , Metal Spraying.	**07 Hrs**

	Chemical Equilibrium	
Unit 6	Introduction, Heterogeneous equilibrium, Mathematical statement of phase Rule, Terminology, Phase diagram, One component system example – Water system. Two component system example – lead - silver, Applications and Limitations of phase rule.	**05 Hrs**

References:

Text Books
1	Textbook of Engineering Chemistry by S.S. Dara and S.S.Umare, S. Chand and Company Lit., New Delhi
2	Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co.(Pvt.) Lit,Delhi
3	Textbook of Engineering Chemistry by Dr. Mrs. Jayshree Parikh , Tech-Max Publication Pune.
Reference Books
1	Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Company Ltd., New Delhi.
2	A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications, Hyderabad
3	Instrumental Methods of Chemical Analysis by Chatwaland Anand, Himalaya Publishing House, New Delhi
4	Engineering Chemistry by Renu Bapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.
5	Engineering Chemistry by Dr. A. K. Pahari and Dr. B. S. Chauhan, Laxmi Publications (P) Ltd, New Delhi.

Web Links/ Video Lectures

Sr. No	Unit No.	Web Links/ Video Lectures
1	1	https://www.researchgate.net/publication/343294128_Water_Quality_Parameters https://nptel.ac.in/courses/105104102
2	2	https://archive.nptel.ac.in/courses/102/107/102107028/
3	3	https://onlinelibrary.wiley.com/journal/2365709X https://nptel.ac.in/courses/113/105/113105057/
4	4	https://www.energy.gov/eere/fuelcells/types-fuel-cells http://www.nptelvideos.in/2012/11/engineering-chemistry-1.html
5	5	https://www.electrochem.org/corrosion-science/ https://nptel.ac.in/courses/113/108/113108051/
6	6	https://www.britannica.com/science/phase-rule https://nptel.ac.in/courses/113/104/113104068/ http://www.nitttrc.edu.in/nptel/courses/video/112104248/L17.html

24UG BSC-FY201 Engineering Mathematics-II

Lectures **:** 3 Hrs/Week

Evaluation Scheme

ISE **:** 40 Marks

ESE **:** 60 Marks

Course Objectives: The objective of the course is to
1) Model a real life scenario into differential equations and solve them analytically and numerically 2) Learn different methods of solving improper and multiple integral

Course Outcomes:	
COs	**At the end of successful completion of the course, the student will be able to**
CO1	**Solve** ordinary differential equations of order one and degree one .
CO2	**Apply** numerical methods to solve ordinary differential equations of first order and first degree.
CO3	**Evaluate** double and triple integrals.
CO4	**Use** double integration to find area , mass of plane lamina.
CO5	**Evaluate** definite integrals using Gamma and Beta functions
CO6	**Estimate** definite integrals using numerical methods

Description:		
Engineering Mathematics-II course is offered as the basic science course. This course contains Mathematical methods and techniques that are typically used in engineering to solve complex engineering problems. This course has six units namely i) Differential equation of first order first degree and Applications, ii)Numerical Solution of Differential Equation of order one degree One, iii)Integral Calculus, iv) Numerical Integration, v) Multiple Integrations and vi) Application of Multiple Integrals		
Prerequisites:	1:	Trigonometric identities and Logarithmic identities
	2:	Differentiation and integration formulae
	3:	Shapes of basic curves like circle, parabola, ellipse, straight line.
Section – I		
Unit 1	**Differential equation of first order first degree and Applications**	
	Exact Differential Equation, Reducible to Exact Differential Equation, Linear Differential Equation, Reducible to Linear,	**8 Hrs**
	Application to orthogonal trajectory (Cartesian and Polar)	

		Numerical Solution of Differential Equation of order one degree One	
Unit 2		Eulers Method Eulers modified Method Runge-Kutta Method of order four Taylor Series Method	**7 Hrs**
Unit 3		**Multiple Integrations**	
		Evaluation of double integral (Cartesian and Polar) Change of order of integration (Cartesian and polar) Evaluation of triple integration Change of Cartesian to spherical coordinates	**8 Hrs**
Section – II			
Unit 4		**Application of Multiple Integrals**	
		Area using double integration Mass of plane lamina using double integration Moment of inertia of plane lamina Volume using triple integration	**6 Hrs**
Unit 5		**Integral Calculus**	
		Gamma Function and properties Beta function and properties Differentiation Under Integral Sign (with constant limits only)	**7 Hrs**
Unit 6		**Numerical Integration**	
		Trapezoidal Rule Simpson's (1/3) rule Simpson's (3/8) rule Weddle's rule	**6 Hrs**

Note-Minimum 06 Assignments should be given covering all units

TextBooks	
1	Higher Engineering Mathematics, Dr. B. S. Grewal, S. Chand and Company, 40th Edition.

ReferenceBooks	
1	Advanced Engineering Mathematics", H. K. Das, S. Chand Publication, 8th Edition.
2	A Text Book of Applied Mathematics",Vol. I and II, P. N.Wartikar and J. N. Wartikar, Vidyarthi GrihaPrakashan, Pune.
3	A textbook of Engineering Mathematics, N. P. Bali, Iyengar, Laxmi Publications (P) Ltd, New Delhi
4	Advanced Engineering Mathematics,ErwinKreyszig, Wiley India Pvt. Ltd

Web Links/ Video Lectures

Sr. No	Unit No.	Web Links/ Video Lectures

1	1	**https://nptel.ac.in/courses/111/106/111106100/**
2	2	https://nptel.ac.in/courses/111/107/111107063/
3	3,4,5	https://nptel.ac.in/courses/111/105/111105122/
4	6	**https://youtu.be/_cgzqVmvqtQ**

24UG PCC-FY111 Computer Programming in C

Lectures : 2 Hrs/Week   **Evaluation Scheme**

               ISE **:** 40 Marks

               ESE **:** 60 Marks

Course Objectives: The objective of the course is to

1) Understand the basics of problem solving techniques
2) Provide an insight into structured programming constructs in C
3) Give details of modular programming

Course Outcomes:

COs	At the end of successful completion of the course
CO1	**Define** algorithm, flowchart and implementing programs in C-languages.
CO2	**Select** appropriate operators in programming expressions for implementing simple C-Programs.
CO3	**Explain** Decision Making and Branching statements for implementing Programs.
CO4	**Illustrate** appropriate looping statements for implementing Programs.
CO5	**Develop C** programming language for applications of 1-D and 2-D Arrays.
CO6	**Make use of** modular programming using functions in C-Language.

Description:
This Course is designed to build programming skills in First year B.Tech students. The programming skills will be helpful to all branches of Engineering.

Prerequisites:	1:	Basic knowledge of Computers.
	2:	Computational Mathematics.

	Section – I	
	Basics of C programming	
Unit 1	Basics of programming: Program development steps, Algorithms / Pseudo code, flowchart, History and Importance of C, Structure of C- Program, A sample C programs, Keyword and Identifier, Basic data types and sizes, Constants, variables.	**04 Hrs**

	Operators and Expressions in C	
Unit 2	Introduction, Arithmetic Operators, Relation Operator, Logical Operator. Assignment Operators, Increment and Decrement Operators, Conditional Operator, Bitwise Operators, Special Operators, Arithmetic Expressions, Evaluation of Expressions, Precedence of Arithmetic Operators, Some Computational Problems.	**04 Hrs**
	Decision Making and Branching Statements	
Unit 3	Decision Making and Branching : Introduction, Decision Making with IF Statement, Simple if Statement , if..else Statement, Nested if....else Statements, else...if Ladder, Switch statement, The ?: Operator, The goto statement. Example programs	**04 Hrs**
	Section – II	
	Decision Making and Looping	
Unit 4	Introduction, while statement, do-while statement, for statement:Simple for loop,Additional feature of for loop, Nesting of for loop, jumps in loops, break and continue. Example programs	**04 Hrs**
	Arrays	
Unit 5	Introduction, Definitions of Array, Assigning and Entering value to an array, Accessing array elements/ Read data from an Array, Array Elements in Memory, 1-Dimensional, 2-Dimensional, Programs on Array operations, basic operations on matrices.	**04 Hrs**
	User Defined Function	
Unit 6	Introduction, Need for User-defined functions, A multifunction progam/Moduler program, Prototype of Funtion/Function Declaration , Definition/Implementation of Functions, Return Values and their types, Function Calls,Category of function, Function Arguments:Call by Value. Example programs..	**04 Hrs**

References:

Text Books	
1	C the Complete Reference by Herbert Schild (Tata McGraw Hill) 4th Edition.
2	The C Programming Language- Brian W. Kernighan, Dennis Ritchie 2nd Edition.
Reference Books	
1	E. Balaguruswamy, "Programming in ANSI C", Tata McGraw Hill, 5th edition,2010.
2	Let Us C By Yashavant P. Kanetkar, 5th Edition.

Web Links/ Video Lectures

Sr. No	Unit No.	Web Links/ Video Lectures
1.	01,02,03,04, 05 and 06	https://www.w3resource.co/ https://www.includehelp.com/c/ https://www.javatpoint.com/

24UG ESC-FY112 Engineering Mechanics

Lectures	:	2 Hrs/Week	**Evaluation Scheme**		
Credit	:	2	ISE	:	40 Marks
			ESE	:	60 Marks

Course Objectives: The objective of the course is to
1) Understand and visualize the various force systems on static bodies.   2) Study the concept of equilibrium and its imaginary existence.   3) Evaluate geometric properties of plain laminae.   4) Understand impact of rigid bodies.
Course Outcomes:

COs	At the end of successful completion of the course, the student willbe able to
CO1	**Solve** the resultant force and moment for a given system of forces.
CO2	**Determine** the support reactions for a given system of forces.
CO3	**Calculate** the support reactions for a given beams.
CO4	**Determine** the centroid of the different cross sections in civil and mechanicalengineering.
CO5	**Determine** the second moment of area of the different cross sections.
CO6	**Understand** impact properties of material.

Description:
This course is designed to provide basic understanding about the different types of forces, moments and their effects on structural elements, which will analyze different structural systems. Students should get enough knowledge about equilibrium condition, in which entire stability depends.

Prerequisites:	1	Learners should know secondary school mathematics
	2	Learners should know the "Mechanics" section from Physics.

Section – I		
Unit 1	**Fundamentals of Statics** Basic Concepts and Fundamental Laws, Force, System of Forces, Resultant, Equilibrant, Resolution and Composition of Forces, Moment and Couple,	**5**

	Varignon's Theorem, Law of Moments.		
Unit 2	**Equilibrium of Forces**		
	Basic concept of equilibrium, Equilibrium conditions, Lamis' Theorem, Free Body Diagram, Equilibrium of spheres.	**5**	
Unit 3	**Equilibrium of Beams**		
	Types of Loads, Types of supports, Analysis of Simple beams, Support reactions.	**4**	
Section – II			
Unit 4	**Centroid**		
	Centroid and Center of Gravity, Centroid of Standard shapes, centroid of given diagram	**5**	
Unit 5	**Moment of Inertia**		
	Moment of Inertia of Standard shapes from first principle, Parallel and perpendicular axis theorem, Moment of Inertia of plain and composite figures, Radius of Gyration.	**5**	
Unit 6	**Impact and Collision of elastic bodies**		
	Impact, Types of Impact, Law of conservation of Momentum, Coefficient of Restitution, Numerical on Direct central Impact and Impact on fixed plane.	**4**	

References:

Text Books	
1	Engineering Mechanics by R. S. Khurmi, S. Chand Publications.
2	Engineering Mechanics by R. K. Bansal and Sanjay Bansal
3	Engineering Mechanics by S. S. Bhavikatti, New Age International Pvt. Ltd
4	Engineering Mechanics by D.P.Sharma, Pearson Education
Reference Books	
1	Engineering Mechanics by Manoj K Harbola, Cengage Learning
2	Vector Mechanics for Engineers Vol.I and II by F. P. Beer and E. R. Johnston, Tata Mc -Graw Hill
3	Engineering Mechanics by K. I. Kumar, Tata Mc -Graw Hill Publication

4	Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.
5	Fundamentals of Engineering Mechanics by S. Rajasekaran, G. Sankarasubramanian, Vikas Publishing House.

Web Links/ Video Lectures

Sr. No	Unit No.	Web Links/ Video Lectures
1	1	https://www.youtube.com/watch?v=nGfVTNfNwnk
2	2	https://www.youtube.com/watch?v=nkg7VNW9UCc
3	3	https://www.youtube.com/watch?v=6u_rjLjv-MY
4	4	https://www.youtube.com/watch?v=Fudcc0JoXdo
5	5	https://www.youtube.com/watch?v=ljDIIMvx-eg
6	6	https://www.youtube.com/watch?v=aiT5mcuXf5Y

24UG ESC-FY113 BASIC MECHANICAL ENGINEERING

Lectures : 2 Hrs/Week

Evaluation Scheme

  ISE : 40 Marks

  ESE : 60 Marks

Course Objectives: The objective of the course is to
1) Acquire basic knowledge of mechanical engineering
2) Impart knowledge of basic concepts of thermodynamics applied to industrial application
3) Understand principle of energy conversion system and power plants
4) Understand and identify power transmission devices with their functions

Course Outcomes:

COs	At the end of successful completion of the course, the student will be able to
CO1	**Describe** the basic concepts of thermodynamics and solve SFEE problems.
CO2	**Demonstrate** working of IC Engine.
CO3	**Explain** working of VCRS and VARS
CO4	**Explain** the principles, construction and working of various power plants.
CO5	**Summarize** the working of energy converting and power transmission devices.
CO6	**Illustrate** the basic manufacturing processes.

Description:

Basic Mechanical Engineering course is offered as the basic science course. This course describes the scope of mechanical engineering in multidisciplinary industries and important phenomenon to run the world. This course describes the applications of Mechanical Engineering in many relative fields.

Prerequisites:	1:	Mathematics
	2:	Basics of Thermodynamics
	3:	Basics of energy sources

	Section – I	
	Thermodynamics	
Unit 1	Thermodynamic State, Process, Cycle, Thermodynamic System, Heat, work, Internal Energy, First Law of Thermodynamics, Application of First Law to steady Flow processes(Numerical Treatment), Limitations of First Law, PMM	**0 5 Hrs**
	Introduction to I C Engine	
Unit 2	Classification of IC engines, Construction and Working of S.I. and C.I. engines Two strokes and Four Stroke engines.	**04 Hrs**
	Introduction to Refrigeration and Air Conditioning	
Unit 3	Applications of Refrigeration & air conditioning Refrigerant types and Properties, Vapour compression system, vapour absorption system, Window Air Conditioning. (Descriptive Treatment only).	**04 Hrs**
	Section – II	
	Energy Sources and power plants	
Unit 4	Renewable and nonrenewable, Photovoltaic cell Wind Power plant, Hydropower plant, Steam Power plant , Bio-gas, Bio-Diesel (Descriptive Treatment only).	**04 Hrs**
	Mechanical Power Transmission and Energy conversion devices	
Unit 5	Type of Belt and belt drives (Descriptive Treatment only), chain drive, Types of gears and gear Trains, Construction, working and applications of centrifugal Pump	**04 Hrs**
	Manufacturing Processes	
Unit 6	Introduction to manufacturing processes – Casting Process, Steps involved in casting processes, and their applications, Metal removing processes (Lathe, milling & drilling operations) Metal Joining Processes – Arc welding, soldering and brazing and their applications.	**0 5 Hrs**

References:

Text Books	
1	Thermal Engineering by R.K. Rajput, Laxmi Publication, Delhi, ISBN-13-978-8131808047, 9 th edition.
2	Engineering Thermodynamics by R.Joel, The English Language Book Society
3	Elements of Heat Engine Vol.I,II,III by Patel and Karamchandani, Acharya Book Depot.
Reference Books	
1	Solar Energy by Dr.S.P. Sukathame,Tata Mc-Graw Hill Publication,4th edition.
2	Power Plant Engineering by Arora and Domkunwar, Dhanpat Rai and Sons
3	Elements of Workshop Technology, Vol.I and II by Hajara Choudhari, Media Promoters

Web Links/ Video Lectures

Sr. No	Unit No.	Web Links/ Video Lectures
1	1	**https://nptel.ac.in/courses/112/105/112105123/**
2	2	**https://nptel.ac.in/courses/112/103/112103262/**
3	3	**https://nptel.ac.in/courses/112/107/112107208/**
4	4	**https://nptel.ac.in/courses/121/106/121106014/**
5	5	**https://nptel.ac.in/courses/112/105/112105234/**
6	6	**https://nptel.ac.in/courses/112/107/112107219/**

24UG HSSM-FY114IndianKnowledgeSystem(IKS)

Lectures	**:**	1Hrs/Week	**EvaluationScheme**	
Credit	**:**	1	**ISA**	**:** 30Marks
			Report	**:** 20Marks

Course Objectives: The objective of the course is to

- To make students conscious about the Traditional knowledge and its importance
- To inculcate the importance of protecting traditional knowledge and kind so taditional knowledge
- To furnish information about the various sectors in traditional knowledge and protection of IKS
- To kind them the Significance of historical places in the vicinity
- To make them aware of the importance and benefits andYoga and Meditation

CourseOutcomes:

Cos	At the end of successful completion of the course the students will be able to
CO1	**Know** the concept of Traditional knowledge and its importance.
CO2	**Use** the traditional knowledge in different sectors and perform yoga and meditation for balanced life style.
CO3	**Understand** the concept of intellectual property to protect the traditional knowledge.
CO4	**Know** the need and importance of proctecting traditional knowledge.

Description:

To facilitate the students with the concepts of Indian traditional knowledge and to make them understandthe Importance of roots of knowledge system. Indian Knowledge Systems (IKS) is an innovative cellunder Ministry of Education (MoE) at AICTE, New Delhi. It is established to promote interdisciplinaryresearchonallaspectsofIKS,preserveanddisseminateIKSforfurtherresearchandsocietalapplications.Itwillactivelyengageforspreadingtherichhheritageofourcountryandtraditionalknowledgeinthefieldof Artsandliterature,Agriculture,BasicSciences,Engineering&Technology, Architecture,Management,Economics,etc

	IntroductiontoTraditionalKnowledge	
Unit 1	- DefineTraditionalKnowledge(TK), - Natureandcharacteristics, - Scopeandimportance,Typesoftraditionalknowledge, - TraditionalknowledgeVswesternknowledge	**03 Hrs**

	TraditionalKnowledgeinDifferentSectors	
Unit 2	• TraditionalknowledgeinagriculturalSector • Needofmeditation and itsbenefits inbehavior pruning • NeedandImportanceof Yogaineducationalsector •	**03 Hrs**
	TraditionalKnowledgeandIntellectualProperty	
Unit 3	• Systemsoftraditionalknowledgeprotection, • Legalconceptsfortheprotectionoftraditionalknowledge, • HistoryanddevelopmentofWaranaindustrialandeducational complex	**03 Hrs**
	ProtectionofTraditionalKnowledge	
Unit 4	• Theneedforprotectingtraditionalknowledge • SignificanceofTKProtection • RoleofGovernmenttoharnessTK • Significanceandprotectionofhistoricalplacesinthevicinityof TKIET,Warana	**03 Hrs**

Note: Course evaluation include an In –Semester Assessment (ISA) 30 marks consisting (not limited to) Attendance, Quizzes, Declared tests, Surprise tests, Group Discussionand Assignmentsetc; and 20 marks for report writing in group/Individual.

References:

RecommendedBooks:
TextBooks:
1) TraditionalKnowledgeSysteminIndia,byAmitJha,2009.
2) *TraditionalKnowledgeSystemandTechnologyinIndiabyBasantaKumarMohantaandVipin KumarSingh, PratibhaPrakashan 2012..*
References:
1) *TraditionalKnowledgeSysteminIndiabyAmitJhaAtlanticpublishers,2002*
2) *"KnowledgeTraditionsandPracticesofIndia"KapilKapoor,MichelDanino*
E-resources:
1) *https://www.youtube.com/watch?v=LZP1StpYEPM*
2) *http://nptel.ac.in/courses/121106003/*

24UG HSSM-FY202 Employability Enhancement Skills (Sem - II)

Credit	**:** 01		**ISE**	**:** 50 Marks
			ESE	**:** NA

Course Objectives: The objective of the course is to
- To make students conscious about Recruitment procedure and ethics at workplace   - To inculcate the importance of Behavioral Skills in day to day communication   - To enhance the writing skills with technical report writing practice   - To prepare students to deliver speeches of various types / occasions

Course Outcomes:	
COs	**At the end of successful completion of the course, the student will beable to**
CO1	**Understand** the procedure of recruitment drive
CO2	**Use** interpersonal skills with precision and competence in different scenario
CO3	**Prepare** technical reports for professional purposes
CO4	**Articulate** prepared speeches to express ideas, thoughts and emotions

Description:
Employment Enhancement Skills course has correlation with the Sem- I course Communication Skills. After learning the basics of language in the first semester, this course concentrates on the personality development, interpersonal skills and expectation from an industry Hence the included models in the syllabus has the direct co-relation with employability of the students. This course would definitely boost personality and interpersonal skills of the learners.

Prerequisites:	1:	Basic knowledge about English Vocabulary
	2:	Communication in simple English

	Recruitment and Career Skills	
Unit 1	- Importance of Planning and Managing Career - Job Application and Resume/CV/Bio data - Group Discussion - Mock Personal Interview - Corporate Etiquettes & Manners	**03 Hrs**
Unit 2	**Behavioral Skills**	

	• Understanding Self: Self Esteem • Personality Types and Traits • Time Management & Stress Management • Positive Attitude Building • Emotional Intelligence	**05 Hrs**
Unit 3	**Technical Writing Skills**	
	• Importance and Objectives of Technical Writing • Structure and Types of Reports (Investigation and Accident Report) • Corporate Email Writing: Dos & Don'ts	**04 Hrs**
Unit 4	**Developing Presentation Skills**	
	• Techniques of Public Speaking • Speeches for Various Occasions: • Welcome Speech, Introduction of a Guest, Vote of Thanks	**02 Hrs**

References:

	Recommended Books:
1)	*Communication Skills for Engineers by S. Mishra & C. Muralikrishna (Pearson)*
2)	*Communication Skills by Meenakshi Raman and Sangeeta Sharma, Oxford University* *Press 2016 1st Edition*
3)	*Lesikar, R. V. and Pettit, J. ,D. Basic Business Communication, McGraw-Hill International Edition, Singapore 10th Edition, 2006*
4)	*Managing Soft Skills for Personality Development* by B.N. Ghosh, Tata McGraw Hill, 2012.
5)	*Bikram K. Das, KalyaniSamantray, "An Introduction to Professional English and Soft* *Skills" Cambridge University Press New Delhi.*
6)	*Comfort, Jeremy, et al. (2011) Speaking Effectively: Developing Speaking Skills for Business English. Cambridge: Cambridge University Press. (Reprint)*
7)	*Sharma, R. C. and Krishna Mohan,Basic Correspondence and Report Writing: A Practical Approach to Business and Technical Communication, Tata McGraw-Hill Publishing Company Limited, India ,5th Edition, 2017*
8)	*Business Correspondence & Report-writing by R.C.Sharma&KrishnaMohan,Tata McGraw-Hill Education*
9)	*Dr. Abha Singh, "Behavioural Science" Wiley India Pvt.Ltd*
10)	*Soft Skills by K. Alex, S. Chand and Company, 2013*
	www.buisnesscommunicationskills.com, www.kcitraing.com, www.mindtools.com

24UG BSC-FY 110LP- ENGINEERING CHEMISTRY Lab

Tutorial/Practical **:** 2 hr/week   **Evaluation Scheme**

Credit **:** 1   **ISA** **:** 25 Marks

                                             POE **:** NA

COs	At the end of successful completion of the course, the student will beable to
CO1	**Use** relevant water treatment process to solve industrial problems.
CO2	**Illustrate** the analytical instrumental techniques for chemical analysis.
CO3	**Select** relevant engineering materials for applications.
CO4	**Select** proper fuels for domestic and industrial use.
CO5	**Use** corrosion preventive measures in domestic and industrial application.
CO6	**Explain** phase and chemical equilibrium.

Description:

This course aims to impart fundamental knowledge of instrumental methods, engineering materials (composite, polymer), phase rule and applied knowledge of water purification methods, fuel and prevention techniques of corrosion, this will help the students to select and use relevant materials and methods which will be economical and eco-friendly.

Prerequisites:	1:	Students should have knowledge about basic chemistry related to periodic table, chemical bonding, metals and nonmetals.
	2:	Basic concepts of reaction mechanism and state of matter.
	3:	Basic concepts of fuel and corrosion.

Number	Practical/ Experiment/Tutorial Topic	Hrs.
1	Determination of acidity of water	2
2	Determination of total alkalinity of water sample.	2
3	Determination of chloride content of water by Mohr's method.	2
4	Determination of temporary and permanent hardness of water sample by EDTA method.	2

5	Determination of moisture content in a given coal sample by proximate analysis	2
6	Determination of volatile content in a given coal sample by proximate analysis	2
7	Determination of ash content in a given coal sample by proximate analysis	2
8	Preparation of urea-formaldehyde resin	2
9	Preparation of phenol-formaldehyde resin	2
10	Determination of percentage of copper in brass by iodometry.	2
11	Estimation of zinc in brass solution	2
12	Determination of rate of corrosion of aluminium by weight loss method in acidic and basic medium	2
13	Determination of amount of copper present in unknown sample by colorimeter	2
14	Demonstration of paper chromatography	2

Suggested list of practicals is given in the above table. Students need to perform minimum 10 practicals to fulfill the ISA evaluation.

References:

	Text Books
1	Textbook of Engineering Chemistry by S.S. Dara and S.S.Umare, S. Chand and Company Lit., New Delhi
2	Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co.(Pvt.) Lit,Delhi
3	Textbook of Engineering Chemistry by Dr. Mrs. Jayshree Parikh , Tech-Max Publication Pune.
	Reference Books
1	Engineering Chemistry by Jain and Jain, Dhanpat Rai Publishing Company Ltd., New Delhi.
2	A Textbook of Engineering Chemistry by C. P. Murthy, C. V. Agarwal and A. Naidu, BS Publications, Hyderabad
3	Instrumental Methods of Chemical Analysis by Chatwaland Anand, Himalaya Publishing House, New Delhi
4	Engineering Chemistry by Renu Bapna and Renu Gupta, MacMillan Publishers (India) Ltd, Delhi.
5	Engineering Chemistry by Dr. A. K. Pahari and Dr. B. S. Chauhan, Laxmi Publications (P) Ltd, New Delhi.

VLab Link:

1) **Experiment name-** Determination of Viscosity (**Lab Name-** Viscosity virtual lab)
   http://vlab.amrita.edu/?sub=2&brch=190&sim=339&cnt=1

2) **Experiment name-**Water Analysis-Physical Parameter (**Lab Name-**Inorganic Chemistry virtual lab) http://vlab.amrita.edu/?sub=2&brch=193&sim=575&cnt=1

3) **Experiment name-**Water Analysis-Chemical Parameter(**Lab Name-** Inorganic Chemistry virtual lab) http://vlab.amrita.edu/?sub=2&brch=193&sim=1548&cnt=1

4) **Experiment name-** Acid Base Titration (**Lab Name-** Inorganic Chemistry virtual lab)
   http://vlab.amrita.edu/?sub=2&brch=193&sim=352&cnt=1

5) **Experiment name-** Soil Analysis (**Lab Name-** Inorganic Chemistry virtual lab)
   http://vlab.amrita.edu/?sub=2&brch=193&sim=1549&cnt=1

6) **Experiment name-** Alloy Analysis (Brass) (**Lab Name –** Inorganic Chemistry virtual lab)
   http://vlab.amrita.edu/?sub=2&brch=193&sim=1255&cnt=1

7) **Experiment name –** Spectrophotometry (Physical Chemistry virtual lab)
   http://vlab.amrita.edu/?sub=2&brch=190&sim=338&cnt=1

				Evaluation Scheme	
Tutorial/Practical	**:**	1 hr/week			
Credit	**:**	1		**ISA**	**:** 25 Marks
				POE	**:** NA

Course Objectives: The objective of the course is to
. Model a real life scenario into differential equations and solve them analytically and numerically
. Learn different methods of solving improper and multiple integral.

Course Outcomes:	
COs	**At the end of successful completion of the course, the student will be able to**
CO1	**Solve** linear and nonlinear ordinary differential equations of order one and find orthogonal trajectory.
CO2	**Find** numerical solutions of ordinary differential equations of first order and first degree.
CO3	**Compute** double and triple integrals.
CO4	**Find** area , mass of plane lamina using double integral.
CO5	**Evaluate** definite integrals using Gamma and Beta functions.
CO6	**Solve** definite integral numerically.

Description:		
Engineering Mathematics-II course is offered as the basic science course. This course contains Mathematical methods and techniques that are typically used in engineering to solve complex engineering problems. This course has six units namely i) Differential equation of first order first degree andApplications,ii)NumericalSolutionofDifferentialEquationoforderonedegreeOne,iii)Integral Calculus, iv) Numerical Integration, v) Multiple Integrations and vi) Application of Multiple Integrals		
Prerequisites:	1:	Trigonometric identities and Logarithmic identities
	2:	Differentiation and integration formulae
	3:	Shapes of basic curves like circle, parabola, ellipse, straight line.

Tutorials

Number	Practical/Experiment/TutorialTopic	Hrs.
1	Exact and reducible exact differential equation	2
2	Linear, reducible to linear diff equation and Applications	2
3	Evaluation of double and triple integration	2
4	Change of order of integration	2
5	Area by double integral, Mass of Lamina	2
6	Gamma function and Differentiation under integral sign	2
7	Beta functions and properties	2
8	Euler and Eulers modified method	2
9	Taylor series and Runge Kutta of order four	2
10	Trapezoidal and Simpson (1/3) rule Simpsons (3/8)th andWeddles rule	2

References:

TextBooks	
1	Higher Engineering Mathematics, Dr. B. S. Grewal, S. Chand and Company, 40th Edition.
ReferenceBooks	
1	Advanced Engineering Mathematics", H. K. Das, S. Chand Publication, 8th Edition.
2	A Text Book of Applied Mathematics",Vol. I and II, P. N.Wartikar and J. N. Wartikar, Vidyarthi GrihaPrakashan, Pune.
3	A textbook of Engineering Mathematics, N. P. Bali, Iyengar, Laxmi Publications (P) Ltd, New Delhi
4	Advanced Engineering Mathematics,ErwinKreyszig, Wiley India Pvt. Ltd

24UG PCC-FY111LP Computer Programming in C Lab

Tutorial/Practical : 2 hr/week   **Evaluation Scheme**

Credit   **:** 1   **ISA :** 25 Marks

COs	At the end of successful completion of the course, the student will beable to
CO1	**Define** algorithm , flowchart and implementing programs in C language.
CO2	**Select** appropriate operators in programming expressions for implementing simple C programs.
CO3	**Explain** decision making and branching statements for implementing programs.
CO4	**Illustrate** appropriate looping statements for implementing programs.
CO5	**Develop C** programming language for applications of 1-D and 2-D arrays.
CO6	**Make use of** modular programming using functions in C language

Description:
This Course is designed to build programming skills in First year B.Tech students. The programming skills will be helpful to all branches of Engineering. The student will learn basic programming concepts from declaring a variable, conditional statements, looping to the concepts of arrays.

Prerequisites:	1:	Basic knowledge of Computers.
	2:	Computational Mathematics.

Tutorials

Number	Practical/ Experiment/Tutorial Topic	Hrs.
1	Write a Program to Demonstrate how to read anddisplay the value in all Basic data type variables. Example:	2

	WAP to display the details of the Student Like: 1. Roll_No of Student 2. Division of Student 3. Height and Weight of Student.	
2	Write a C Program to demonstrate the working of Arithmetic operations using arithmetic operators in C.	2
3	Write a C Program to do the following using relationaloperators and branching statement: a. Read two integers and check they are equalor not. b. Print the greatest of Two numbers.	2
4	Write a Program to enter student marks through keyboard andfind grade using the conditional operator. grades are 1. Honor- 90 above 2. Distinction-80 to 89 3. Grade A+ - 70 to 79 4. Grade A - 60 to 69 5. Grade B - 50 to 59 6. Pass Grade - 40 to 49 7. Fail - Below 40	2
5	Write a C Program to demonstrate Switch Statement and Constant Variable by finding the area of Circle, Rectangle,Square and Triangle considers each as a different case.	2
6	Write a C Program to demonstrate looping statements. a. Find the Factorial by given a number. b. Count total number of digits for a given integer number. c. Find the Sum of Digits in a given number. d. Reverse the given integer number and display the sameon the output screen.	2
7	Write a C program to read N numbers in an integer array and print it in reverse order.	2
8	Write a C program to read N numbers in an array and displaythe sum of array elements.	2
9	Write a program to read two matrices and store the addition of two matrices in the third matrix.	2
10	Write a C Program to swap two numbers using call by value.	2

References:

Text Books	
1	C the Complete Reference by Herbert Schild (Tata McGraw Hill) 4th Edition.
2	The C Programming Language- Brian W. Kernighan, Dennis Ritchie 2nd Edition.
Reference Books	
1	E. Balaguruswamy, "Programming in ANSI C", Tata McGraw Hill, 5th edition,2010.
2	Let Us C By Yashavant P. Kanetkar, 5th Edition.

Web Links Practicals

1. **http://cse02-iiith.vlabs.ac.in/**

2. **https://codeforwin.org/category/c-programming**

3. **https://www.w3resource.co/**

24UG ESC-FY112LP - ENGINEERING MECHANICS Lab

Tutorial/Practical	**:**	2 hr/week	**Evaluation Scheme**	
Credit	**:**	1	**ISA** **:** 25 Marks	
			POE **:** NA	

Course Objectives: The objective of the course is to

1) Understand the vector mechanics.
2) Visualize concept of equilibrium and its imaginary existence.
3) Apply equilibrium conditions for various cases.
4) Find support reactions of beams

Course Outcomes:

COs	At the end of successful completion of the course, the student will be able to
CO1	**Determine** the resultant of concurrent coplanar force system graphically.
CO2	**Analyze** the force the given force system.
CO3	**Verify** the law of moment of given force system.
CO4	**Determine** the support reactions of the given beam.

Description:

This course is designed to provide basic understanding about the different types of forces, moments and their effects on structural elements, which will analyze different structural systems. Students should get enough knowledge about equilibrium condition, in which entire stability depends.

Prerequisites:	1	Learners should know secondary school mathematics
	2	Learners should know the "Mechanics" section from Physics.

Practical

Number	Practical/ Experiment/Tutorial Topic	Hrs.
1	Law of polygon of forces	2
2	Jib crane	2
3	Bell crank lever	2
4	Support Reactions of Beam	2
5	To find Resultant by Graphical Method	2
6	To find Support Reactions by Graphical Method	2
7	Assignment on finding Resultant	2
8	Assignment on Equilibrium of Sphere	2
9	Assignment on Finding support reactions of beam	2
10	Assignment on finding Centroid of given shape	2
11	Assignment on finding Moment of Inertia of given shape	2
12	Assignment on impact of elastic bodies	2

References:

Text Books	
1	Engineering Mechanics by R. S. Khurmi, S. Chand Publications.
2	Engineering Mechanics by R. K. Bansal and Sanjay Bansal
3	Engineering Mechanics by S. S. Bhavikatti, New Age International Pvt. Ltd
4	Engineering Mechanics by D.P.Sharma, Pearson Education
Reference Books	
1	Engineering Mechanics by Manoj K Harbola, Cengage Learning
2	Vector Mechanics for Engineers Vol.I and II by F. P. Beer and E. R. Johnston, Tata Mc -Graw Hill
3	Engineering Mechanics by K. I. Kumar, Tata Mc -Graw Hill Publication
4	Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.

24UG ESC-FY113LP - BASIC MECHANICAL ENGINEERING Lab

Tutorial/Practical **:** 2 hr/week   **Evaluation Scheme**

Credit   **:** 1   **ISA** **:** 25 Marks

                                                              POE **:** NA

COs	At the end of successful completion of the course, the student will be able to
CO1	**Describe** the working of IC engine
CO2	**Classify** Renewable and non-renewable energy sources
CO3	**Explain** different mechanisms for power transmission systems
CO4	**Understand** various basic operations of Lathe, Milling and Drilling machines

Description:		
As this subject has huge scope in various industries, so in labs the concept, construction, working and demonstration of various machines, equipment and devices is observed and understood with the help of various models.		
Prerequisites:	1:	Theory knowledge of types and components of IC engine.
	2:	Theory knowledge of types and components of refrigeration and air conditioning system.
	3:	Theory knowledge of types of energy sources

Number	Practical/ Experiment/Tutorial Topic	Hrs.
1	Solving SFEE numericals	4

2	Demonstration of I.C. engine	4
3	Demonstration of vapour compression refrigeration system and window air conditioner.	4
4	Demonstration of various power plants such as Windmill / Biogas / Hydroelectric Power Plant etc.	4
5	Demonstration of belt drive, chain drive, gear trains and centrifugal pump	4
6	Demonstration of casting, metal removal and metal joining processes	4

References:

Text Books	
1	Thermal Engineering by R.K. Rajput, Laxmi Publication, Delhi,ISBN-13-978-8131808047, 9 th edition.
2	Engineering Thermodynamics by R.Joel, The English Language Book Society
3	Elements of Heat Engine Vol.I,II,III by Patel and Karamchandani, Acharya Book Depot.
Reference Books	
1	Solar Energy by Dr.S.P. Sukathame,Tata Mc-Graw Hill Publication,4th edition.
2	Power Plant Engineering by Arora and Domkunwar, Dhanpat Rai and Sons
3	Elements of Workshop Technology, Vol.I and II by Hajara Choudhari, Media Promoters

24UG HSSM-FY202LP Employability Enhancement Skills (Sem - II) – PRACTICAL

Tutorial/Practical	**:** 02 hr/week	**Evaluation Scheme**	
Credit	**:** 1	**ISA :**	25 Marks

COs	At the end of successful completion of the course, the student will beable to
CO1	**Understand** the procedure of recruitment drive
CO2	**Prepare** technical reports for variety of purposes
CO3	**Deliver** prepared speeches to express ideas, thoughts and emotions
CO4	**Use** interpersonal skills with precision and competence in different scenario.

Description:
This course is designed to differentiate between formal and informal communication and language, strategies for communicating in the workplace, using negotiation and diplomacy, and how to be a good promoter of using communication and soft skills complementing to hard skills while getting to be recruited and applying workplace etiquettes.

Prerequisites:	1:	Basic knowledge about English Vocabulary
	2:	Communication in simple English

Practical

Number	Practical/ Experiment/Tutorial Topic	Hrs
01	SWOC- Analysis	02
02	Group Discussion	04
03	Debate	02
04	Mock Interview	04

05	Speeches for Various Occasions	02
06	Email Writing	02
07	Practice on Technical Writing	04
08	Extempore or Pep talk	02

References:

Recommended Books:	
1)	*Communication Skills for Engineers by S. Mishra & C. Muralikrishna (Pearson)*
2)	*Communication Skills by Meenakshi Raman and Sangeeta Sharma, Oxford University Press 2016 1st Edition*
3)	*Lesikar, R. V. and Pettit, J. ,D. Basic Business Communication, McGraw-Hill International Edition, Singapore 10th Edition, 2006*
4)	*Managing Soft Skills for Personality Development* by B.N. Ghosh, Tata McGraw Hill, 2012.
5)	*Bikram K. Das, KalyaniSamantray, "An Introduction to Professional English and Soft Skills" Cambridge University Press New Delhi.*
6)	*Comfort, Jeremy, et al. (2011) Speaking Effectively: Developing Speaking Skills for Business English. Cambridge: Cambridge University Press. (Reprint)*
7)	*Sharma, R. C. and Krishna Mohan,Basic Correspondence and Report Writing: A Practical Approach to Business and Technical Communication, Tata McGraw-Hill Publishing Company Limited, India ,5th Edition, 2017*
8)	*Business Correspondence & Report-writing by R.C.Sharma&KrishnaMohan,Tata McGraw-Hill Education*
9)	*Dr. Abha Singh, "Behavioural Science" Wiley India Pvt.Ltd*
10)	*Soft Skills by K. Alex, S. Chand and Company, 2013*
	www.buisnesscommunicationskills.com, www.kcitraing.com, www.mindtools.com

24UG CC-FY115T Inquisitive learning

Teaching Scheme: **Evaluation Scheme:**

Practical's: 2 hrs per week   **ISA:**   25 Marks

Credits: 1   **Presentation:** 25 Marks

                                                        Total Marks: 50 Marks

Cos	At the end of successful completion of the course the student will be able to
CO1	**Identify** real life problems through rigorous literature survey from societal need point of view.
CO2	**Analyze** the identified problems through technological perspective.
CO3	**Proposed** suitable solution to contribute society using fundamental knowledge of engineering through modern tools.
CO4	**Use** of technology to demonstrate proposed work in oral & written form.
CO5	**Develop** ability to work as an individual and as a team member and inculcate attitude of this for lifelong learning.

Group Structure:

Working in supervisor/mentor – monitored groups. The students Should plan, manage and complete a task/project/activity which addresses the stated problem.

- There should be team/group of 5 -6 students
- A supervisor/mentor teacher assigned to individual groups

Selection of Project/Problem:

The problem-based project oriented model for learning is recommended. The model begins with the identifying of a problem, often growing out of a question or "wondering". This formulated problem then stands as the starting point for learning. Students design and analyze the problem within an articulated interdisciplinary or subject frame. A problem can be theoretical, practical, social, technical, symbolic, cultural and/or scientific and grows out of students' wondering within different disciplines and professional environments. A chosen problem has to be exemplary. The problem may involve an

interdisciplinary approach in both the analysis and solving phases .By exemplarity, a problem needs to refer back to a particular practical, scientific, social and/or technical Department of First Year B.Tech domain. The problem should stand as one specific example or manifestation of more general learning outcomes related to knowledge and/or modes of inquiry. There are no commonly shared criteria for what constitutes an acceptable project. Projects vary greatly in the depth of the questions explored, the clarity of the learning goals, the content and structure of the activity.

- A few hands-on activities that may or may not be multidisciplinary
- Use of technology in meaningful ways to help them investigate, collaborate, analyze, synthesize and present their learning.
- Activities may include-Solving real life problem, investigation /study and Writing reports of in depth study, field work.

Assessment:

The institution/head/mentor is committed to assessing and evaluating both student performance and program effectiveness. Progress of Inquisitive learning is monitored regularly on weekly basis. Weekly review of the work is necessary. During process of monitoring and continuous assessment AND evaluation the individual and team performance is to be measured. Inquisitive learning is monitored and continuous assessment is done by supervisor/mentor and authorities. Students must maintain an institutional culture of authentic collaboration, self-motivation, peer-learning and personal responsibility. The institution/department should support students in this regard through guidance/orientation programs and the provision of appropriate resources and services. Supervisor/mentor and Students must actively participate in assessment and evaluation processes.

- Group may demonstrate their knowledge and skills by developing a public product and/or report and/or presentation.
- Individual assessment for each student (Understanding individual capacity, role and involvement in the project)
- Group assessment (roles defined, distribution of work, intra-team communication and togetherness)
- Documentation and presentation

Evaluation and Continuous Assessment:

It is recommended that the all activities are to be record and regularly, regular assessment of work to be done and proper documents are to be maintained at college end by both students as well as mentor (you may call it Inquisitive learning work book).Continuous Assessment Sheet (CAS) is to be maintained by all mentors/department and institutes. Recommended parameters for assessment, evaluation and weightage:

- Idea Inception   (10%)
- Outcomes of Inquisitive learning / Problem Solving Skills/ Solution provided/ Final product (Individual assessment and team assessment)   (20%)
- Documentation (Gathering requirements, design & modeling, implementation/execution, use of technology and final report, other documents)   (20%)
- Demonstration (Presentation, User Interface, Usability etc)   (50%)

Inquisitive learning workbook will serve the purpose and facilitate the job of students, mentor and project coordinator. This workbook will reflect accountability, punctuality, technical writing ability and work flow of the work undertaken.

Recommended Guidelines and Phases:

It is learning through activity. Following are the recommended guidelines that will work as an initiator and facilitator in process of completion of Inquisitive learning.

1. Get groups of students registered preferably 4-6 students per group.

2. Assign mentor to each group.

3. Provide guidelines for title identification (Problem can be some real life situation that needs technology solutions. This situation can be identified by meeting people around, visiting various industries, society, and institutes. The solution can be prototype, model, convertible solutions, survey and analysis, simulation, and similar).

4. Let students submit the problem identified in prescribed format (Title, Problem statement, details of a problem undertaken, and what is need of solution to the problem)

5. Mentor can approve the problem statements based on feasibility and learning outcomes expected for first year engineering students

6. Mentor is to monitor progress of the task during phases of project work. Broadly phases may include- requirements gathering, preparing a solution, technology design for the solution. (Optional phases- implementation and testing)

7. Fortnightly monitoring and continuous assessment record is to be maintained by mentor.

8. Get the report submitted at the end of semester.

Evaluation and Assessment Sheet (To be filled in my mentor)			
Sr. No.	**Details**	**Maximum Marks**	**Marks Obtained**
1.	Problem Identification (Idea Inception)	**05**	
2.	Problem Analysis (Requirement Gathering)	**05**	
3.	Proposed Solution (Model/Design/ Process / prototype)	**05**	
4.	Report	**10**	
5.	Presentation	**25**	
Total Marks		**50**	
Date: **Name & Sign of Mentor**			