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BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT- 587 103

COMMON TO ALL BRANCHES

gBE I - Semester Scheme for 2021-2022

Physics Cycle

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1.	NUMA101C	Engineering Mathematics – I	3.0	3	-	-	50	50	100
2.	NUPH102C	Engineering Physics	3.0	3	-	-	50	50	100
3.	NUCS103C	Principles of Programming with C	3.0	3	-	-	50	50	100
4.	NUEC104C	Basic Electronics	3.0	2	2	-	50	50	100
5.	NUEE105C	Basic Electrical Engineering	3.0	3	-	-	50	50	100
6	NUHS106C	Communicative English	2.0	2	-	-	50	50	100
7.	NUHS107C	Scientific Foundations of Health	1.0	2	-	-	50	50	100
8.	NUPH108L	Engineering Physics Laboratory	1.0	-	-	3	50	50	100
9.	NUCS109L	Programming Practice using C	1.0	-	-	2	50	50	100
		Total	**20**	**18**	**2**	**5**	**450**	**450**	**900**

Chemistry Cycle

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1.	NUMA101C	Engineering Mathematics – I	3.0	3	-	-	50	50	100
2.	NUCH110C	Engineering Chemistry	3.0	3	-	-	50	50	100
3.	NUCV111C	Engineering Mechanics	3.0	3	-	-	50	50	100
4.	NUME112C	Elements of Mechanical Engineering	3.0	2	2	-	50	50	100
5.	NUME113L	Computer Aided Engineering Drawing	3.0	2	-	1	50	50	100
6.	NUHS106C	Communicative English	2.0	2	-	-	50	50	100
7.	NUCH114L	Engineering Chemistry Laboratory	1.0	-	-	2	50	50	100
8.	NUBE115L	Innovation and Design Thinking	2.0	2	-	-	50	50	100
		Total	**20**	**17**	**2**	**3**	**400**	**400**	**800**

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BE II - Semester Scheme for 2021-2022

Physic Cycle

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	NUMA201C	Engineering Mathematics – II	3.0	3	-	-	50	50	100
2	NUPH202C	Engineering Physics	3.0	3	-	-	50	50	100
3	NUCS203C	Principles of Programming with C	3.0	3	-	-	50	50	100
4	NUEC204C	Basic Electronics	3.0	2	2	-	50	50	100
5	NUEE205C	Basic Electrical Engineering	3.0	3	-	-	50	50	100
6	NUHS206C	Professional writing skills in English	2.0	2	-	-	50	50	100
7	NUHS207C	Scientific Foundations of Health	1.0	2	-	-	50	50	100
8	NUPH208L	Engineering Physics Laboratory	1.0	-	-	3	50	50	100
9	NUCS209L	Programming Practice using C	1.0	-	-	2	50	50	100
		Total	**20**	**18**	**2**	**5**	**450**	**450**	**900**

Chemistry Cycle

Sl. No.	Subject Code	Subject	Credits	Hours/Week			Examination Marks		
				Lecture	Tutorial	Practical	CIE	SEE	Total
1	NUMA201C	Engineering Mathematics – II	3.0	3	-	-	50	50	100
2	NUCH210C	Engineering Chemistry	3.0	3	-	-	50	50	100
3	NUCV211C	Engineering Mechanics	3.0	3	-	-	50	50	100
4	NUME212C	Elements of Mechanical Engineering	3.0	2	2	-	50	50	100
5	NUME213 L	Computer Aided Engineering Drawing	3.0	2	-	1	50	50	100
6	NUHS206C	Professional writing skills in English	2.0	2	-	-	50	50	100
7	NUCH214L	Engineering Chemistry Laboratory	1.0	-	-	2	50	50	100
8	NUBE215L	Innovation and Design Thinking	2.0	2	-	-	50	50	100
		Total	**20**	**17**	**2**	**3**	**400**	**400**	**800**

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Syllabus as per NEP applicable to Students admitted to
BE I - Semester during the academic year 2021 - 2022

NUMA101C	**Engineering Mathematics – I**	**03 - Credits (3 : 0 : 0)**
Hrs/Week : 03		CIE Marks : 50
Total Hours : 40		SEE Marks : 50

UNIT - I	**10 Hrs.**
Differential Calculus-1: Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian, parametric and polar forms (without proof) problems.	
UNIT – II	**10 Hrs.**
Differential Calculus-2: Introduction to function of several variables, Partial differentiation; Total derivatives-differentiation of composite functions, Jacobian. Maxima and minima for a function of two variables and its applications; -problems.	
UNIT – III	**10 Hrs.**
Integral Calculus: Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals-change of order of integration and changing into polar, spherical and cylindrical co-ordinates. Applications to find area and volumes.	
UNIT – IV	**10 Hrs.**
Beta and Gamma functions: Definitions, relation between beta and gamma functions-problems. Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- problems	

Reference books:

1. Maurice D weir, Joel Hass and Frank R. Giordano, “Thomas calculus”, Pearson, eleventh edition, 2011.
2. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
3. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010
4. Erwin Kreyszing’s Advanced Engineering Mathematics volume1 and volume1I, wiley India Pvt.Ltd., 2014.

Course Outcomes:

At the end of the course the student should be able to:

1. Understand the concepts of polar curves and curvatures apply when needed.
2. Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions.
3. Apply the concepts of partial differentiation in computing Jacobians and extreme values.
4. Apply the concepts of multiple integrals & their usage in computing the area and volumes.

5. Learn how complex integrals can be reduced to expressions involving beta function and gamma function is useful for modeling situations involving continuous change, with important applications to calculus, differential equations, complex analysis and statistics.
6. Apply the knowledge of differentiation of vectors to solve the engineering problems.

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NUPH102C/NUPH202C	Engineering Physics	03 - Credits (3 : 0 : 0)
Hrs./Week : 03		CIE Marks : 50
Total Hours : 40		SEE Marks : 50

UNIT – I	10 Hrs

Modern physics: Introduction, quantization of energy levels, Frank-Hertz experiment. Photoelectric effect, Compton effect and wave particle dualism. de-Broglie hypothesis, de-Broglie wavelength. Phase velocity and group velocity. Principle, construction and working of SEM. Numerical Problems.

Quantum mechanics: Heisenberg's uncertainty principle and its physical significance (no derivation). Application of uncertainty principle (non-existence of electron in the nucleus). Wave function, properties and physical significance of a wave function. Probability density and normalization of a wave function. Setting up of a one dimensional time independent Schrodinger wave equation. Eigen functions and eigen values. Applications of Schrodinger wave equation- eigen function and energy eigen values of a particle in a potential well of infinite height. Principle, construction and working of STM. Numerical problems.

UNIT – II	10 Hrs

Electrical properties of metals: Free electron concept (Drude-Lorentz theory). Classical free electron theory-assumptions. Expression for electrical conductivity for metals (no derivation). Failures of classical free electron theory. Quantum free electron theory-assumptions, Fermi-Diarc statistics, Fermi energy, density of states (no derivation). Expression for electrical conductivity for metals (derivation). Fermi factor and variation of Fermi factor with energy for different temperatures. Derivation of Fermi energy for 0K. Merits of quantum free electron theory. Numerical problems.

Semiconductors: Fermi level in intrinsic and extrinsic semiconductors (qualitative). Direct and indirect band gap semiconductors. Derivation of electrical conductivity for semiconductors. Hall effect, derivation of Hall voltage and Hall coefficient. Applications of Hall effect. Numerical problems.

Superconductivity: Temperature dependence of resistance in conductors and superconductors. Meissner effect, critical magnetic field, Type-I and Type-II superconductors. BCS theory (qualitative). Applications of superconductors- maglev vehicle and SQUID.

UNIT – III	10 Hrs

Crystal structure: Directions and planes in a crystal. Miller indices, Expression for inter-planar spacing in terms of Miller indices. Atomic packing factor for HCP. Relation between lattice constant and density of material. Crystal structures of NaCl and Diamond. Bragg's law and Bragg's X-Ray spectrometer. Determination of cubic crystal structures using diffractograms. Numerical problems.

Dielectric materials: Polar and non-polar dielectrics. Dielectric polarization, polarization

mechanisms (qualitative). Dielectric constant, internal field and derivation of internal field in solids and liquids (one dimensional). Clausius - Mossotti relation. Dielectric loss and its derivation. Applications of dielectric materials. Numerical problems.

UNIT – IV	10 Hrs

Laser: Introduction, absorption, spontaneous emission and stimulated emission, Einstein's coefficients (expression for energy density). Conditions for laser action, requisites of a laser system, working mechanism. Characteristics of a laser. Classification of lasers. Construction and working of Nd: YAG and carbon dioxide laser. Applications of lasers- industry, defense and medical. Numerical problems.

Optical fibers: Introduction, propagation mechanism in optical fibers, angle of acceptance, numerical aperture and its derivation. Modes of propagation (qualitative), types of optical fibers and attenuation (qualitative). Applications-optical fiber communication system. Numerical problems.

Ultrasonic Waves: Introduction, generation of ultrasonic waves by inverse piezoelectric methods and its properties. Measurement of velocity of ultrasonic waves in solids by pulse echo method. Applications of ultrasonic waves-non-destructive testing of materials. Numerical problems.

Reference Books:

1. M. N. Avadhanulu and P. G. Kshirsagar and TVS Arun Murty, "A Text Book of Engineering Physics", 11th revised edition, S. Chand & Company, 2019.
2. S. O. Pillai "Solid State Physics", Sixth edition, New Age International, 2010.
3. R. K. Puri and V. K. Babbar, "Solid State Physics", third edition, S.Chand, 2010.
4. Arthur Beiser, "Modern physics", sixth edition, T.M.H, 2002.
5. B. B. Laud, "Lasers and non linear optics", second edition, New Age International, 1991.
6. R. K. Gaur and S. L. Gupta, "Engineering Physics", eighth edition, Dhanpat Rai, 2012.

Course Outcomes:

At the end of the course the student should be able to:

1. Apply quantum mechanics principles for computing probability density and energy for simple systems.
2. Verify conductivity of metals and semiconductors theoretically and explain applications of conductors, semiconductors and superconductors.
3. Identify crystal structure of cubic crystals and explain physical properties and applications of dielectric materials.
4. Analyze suitability of lasers, optical fibers and ultrasonic waves for engineering applications.

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NUCS103C/NUCS203C	Principles of Programming with C	03 - Credits (3 : 0 : 0)
Hrs/Week : 03		CIE Marks : 50
Total Hours : 40		SEE Marks : 50

UNIT – I	10 Hrs.

Introduction to Computer Science: Overview of Computer Science, Hardware and Software, Information Processing cycle, Algorithms and Flowcharts, Examples to elaborate the principles of programming and problem solving.

Overview of C Language: Introduction, Why C? Scope of Computer Science, Applications. Features, Structure of C program, Process of compiling and running C program.

C**onstants, Variables and Data types:** Introduction, Character set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of variables, Example programs.

Operators and Expressions: Arithmetic operators, Relational operators, Logical operators, Assignment operators, Increment and Decrement operators, Conditional operator, Bitwise operators, Special operators, Arithmetic expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversion in expressions, Operator precedence and Associativity, Example programs.

Managing Input / Output operations: Formatted and Unformatted input and output statements, Example programs.

UNIT – II	10 Hrs.

Decision making and Branching: Decision making with *if*, *if-else*, Nesting of *if-else* statements, *else-if* ladders, *switch* statement, ?: Operator, *goto* statement, Example programs.

Decision making and Looping: *while* statement, *do-while* statement, *for* statement, jumps in loops, Example programs.

UNIT – III	10 Hrs.

Arrays: Introduction, One dimensional arrays, Declaration of one-dimensional arrays, Initialization of one-dimensional arrays Declaration of two-dimensional arrays, Initialization of two-dimensional arrays. Example programs.

Strings: Introduction, Declaring and initializing string variables, String-handling functions, Example programs.

User defined functions: Introduction, Need for user-defined functions, Elements of user defined functions, Definition of functions, Return values and their types, Function calls, Function declaration

Category of functions: Based on call by value, call by reference, arguments and return type and recursion, Example programs.

UNIT – IV	10 Hrs.

Structures: Defining a structure, Declaring structure variables, Accessing structure members, Initialization, Arrays of structure, Arrays within structures, Structures within structures, Example programs.

Pointers: Introduction, Accessing the address of a variable, Declaring and initialization of pointer variables, Pointers as function arguments, Example programs.

Command-line arguments.

Reference Books:

1. Programming in ANSI C, E. Balaguruswamy, Tata McGraw Hill 7th Edition,2017
2. C Programming Language, Kernighan and Ritchie, Prentice Hall of India. 2nd Edition 2017
3. A structured programming approach using C, Wesley J. Chun, Pearson Education India, Third Edition, 2015
4. Programming in C, Stephen Kochan 4th Edition, 2014
5. Computer Concepts and C programming, B. S. Anami, S. A. Angadi, S. S. Manvi, Prentice Hall of India, 2nd Edition 2010

Course Outcomes:

1. Comprehend the functioning of computer components and understand the use of flowchart and algorithm.
2. Design an algorithm for a given problem statement and draw the corresponding flowchart.
3. Develop the program and debug for a given problem.
4. Analyze the given program and improvise upon.
5. Apply the learnt programming constructs to develop simple real-world applications, employing modular programming approach.

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NUEC104C/NUEC204C	Basic Electronics	03 - Credits (2 : 2 : 0)
Hrs/Week : 03		CIE Marks : 50
Total Hours: 30L + 26T		SEE Marks : 50

UNIT - I	10 Hrs.

Scope and Applications of Electronics and Communication Engineering. Diode Applications: Half Wave Rectification, Full Wave Rectification, Rectifier with Shunt Capacitor (qualitative analysis), Zener Diode, Voltage Regulator, DC Voltage Multipliers, Diode logic Gates. Bipolar Junction Transistors: Transistor operation, Transistor Voltages and Currents, Common-Base Characteristics, Common-Emitter Characteristics and Common-Collector Characteristics.

Self-Study Components: Quantum Tunneling mechanism, VI-Characteristics of Esaki diode and Varactor diode.

UNIT – II	10 Hrs.

BJT Biasing and Applications: The DC Load Line and Bias Point, Base Bias, Collector to Base Bias, Voltage Divider Bias, Comparison of Basic Bias Circuits. Amplifier: Decibels and half power points, Single-Stage CE Amplifier. Oscillators: Concept of Feedback, Positive and Negative Feedback, Barkhausen criterion, BJT RC Phase Shift Oscillator, Hartley Oscillator, Colpitt's Oscillator and Crystal (qualitative analysis) Oscillator.

Self-Study Components: FET and its Operation, FET as an Amplifier, CE Feedback Amplifier.

UNIT - III	10 Hrs.

Number Systems: Introduction, Decimal, Binary and Hexadecimal Number Systems. Addition and subtraction, Binary Coded Decimal Numbers. Digital Logic: Boolean Algebra, Logic Gates, Universal Gates, 3-variable K-map, Half and Full Adder, Parallel Adder, Latches, SR Latch, D Latch.

Self-Study Components: Half Subtractor, Full Subtractor, Booth's Algorithm for Binary number Multiplication.

UNIT – IV	10 Hrs.

Introduction to Communication Systems: Basic Communication Block Diagram. Modulation, Need for Modulation, Amplitude Modulation & Demodulation and Frequency Modulation & Demodulation (qualitative discussion only). Analog Communication, Digital Communication. Basics of Wireless Communication, Multimedia Communication.

Self-Study Components: Principles of Optical Fiber Communication and Satellite Communication.

Reference Books:

1. David A. Bell, "Electronic Devices and Circuits", 4th edition, PHI, 2006.
2. George Kennedy, "Electronic Communication Systems", 4th edition. TMH, 2005.
3. Floyd and Jan, "Digital fundamentals", 8th edition, Pearson, 2006.

4. Jacob Milliman, Christos C. Halkies, "Electronics Devices and Circuits", TMH, 2001.
5. A.P. Malvino, "Electronic Principles", TMH, 2003.

Course Outcomes:

1. Describe operation and characteristics of electronic devices and systems.
2. Understand the parameters and their significance of electronic devices in electronic systems.
3. Analyze the applications of electronic circuits and systems.
4. Solve numerical problems related to basic electronic circuits and systems.
5. Design basic electronic systems to meet given specifications.
6. Visualize applications of electronic devices and systems in real world.

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NUEE105C/NUEE205C	Basic Electrical Engineering	03 - Credits (3 : 0 : 0)
Hrs/Week : 03		CIE Marks : 50
Total Hours : 40		SEE Marks : 50

UNIT – I	10 Hrs.

Electrical Power Generation:

Power Generation: Hydel plants, Thermal plant, Nuclear plant- Working principle, Site selection parameters, Pros & Cons.

Renewable energy sources: Solar power plant and Wind turbine generators

Electromagnetism:

Comparison between magnetic and electric circuits, Faradays laws, Lenz's law, Fleming's rules, Statically and dynamically induced emf, Self and mutual inductance, Coefficient of coupling, Energy stored in a magnetic field.

UNIT – II	10 Hrs.

Single Phase AC Circuits:

Generation of sinusoidal voltages, Phase & phase difference of sinusoidal waveform, J-operator, Voltage and current relationships, Instantaneous and average power in R, L, C, R-L, R-C & R-L-C series circuits, R-L-C Parallel circuits.

Three Phase AC Circuits:

Generation of three phase AC voltage, Phase sequence, Voltage and current relationship for star and delta connections, Advantages of three phase supply over single phase.

Measurement of power using two wattmeters (for balanced load), Expression for power factor in terms of wattmeter readings, Effect of power factor on wattmeter readings.

UNIT – III	10 Hrs.

Transformer:

Types, Construction and principle of operation, EMF equation, No load and On load operation, Losses and efficiency.

DC Machines:

Construction, Principle of operation as generator and motor, emf equation, back emf, Torque equation, Classification and applications, Necessity of starters.

UNIT – IV	10 Hrs.

AC Machines:

Alternator: Types, Construction, Principle of operation, emf equation excluding Kp & Kd.

Induction Motor: Types, Construction and principle of operation, Rotating magnetic field, Frequency of rotor current, Slip, Torque equation, Applications, Star-Delta starter.

Electrical Wiring and Safety:

Elementary details: safety devices- Fuses, MCB's, Necessity of earthing and types of earthing. Electrical wiring- Conduit and Concealed wiring, Two way and three way control of lamps, Calculation of energy consumption and billing

Reference Books:

1. Edward Hughes, "Electrical and Electronic Technology", Pearson Publications, 10th Edn., 2010
2. B. L Theraja, "Fundamentals of Electrical Engineering and Electronics", S. Chand Publications, 27th Edition, 2008
3. Rajendra Prasad, "Fundamentals of Electrical Engineering", 2nd Edition, PHI Learning, 2009
4. V. N. Mittle & A. Mittal, "Basic Electrical Engineering", Tata McGraw-Hill Education, 2005
5. S. K. Bhattacharya, "Basic Electrical and Electronics Engineering", 2nd Edition, Pearson Publications, 2017

Course Outcomes:

1. Recall basics of magnetic circuits, electromagnetism, single phase & three phase circuits and electrical earthing (BLL 1)
2. Illustrate the laws of magnetic & electric circuits, concepts of single phase & three phase AC circuits, Operation of transformer and AC & DC machines, domestic wiring practices and electricity generation principles (BLL 2)
3. Derive the expressions for statically & dynamically induced emf, Self & mutual inductances, power in AC series & parallel circuits, emf equations for transformer, DC-AC machines (BLL 3)
4. Calculate different parameters related to magnetic circuits, single phase & three phase AC circuits, transformers and AC & DC machines. (BLL 4)

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NUHS106C	Communicative English	02 - Credits (2 : 0 : 0)
Hrs/Week : 02		CIE Marks : 50
Total Hours : 26		SEE Marks : 50

UNIT – I	10 Hrs.

Introduction to Communicative English: Introduction, Language as a Tool, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English (Communication Channels). Interpersonal and Intrapersonal Communication Skills, How to improve and Develop Interpersonal and Intrapersonal Communication Skills.

UNIT – II	10 Hrs.

Introduction to Phonetics: Introduction, Phonetic Transcription, English Pronunciation, Pronunciation Guidelines Related to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure, Word Accent and Stress Shift, – Rules for Word Accent, Intonation – purposes of intonation, Spelling Rules and Words often Misspelt – Exercises on it. Common Errors in Pronunciation.

Basic English Communicative Grammar and Vocabulary PART - I :

Grammar: Basic English Grammar and Parts of Speech - Nouns, Pronouns, Adjectives, Verbs, Adverbs, Conjunctions, Articles and Preposition.

UNIT – III	10 Hrs.

Basic English Communicative Grammar and Vocabulary PART - II: Preposition, kinds of Preposition and Prepositions often Confused. Articles: Use of Articles – Indefinite and Definite Articles, Pronunciation of '*The*', words ending '*age*', some plural forms. Introduction to Vocabulary, All Types of Vocabulary –Exercises on it.

Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exceptions in Question Tags and Exercises, One Word Substitutes and Exercises. Strong and Weak forms of words, Words formation - Prefixes and Suffixes (Vocabulary), Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.

UNIT – IV	10 Hrs.

Communication Skills for Employment: Information Transfer: Oral Presentation - Examples and Practice. Extempore/Public Speaking, Difference between Extempore/ Public Speaking, Communication Guidelines for Practice. Mother Tongue Influence (MTI) – South Indian Speakers, Various Techniques for Neutralization of Mother Tongue Influence – Exercises. Reading and Listening Comprehensions-Exercises.

Reference Books:

1. A Textbook of English Language Communication Skills, Infinite Learning Solutions–(Revised Edition) 2021.
2. Communication Skills by Sanjay Kumar and Pushplata, Oxford University Press - 2019.

3. English for Engineers by N. P. Sudharshana and C. Savitha, Cambridge University Press – 2018.
4. A Course in Technical English – D Praveen Sam, KN Shoba, Cambridge University Press – 2020.
5. Technical Communication by Gajendra Singh Chauhan and Et al, Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
6. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – 2019.
7. Practical English Usage by Michael Swan, Oxford University Press – 2016.
8. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.

Course Outcomes:

On successful completion of this course the student should be able to

1. Understand and apply the Fundamentals of Communication Skills in their communication skills.
2. Identify the nuances of phonetics, intonation and enhance pronunciation skills.
3. To impart basic English grammar and essentials of language skills as per present requirement.
4. Understand and use all types of English vocabulary and language proficiency.
5. Adopt the Techniques of Information Transfer through presentation.

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NUHS107C	Scientific Foundations of Health	1.0 Credit (2 : 0 : 0)
Hrs/Week : 02		CIE Marks : 50
Total Hours: 26		SEE Marks : 50

UNIT – I	10 Hrs

Good Health and It's balance for positive mindset: What is Health, Why Health is very important Now? – What influences your Health? Health and Behaviour, Health beliefs and advertisements, Advantages of good health (Short term and long-term benefits), Health and Society, Health and family.

Health and Personality - Profession: Health and behaviour, Disparities of health in different vulnerable groups. Health and psychology, Methods to improve good psychological health. Psychological disorders (Stress and Health - Stress management), how to maintain good health, Mindfulness for Spiritual and Intellectual health, Changing health habits for good health. Health and personality.

UNIT – II	10 Hrs

Building of healthy lifestyles for better future: Developing a healthy diet for good health, Food and health, Nutritional guidelines for good health and well beingness, Obesity and overweight disorders and its management, eating disorders - proper exercises for its maintenance (Physical activities for health), Fitness components for health, Wellness and physical function, How to avoid exercise injuries.

Creation of Healthy and caring relationships: Building communication skills (Listening and speaking), Friends and friendship - education, the value of relationships and communication, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviours through social engineering.

UNIT – III	10 Hrs

Avoiding risks and harmful habits: Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction develops and addictive behaviors, Types of addictions, influencing factors for addictions, Differences between addictive people and non-addictive people and their behavior with society, Effects and health hazards from addictions Such as how to recovery from addictions.

UNIT – IV	10 Hrs

Preventing and fighting against diseases for good health: Process of infections and reasons for it, How to protect from different types of transmitted infections such as Current trends of socio economic impact of reducing your risk of disease, How to reduce risks for good health, Reducing risks and coping with chronic conditions, Management of chronic illness for Quality of life, Health and Wellness of youth : a challenge for the upcoming future Measuring of health and wealth status.

Reference Books:

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY

10017.
2. **Health Psychology - A Textbook,** 4th edition by Jane Ogden McGraw Hill Education (India) Pvt. Ltd. - Open University Press
3. **Scientific Foundations of Health (Health & Wellness) - General Books** published for university and colleges references by popular authors and published by the reputed publisher.
4. **HEALTH PSYCHOLOGY (Ninth Edition)** by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press
5. **SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos** and other materials / notes

Course Outcomes:

At the end of the course the student will be able to:

1. Understand Health and wellness (and its Beliefs)
2. Acquire Good Health & It's balance for positive mindset
3. Inculcate and develop the healthy lifestyle habits for good health.
4. Create of Healthy and caring relationships to meet the requirements of MNC and LPG world
5. Adopt the innovative & positive methods to avoid risks from harmful habits in their campus & outside the campus.
6. Positively fight against harmful diseases for good health through positive mindset.

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NUPH108L/NUPH208L	Engineering Physics Laboratory	01-Credits (0 : 0 : 3)
Hrs/Week : 02		CIE Marks : 50
Total Hours: 30		SEE Marks : 50

LIST OF EXPERIMENTS

1. Determination of Fermi energy for a conductor.
2. Determination of dielectric constant by RC charging and discharging method.
3. The study of frequency response in series and parallel LCR circuits.
4. Identification of passive components and estimations of their values
5. in a given Black Box.
6. Determination of rigidity modulus of a wire by torsional pendulum method.
7. Determination of Young's modulus of a metal strip by single cantilever method.
8. The study of characteristics of a laser.
9. Determination of Planks Constant (using LED's or photoelectric effect method)
10. Measurement of velocity of ultrasonic waves in liquids by using ultrasonic interferometer.
11. Verification of Stefan's law.
12. Measurement of numerical aperture and attenuation of an optical fiber.
13. Determination of electric resistivity and energy gap of a semiconductor by four probe method.
14. Determination of specific heat of a solid or liquid using calorimeter.
15. Determination of viscosity of a liquid.

Note:

1. Minimum eight experiments are to be conducted in a semester.
2. The student has to perform one experiment during Lab CIE Test.
3. The student has to perform one experiment during the SEE practical examinations.

List of experiments for virtual labs

1. Franck Hertz experiment.
2. Hall Effect experiment.
3. Emission spectra.
4. Magnetic field along the axis of a circular coil carrying current.
5. Determination of Stefan's constant.
6. Newton's rings- wavelength of light.

Note:

1. Two virtual lab experiments are to be performed by students in a semester.

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Course Outcomes:

1. Apply experimental skills for solving engineering problems.
2. Apply measuring tools for precision measurements.
3. Measure properties of different materials.
4. Exhibit documentation skill in the form of experimental write-up.

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NUCS109L/NUCS209L	Programming Practice using C	01- Credits (0: 0: 2)
Hrs/Week : 02		CIE Marks : 50
Total Hours : 30		SEE Marks : 50

PART - A	
1. Program to demonstrate the use of C operators.	(Four programs)
2. Programs to illustrate the application of branching statements.	(Four programs)
3. Programs to employ the looping constructs.	(Four programs)
4. Application programs based on arrays.	(Four programs)
PART – B	
1. Application Programs based on strings.	(Four programs)
2. Demonstrate modular programming approach using functions.	(Four programs)
3. Application Programs using structures.	(Two programs)
4. Programs using pointers.	(Two programs)

Course Outcomes:

1. Design an algorithmic solution for a given problem.
2. Develop well-indented/well-structured C program for a given algorithm, according to coding standards.
3. Debug and execute a given program.
4. Document the developed programming solution as per the standards.
5. Analyze a given problem (specific to the branch of the student) and propose a solution.

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NUCH110C/NUCH210C	Engineering Chemistry	03-Credits (3: 0: 0)
Hrs/Week : 03		CIE Marks : 50
Total Hours: 40		SEE Marks : 50

UNIT – I	10 Hrs.

Water Technology: Introduction, sources, impurities and specifications of water, Hardness of water, Basic terms, Determination of total hardness of water by EDTA method, Numerical problems. Boiler feed water - boiler problems, Scale and sludge formation, priming and foaming, boiler corrosion (due to dissolved O_2, CO_2 and $MgCl_2$).

Chemical analysis of water: Standard for portable water, Determination of; Dissolved oxygen, Chlorides. Water softening **-** Desalination of sea water by reverse osmosis.

Self Study: Softening of water by ion exchange process.

Electro Chemical Technology: Introduction, Origin of electrode potential, Nernst equation, concentration cell, numerical problems on concentration cell, Reference electrode – Calomel electrode. Determination of single electrode potential using calomel electrode, Ion Selective Electrode – Glass electrode, Determination of pH of solution using glass electrode.

Energy storage devices: Introduction, Basic concept, Classification, Characteristics of batteries. Construction and working of; 1) Nickel Metal hydride battery 2) Li-Cobalt oxide battery.

Self Study: Different types of Reference electrodes and their working principle.

UNIT – II	10 Hrs.

Corrosion Science: Introduction, Corrosion – Definition, Types of corrosion, Chemical (Dry) and Electrochemical (Wet) corrosion. Theory of electrochemical corrosion by taking Iron as an example. Types of Electrochemical corrosion - Differential metal corrosion, Differential aeration corrosion. e.g. water line corrosion, Pitting corrosion. Stress corrosion e.g. Caustic embrittlement. Factors affecting the rate of corrosion; Related to metal & Related to environment. Numerical problems on Corrosion Penetration Rate (CPR) & Weight loss method.

Corrosion Control: Protective coatings: Inorganic coatings, Anodizing – meaning, Anodizing of Al and applications. Cathodic protection - i) Sacrificial anodic method ii) Impressed current method.

Self study: Metallic coating methods.

Metal Finishing: Introduction, Technological importance of metal finishing. Factors governing electroplating - Polarization, Decomposition potential and Over voltage.

Electroplating process: Theory of electroplating - Definition, Principle components of an electroplating bath. Effects of plating variables on the nature of electro deposit. Determination of throwing power of plating bath by Harring - Blum cell and Numerical problems. Surface preparation for electroplating. Electroplating of Chromium (Decorative & Hard) and its applications.

Electroless plating process: Meaning, Distinction between electroplating and electroless plating. Surface preparation, Electroless plating of Copper on PCB and its applications.
Self study: Electroplating of Gold and Electroless plating of Ni on Al

UNIT – III	10 Hrs.

Green Chemistry: Introduction, definition, Major environmental pollutants, Basic principles of green chemistry (12 principles). Various green chemical approaches – Microwave synthesis, Bio catalysed reactions, Phase transfer catalysis. Super critical conditions for solvent free reactions. Synthesis of typical organic compounds by conventional and green route; i) Adipic acid ii) Paracetamol

Atom economy – Atom economy calculations on synthesis of Ethylene oxide & Methyl Methacrylate. Numerical problems on Atom economy calculations. Industrial applications of green chemistry.

Self study: Information on recent green technology in industry.

Fuel Technology

Non Renewable Energy Sources

Chemical Fuels: Introduction, Definition, classification, characteristics of fuel, Combustion, Calorific value - Definition, HCV, LCV, Determination of CV solid/liquid fuel by Bomb calorimeter, numerical problems.

Renewable Energy Sources

Biofuel - Introduction, Classification of biofuel. Biomass, Sources of biomass. Biodiesel- production of biodiesel by alkali catalyzed trans - esterification methods. Advantages and disadvantages of biodiesel.

Solar Energy – Photo Voltaic Cell; Introduction , Construction and Working of Typical P.V.Cell, Preparation of solar grade silicon by union carbide process, Advantages & Disadvantages of P.V.Cell.

Self study: Fuel cell technology eg: $CH_3OH – O_2$ fuel cell.

UNIT – IV	10 Hrs.

Polymer materials

Introduction, definitions, classification, types of polymerization. Ionic polymerization; Mechanism of polymerization – Cationic and Anionic polymerizations of styrene. Molecular weight of polymers- Number average and weight average methods, numerical problems. Glass transition temperature and factors affecting T_g & its significance. Synthesis, properties and applications of ; i) Epoxy resin ii) Silicon rubber iii) PLA iv) PET.

Conducting polymers: Introduction – Definition, Mechanism of conduction in polycetylene and its applications.

Self study: Polymer composites.

Dyes: Introduction, definition, sensation of colour, classification based on chromophores. Theories of dyes- Witt theory & Electronic theory. Synthesis and applications of; i)

Phenolphthalein ii) Methyl orange iii) Malachite green. Applications of Phenolphthalein & Methyl orange in chemical analysis.

Self study: Information on food dyes with example and applications

Reference books:

1. Engineering Chemistry, 2nd Edn., by Dr. Suba Ramesh etal., Wiley India Pvt. Ltd., Delhi. 2011.
2. A Text Book of Engineering Chemistry, 3rd Edn, by Shashi Chawla, Dhantpat Rai & Co. Pvt., Pub. Delhi. 2003.
3. Engineering Chemistry,12th Edn., by Dr. S. S. Dhara, Dr. S. S. Omare, S.Chand & Company Ltd., 2010
4. Engineering Chemistry, 16th Edn., by Jain & Jain, Dhanapath Rai Pub. Co.2013.
5. A Text Book of Engineering Chemistry, 1st Edn., by Dr. P. L. Timmanagoudar & Dr. S. K. Patil, , EBPB, Gadag, 2014.
6. Green organic Chemistry, 1st Edn., by Kenneth Doxsee & James Huchison, Thomson-Brooks/Cole, 2004.
7. Introduction to Bio fuels,3rd Edn., by David M. Mousdale, CRC Press,2017.

Course Outcomes:

1. Apply and demonstrate quantitative chemical analysis and electrochemical analysis techniques and incorporate new methods to produce soft water for industrial and domestic use at cheaper cost.
2. Analyze engineering problems related to corrosion and develop/practice suitable preventive measures. Utilize surface modification methods to improve various cost effective properties of materials
3. Apply the principles of green chemistry in design and development of alternative ecofriendly chemical synthesis methods to minimize hazardous substances and impart the knowledge of conventional and non-conventional energy sources and their effective management.
4. Acquire the knowledge of different polymer materials and dyes for wide variety of engineering applications.

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COMMON TO ALL BRANCHES

NUCV111C/NUCV211C	Engineering Mechanics	03 - Credits (3: 0: 0)
Hrs/Week : 03		CIE Marks : 50
Total Hours: 40		SEE Marks : 50

UNIT - I	10 Hrs.

Introduction to Engineering Mechanics: Particle, continuum, rigid body, laws of motion, law of parallelogram, forces, polygon forces, classification of force system, resolution and addition of forces, Principle of transmissibility of force. Resultant of co-planar concurrent force system. Lami's theorem, Equilibrium of a particle, Numerical problems.

Moment and couple: Definition of moment, moment of a couple, characteristics of a couple, equivalent force and couple system, Varignon's principle, resultant of coplanar non concurrent force system. Numerical problems.

UNIT – II	10 Hrs.

Support Reaction: Types of beams, loads and supports. Support reaction of statically determinate beams subjected to various loads. Numerical problems.

Friction: Types of friction, Laws of friction, limiting friction, angle of friction, angle of repose, impending motions on horizontal and inclined planes. Numerical problems.

UNIT - III	10 Hrs.

Shear Force and Bending Moment : Definition of bending moment and shear force, sign conventions, relationship between load intensity, bending moment and shear force. Shear force and bending moment diagrams for statically determinate beams subjected to point load, uniformly distributed loads, uniformly varying loads, couples and their combinations. Numerical Problems.

Truss: Introduction, types of trusses, assumptions in analysis, analysis of determinate trusses by method of joints and method of sections. Numerical Problems.

UNIT - IV	10 Hrs.

Centroid: Definitions, locating centroid of a triangle, rectangle, circle, semi circle, quadrant of a circle using method of integration. Centroid of simple built up sections. Numerical problems.

Moment of Inertia: Moment of Inertia of an area, polar moment of inertia, radius of gyration, perpendicular axis theorem and Parallel axis theorem. Moment of Inertia of rectangle, circle, semi circle, quadrant of a circle and triangle by method of integration. Moment of inertia of composite sections. Numerical problems.

Reference Books:

1. K.V. Rao and G.C. Raju, "*Engineering Mechanics*", Subhas Publications, Bangalore.
2. S. S. Bhavikatti, "*Engineering Mechanics*", New Age International Publishers, New Delhi.
3. S. P. Nitsure H. J. Sawant, "*Elements of Civil Engineering and Engineering Mechanics*", Technical Publications, Pune.
4. Timoshenko"*Engineering Mechanics*" 4th Edin., McGraw-Hill Publications New York, 1983.
5. Ferdinand P. Beer and E. Russel Johnston Jr. "*Mechanics for Engineers (Statics and*

Dynamics)", 9th Edition, Tata Mc Graw Hill Publications, New Delhi, 2011.
6. Singer F.L. "*Engineering Mechanics statics and dynamics*" 3rd Edition, Horper and International New York, 1975.
7. J. L. Meriam and L. G. Kraige, "Engineering Mechanics, Vol I – Statics, Vol II –Dynamics", 6th Edition, John Wiley, 2008
8. N. H. Dubey, "*Engineering Mechanics: Statics and Dynamics*", McGraw-Hill Education 2015

Course Outcomes:

1. Apply the knowledge of the basic concepts and principles of mechanics in day to day life.
2. Ability to identify, formulate and analyze the rigid bodies subjected to various external forces.
3. Use technical skills necessary for Engineering practice and hence, forming a base for further study of subjects like Mechanics of Materials.

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COMMON TO ALL BRANCHES

NUME112C/NUME212C	Elements of Mechanical Engineering	03 - Credits (2 : 2 : 0)
Hrs/Week : 03		CIE Marks : 50
Total Hours: 40		SEE Marks : 50

UNIT - I	10 Hrs.

Steam formation: Introduction, Formation of Steam, TS and TH diagrams, Types of steam, Steam properties: specific volume, enthalpy, internal energy and Entropy (numerical problems),Working of steam boilers: Babcock and Wilcox Boiler, Lancashire Boiler, List of mountings, accessories, their locations and applications.

Water Turbines: Introduction, Classification, Working principle and operation of Pelton wheel, Francis turbine and Kaplan turbine.

Steam Turbines: Introduction, Classification, Working principle and operation of Impulse and Reaction turbine, Necessity of compounding of Impulse turbine.

Gas Turbines: Introduction, Classification, Working of open cycle Gas Turbine and Closed cycle Gas turbine with schematic diagram and comparison between open and close cycle gas turbine.

UNIT – II	10 Hrs.

Internal Combustion Engines: Introduction, Classification of I. C. engine, Parts of I.C. engine, I.C. engine nomenclature, Working of four stroke petrol and diesel engines, Comparison between SI and CI engines, Calculations: I.P., B.P., mechanical efficiency, thermal efficiency, volumetric efficiency, specific fuel consumption, brake specific energy consumption, Numerical Problems on four stroke engine.

Automobile Engineering: Introduction, History and development of an automobile, Classification of automobiles, Layout of four wheeler (Layout diagram), Definition and working (function and block diagram) of Clutch, Gearbox and Differential.

UNIT – III	10 Hrs.

Refrigeration and Air-conditioning: Introduction, Definition of refrigeration, Principle of refrigeration, Unit of refrigeration (TR), Co-efficient of performance, Relative co-efficient of performance, Working of vapour compression refrigeration system(VCRS), Working of vapour absorption refrigeration system (VARS), Comparison between VCRS and VARS, Properties of good refrigerant, Working of room air-conditioner.

Metal Joining Processes:

Definition: Soldering, brazing and welding, Working principle: soldering and brazing, Welding process: Definition, Principles, Classification, Application, Advantages & limitations of welding, Arc welding process, Gas welding: Gas welding process, types of gas flames, Comparison between soldering, brazing and welding.

Lubrication: Classification and properties of lubricants.

Bearing: Classification of bearings, working of Bush bearing, pedestal bearing, pivotal bearing, collar bearing and antifriction bearing.

UNIT – IV	10 Hrs.

Power Transmission:

Belt drives: Open belt drive, Crossed belt drive, Derivation: Length of belt for open system and crossed systems, Velocity ratio of belt drives, Slip, Creep, Belt tension, Power transmitted by a belt drive, Comparison between flat and V belt drives, Numerical Problems.

Gear drives: Type of gear drives, Nomenclatures of spur gear with sketch, Advantages of gear drives, Disadvantages of gear drives, velocity ratio of gear drives, Gear trains: Simple and compound gear trains, Numerical Problems.

Industrial Engineering: Concept of Industrial Engineering: Definition, History and development, Roles of Industrial Engineer, Application of Industrial Engineering, Scope of Industrial Engineering.

Reference Books:

1. K. R. Gopalkrishna, Sudhir Gopalkrishna and S. C. Sharma, "Elements of Mechanical Engineering", 29th Edition, Subhash Publishers, Bangalore, 2009.
2. S.Trymbaka Murthy, "Elements of Mechanical Engineering", 3rd Edition, I.K. International Publishing House Pvt. Limited, New Delhi, 2010.
3. B.Agarawal and C.M. Agarwal, "Basic Mechanical Engineering", Wiley, 2011.
4. R.K.Rajput,"Automobile Engineering", 1st Edition, Laxmi Publications, 2007.
5. T.R.Bangaand, S.C.Sherma, "Industrial Engineering and Management", 11th Edition, Khanna Publishers, 2013.
6. S. Ravindra, "Elements of Mechanical Engineering", 8th Edition, Cengage learning, 2011.

Course Outcomes:

1. Apply the principles of thermodynamics to evaluate the properties of steam and explain the concepts of mechanical energy generation from the available natural source of energy.
2. Explain different types of IC engines, analyze and compute the performance parameters of an IC engine and identify the layouts of four wheeler with different parts of an automobile.
3. Differentiate the types of refrigeration systems and apply the knowledge of metal joining processes and bearings in various engineering applications.
4. Apply the fundamental concepts of power transmission in real time applications and explain the basics of industrial engineering.

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NUME113L / NUME213L	Computer Aided Engineering Drawing	03 - Credits (2 : 0 : 1)
Hrs/Week : 03		CIE Marks : 50
Total Hours: 40		SEE Marks : 50

UNIT – I	10 Hrs.

Projection of points: Projection of points located in all quadrants.

Projections of straight lines:

Projections of lines located in first quadrant only, line parallel to both the planes, perpendicular to one plane and parallel to other, inclined to one plane and parallel to other, inclined to both the planes. Determinations of true length and true inclinations with principal planes.

Projections of planes:

Projections of planes- perpendicular to the both the planes, parallel to one plane and perpendicular to other, inclined to one plane and perpendicular to other and inclined to both the planes.

Projections of solids:

Projection of solids (Prisms, pyramids, Cones, and Cylinders) resting on HP, axis/base inclined to HP and profile views.

Isometric Projection:

Isometric Projection of Prisms, pyramids, Cones and Cylinders, Combinations of solids (Maximum of two solids Co-Axial only)

Laboratory Assessment:

(a) Each laboratory subject is evaluated for 100 marks (50 CIE and 50 SEE).
(b) Allocation of 50 marks for CIE (30 marks for term work (sketching and printouts from SOLID EDGE) and 20 Marks for one practical test).
(c) The SEE Practical is conducted for 50 marks of three-hour duration, five questions to be from above syllabus. Students have to answer any three questions.
(d) 50%weightage is given to sketch and 50% is given to printouts.

Reference Books:

1. K. R. Gopalkrishan, ''Engineering Drawing',vol. I and II, 23rd edition, Subhas, 2014.
2. R. K. Hegde and Niranjan Murthy, ''Engineering Graphics''1st edition, Sapna, 2003.
3. K. R. Gopalkrishna, ''Engineering Graphics'', 30th edition, Subhas,2003.
4. Dr. B. K. Venkanna''Engineering Graphics'',
5. N. D. Bhat "Engineering Drawing"
6. P. I. Varghese, ''Engineering Graphics'', McGraw Hill, 2013

Course Outcomes:

1. Draw the points and lines at various position and quadrant, applying the principal of orthotropic projection using computer and software.
2. Draw the planes of various shapes with different orientations applying the principal of

orthotropic projection using computer and software.

3. Draw the primitive solids with different orientations applying the principal of orthotropic projection using computer and software.
4. Draw the isometric view of solids with different orientations applying the principal of isometric projection using computer and software.

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COMMON TO ALL BRANCHES

NUCH114L/ NUCH214L	Engineering Chemistry Laboratory	1.0 Credit (0 : 0 : 2)
Hrs/Week : 03		CIE Marks : 50
Total Hours: 40		SEE Marks : 50

PART – A

1. Determination of viscosity of liquid by Ostwald's Viscometer.
2. Potentiometric estimation of Iron in the given solution using standard $K_2Cr_2O_7$ solution.
3. Determination of pKa of a weak acid by standard NaOH using pH meter.
4. Conductometric estimation of HCl & CH_3COOH in acid mixture by Standard NaOH.
5. Colorimetric estimation of copper in the given solution.

PART – B

1. Preparation standard solution and Standardization of a given solution.
2. Determination of total hardness of a given water sample by EDTA method.
3. Determination of amount of CaO in the cement solution by EDTA method.
4. Determination of alkalinity of water sample by duel indicator method.
5. Determination of amount of Fe in a given solution using standard $K_2Cr_2O_7$ solution.

Reference Books:

1. Laboratory manual in Engineering Chemistry by Department of Chemistry, BEC Bagalkot.
2. Vogel's Text Book of Quantitative Chemical Analysis revised by G. H. Jeffery, J. Bassett, J. Mendham and R.C. Denny, 4th Edition.
3. Practical Engineering Chemistry by Sunita & Ratan Pub: S.K.Kataria & Sons.

Course Outcomes:

1. Write systematic procedure for setting up and conduct of experiment.
2. Perform experiment on volumetric analysis of materials of social relevance individually along with interpretation of results of analysis and calculation.
3. Perform experiments using instruments for chemical analysis with high accuracy.
4. Incorporate the practical skills of chemistry for engineering applications.

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NUBE115L/NUBE215L	Innovation and Design Thinking	02 - Credits (2 : 0 : 0)
Hrs/Week : 02		CIE Marks : 50
Total Hours: 40		SEE Marks : 50

UNIT – I	10 Hrs.

PROCESS OF DESIGN

Understanding Design thinking: Shared model in team-based design–Theory and practice in Design thinking–Explore presentation signers across globe–MVP or Prototyping.

UNIT – II	10 Hrs.

Tools for Design Thinking: Real-Time design interaction capture and analysis Enabling efficient collaboration in digital space–Empathy for design–Collaboration in distributed Design.

UNIT – III	10 Hrs.

Design Thinking in IT: Design Thinking to Business Process modeling – Agile in Virtual collaboration environment – Scenario based Prototyping.

UNIT – IV	10 Hrs.

DTF or strategic innovations: Growth – Story telling representation – Strategic Foresight - Change – Sense Making – Maintenance Relevance–Value redefinition-Extreme Competition–experience design-Standardization–Humanization-Creative Culture–Rapid prototyping, Strategy and Organization–Business Model design. Design thinking work shop Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test.

Reference Books:

1. John R. Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning International edition) 2nd edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand–Improve–Apply",Springer,2011
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.
5. Yousef Haik and Tamer M. Shahin, "Engineering Design Process", Cengage Learning, 2nd edition, 2011.
6. Book-Solving Problems with Design Thinking-Ten Stories of What Works (Columbia Business School Publishing) Hardcover–20 Sep 2013 by Jeanne Liedtka, Andrew King, Kevin Bennett.
7. **A**ctivity Based Learning(Suggested Activities in Class)/ Practical Based learning http://dschool.stanford.edu/dgift/
8. https://onlinecourses.nptel.ac.in/noc19_mg60/preview

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Course Outcomes:

Upon successful completion of the course, students will be able to:

1. Appreciate various design process procedure
2. Generate and develop design ideas through different technique
3. Identify the significance of reverse Engineering to Understand Products
4. Draw technical drawing for design ideas

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COMMON TO ALL BRANCHES

NUMA201C	Engineering Mathematics – II	03-Credits (3 : 0 : 0)
Hrs/Week : 03		CIE Marks : 50
Total Hours: 40		SEE Marks : 50

UNIT – I	10 Hrs.

Linear Algebra: Recap of Matrices: Rank of a matrix-echelon form. Solution of system of linear equations –consistency, Gauss-elimination method and Gauss-Seidel method, Eigen values and Eigen vectors.

Differential Equations-1: Exact and reducible to exact differential equations. Linear and Bernoulli's differential equation.

UNIT – II	10 Hrs.

Applications of ODE-orthogonal trajectories, Newton's law of cooling and L-R circuits.

Differential Equations-2: Second and higher order linear ODE's with constant coefficients-Inverse differential operator, method of variation of parameters (second order); Cauchy's and Legendre homogeneous equations.

UNIT – III	10 Hrs.

Laplace Transform: Introduction, Definition of Laplace Transform, Laplace Transform of standard functions, Properties: Shifting, differentiation, Integral and division by t. Periodic function, Heaviside's Unit step function.

UNIT – IV	10 Hrs.

Inverse Laplace transforms: Properties, Convolution theorem, Solutions of linear differential equations, Applications to Engineering problems.

Reference Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
2. Erwin Kreyszing's Advanced Engineering Mathematics volume I and volume II,wiley India Pvt.Ltd.,2014.
3. H K Das, Higher Engineering Mathematics
2. Erwin Kreyszing's Advanced Engineering Mathematics, wiley India Pvt.Ltd.,2014.
4. Elementary Differential Equations by Earl D. Rainville and Phillip E, Bedient, Sixth Edition.

Course Outcomes:

1. Able to recall the elementary matrices and find the rank of a matrix by reducing it into echelon form.
2. Ability to find the consistency and solution of system linear equations by using Gauss elimination and Gauss Seidel methods.
3. Able to find the Eigen values and Eigen vectors of the matrix.
4. Able to solve the exact, reducible to exact differential equations.
5. Able to solve linear and Bernoulli's differential equations.

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BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT- 587 103

COMMON TO ALL BRANCHES

NUHS206C	Professional Writing Skills in English	03 - Credits (2 : 0 : 0)
Hrs/Week : 03		CIE Marks : 50
Total Hours: 40		SEE Marks : 50

UNIT – I	10 Hrs.
Identifying Common Errors in Writing and Speaking English: Advanced English Grammar for Professionals with exercises, Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules with Exercises).Common errors in Subject-verb agreement, Noun-pronoun agreement, Sequence of Tenses and errors identification in Tenses. Advanced English Vocabulary and its types with exercises – Verbal Analogies, Words Confused/Misused, Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words, Common errors in the use of Idioms and phrases, Gender, Singular & Plural. Redundancies & Clichés.	
UNIT – II	**10 Hrs.**
Nature and Style of sensible writing: Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indianism in English Communication, Creating Coherence and Cohesion, Sentence arrangements exercises, Practice of Sentence Corrections activities. Importance of Summarizing and Paraphrasing. **Grammar** – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.	
UNIT – III	**10 Hrs.**
Technical Reading and Writing Practices: Reading Process and Reading Strategies, Introduction to Technical writing process, Understanding of writing process, Effective Technical Reading and Writing Practices , Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. The Listening Comprehension, Importance of Listening Comprehension, Types of Listening, Understanding and Interpreting, Listening Barriers, Improving Listening Skills. Attributes of a good and poor listener. Reading Skills and Reading Comprehension, Active and Passive Reading, Tips for effective reading.	
UNIT – IV	**10 Hrs.**
Professional Communication for Employment: Preparing for Job Application, Components of a Formal Letter, Formats and Types of official, employment, Business Letters, Resume vs Bio Data, Profile, CV and others, Types of resume, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types. Presentation skills and Formal Presentations by Students - Importance, Characteristics, Strategies of Presentation Skills. Dialogues in Various	

Situations (Activity based Practical Sessions in class by Students).

Professional Communication at Workplace: Group Discussions–Importance, Characteristics, Strategies of Group Discussions. Group Discussions is a Tool for Selection. Employment/ Job Interviews - Importance, Characteristics, Strategies of an Employment/ Job Interviews. Intra and Interpersonal Communication Skills - Importance, Characteristics, Strategies of a Intra and Interpersonal Communication Skills. Non-Verbal Communication Skills (Body Language) & its importance in GD and PI/JI/EI.

Reference Books:

1. Functional English (As per AICTE 2018 Model Curriculum) Cengage learning India Pvt. Ltd. [Latest Revised Edition] - 2020.
2. Professional Writing Skills in English, Infinite Learning Solutions – (Revised Edition) 2021.
3. A Course in Technical English, Cambridge University Press – 2020.
4. Communication Skills by Sanjay Kumar and Pushplata, Oxford University Press - 2018. Refer it's workbook for activities and exercises – "Communication Skills – I (A Workbook)" published by Oxford University Press – 2018.
5. Technical Communication – Principles and Practice, 3rd edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
6. High School English Grammar & Composition by Wren and Martin S. Chandh & Company Ltd., 2015.
7. Effective Technical Communication – 2nd edition by M. Ashraf Rizvi, McGraw Hill Education (India) Pvt. Ltd. – 2018.
8. Technical Communication - Cengage learning India Pvt. Ltd. [Latest Revised Edition] - 2020.

Course Outcomes:

1. To understand and identify the Common Errors in Writing and Speaking.
2. To achieve better technical writing and Presentation skills.
3. To read technical proposals properly and make them to write good technical reports.
4. Acquire Employment and Workplace communication skills.
5. To learn about Techniques of Information Transfer through presentation in different level.