WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR

(ANAUTONOMOUS INSTITUTE)

Affiliated to
Punyashlok Ahilyadevi Holkar Solapur
University, Solapur

CHOICE BASED CREDIT SYSTEM (CBCS)

F.Y.B.Tech

Syllabus Group-B

W.E.F.2023-24

WALCHAND INSTITUTE OF TECHNOLOGY, SOLAPUR
(An Autonomous Institute affiliated to PAH Solapur University, Solapur.)
CBCS Curriculum for First Year B. Tech (Common to all branches)
w. e. f. 2023-24

Semester-I (Group B)

- **Theory Courses**

Group	Name of the Course	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
Basic Science	Engineering Chemistry	3	-	-	3	60	40	-	100
Basic Science	Engineering Mathematics-I	2	-	-	2	60	40	-	100
Basic Science	Engineering Mathematics-I	-	1	-	1	-	-	25	25
Engg. Science	Basic Electrical & Electronics Engineering	2	-	-	2	60	40	-	100
Engg. Science	Basic Civil & Mechanical Engineering	3	-	-	3	60	40	-	100
Ability Enhancement Course	Professional & Communication Skills	1	-	-	1	30	20	-	50
Voc.& Skill Enhancement Course	Workshop Practice	1	-	-	1	-	-	-	-
Co-curricular Course	Creativity and Design Thinking	1	-	-	1	-	-	-	-
	Total	13	1	-	14	270	180	25	475

- **Laboratory Courses**

Group	Name of the Course	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
Basic Science	Engineering Chemistry	-	-	2	1	-	-	25	25
Ability Enhancement Course	Professional & Communication Skills	-	-	2	1	-	-	25	25
Engg. Science	Basic Electrical & Electronics Engineering	-	-	2	1	-	-	25	25
Engg. Science	Basic Civil & Mechanical Engineering	-	-	2	1	-	-	25	25
Voc.& Skill Enhancement Course	Workshop Practice	-	-	2	1	-	-	50	50
Co-curricular Course	Creativity and Design Thinking	-	-	2	1	-	-	50	50
	Total	-	-	12	6	-	-	200	200
	Grand Total	13	1	12	20	270	180	225	675
	Induction Program	** Please see note below							

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Semester-II (Group B)

- **Theory Courses**

Course Code	Name of the Course	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
Basic Science	Engineering Physics	3	-	-	3	60	40	-	100
Basic Science	Engineering Mathematics-II	2	-	-	2	60	40	-	100
Basic Science	Engineering Mathematics-II	-	1	-	1	-	-	25	25
Engg. Science	Engineering Mechanics	2	-	-	2	60	40	-	100
Engg. Science	Engineering Graphics & CAD	2	-	-	2	-	50	-	50
Professional Core Course	Programming for Problem Solving	2	-	-	2	-	50	-	50
Voc.& Skill Enhancement Course	Technical English	1	-	-	1	30	20	-	50
IKS	IKS (From basket)	2	-	-	2	-	25	25	50
	Total	14	1	-	15	210	265	50	525
	Democracy, Elections and Good Governance	-	-	-	-	50	-	-	50

- **Laboratory Courses**

Course Code	Name of the Course	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
Basic Science	Engineering Physics	-	-	2	1	-	-	25	25
Voc.& Skill Enhancement Course	Technical English	-	-	2	1	-	-	25	25
Engg. Science	Engineering Mechanics	-	-	2	1	-	-	25	25
Engg. Science	Engineering Graphics & CAD	-	-	2	1	-	-	50	50
Professional Core Course	Programming for Problem Solving	-	-	2	1	25#	-	25	50
Co-curricular Activity	Co-curricular Activity	-	-	-	2	-	-	50	50
	Total	-	-	10	7	25	-	200	225
	Grand Total	14	1	10	22	235	265	250	750

- **Legends used–**

L	Lecture	FA	Formative Assessment
T	Tutorial	SA	Summative Assessment
P	Lab Session	ESE	End Semester Examination
		ISE	In Semester Evaluation
		ICA	Internal Continuous Assessment

- **Notes-**

  Approximately half of the total students at F. Y. will enroll under Group A and remaining will enroll under Group B.

  - # - Indicates the subject 'Programming for Problem Solving' shall have a 'Practical and Oral Examination at the end of the semester assessing student's programming skills.

  - In Semester Evaluation (ISE) marks shall be based upon student's performance in three tests conducted &evaluated at Institute level.

  - Internal Continuous Assessment Marks (ICA) are calculated based upon student's performance during laboratory sessions /tutorial sessions.

  - Democracy, Elections & Good Governance is mandatory course. The marks earned by student with this course shall not be considered for calculation of SGPA/CGPA. However, student must complete End Semester Examination (ESE) of 50 marks (as prescribed by university) for fulfillment of this course. This course is not considered as a passing head for counting passing heads for ATKT. However, student must pass this subject for award of the degree.

    The rationale of the study is to make the pupils aware of the importance of democracy. What constitute democracy, what is its importance from the point of view of the role of individual and what exactly can an individual get if he performs his role well in the society. This module also aims to make the individual understand the different aspects of democracy and its implications in the overall development of the state. The syllabus is introduced from the point of view that all students upon entering into the college, enroll themselves as voters and encourage and enthuse other members of the society to participate not only in election process but also electoral and political process in general.

***Note: Student must complete induction program of minimum five days before commencement of the regular academic schedule at the first semester.**

GUIDELINESFORINDUCTIONPROGRAM

The purpose of the education system is to develop good human beings capable of rational thought and action, possessing compassion and empathy, courage and resilience, scientific temper, and creative imagination, with sound ethical moorings and values, while at the same time prepare them for gainful, fulfilling employment.

The students come from various backgrounds and the new students are basically moving from one culture to another. Each family, institution, region, community, etc. have evolved their way of life, their cultures over a while. Today, a major issue is that one culture tends to oppose other cultures. This is because of their basic assumptions, and therefore their thoughts tend to differ. Even though there are commonalities at the core value level, the conflict is at the level of expression and details. With this situation, it is imperative to articulate the essence or core aspects of human culture and civilization i.e. understand universal human values like trust and respect, love and compassion; and appreciate the various expressions, different approaches taken in different regions.

The Induction Program aims at producing engaged, productive, and contributing citizens for building an equitable, inclusive, and plural society as envisaged by our Constitution. It would prepare newly admitted undergraduate students for the new stage in their life by facilitating a smooth transition from their home and

school environment into the college and university environment. During this, the student would build a healthy lifestyle, become aware of others and society beyond the individual, enhance creativity, bonding, character, and develop sensitivity towards self and one's relationships, and also bond with their own batch-mates and senior students as well as faculty members. Besides the above, several meta-skills and underlying values are needed.

So, when new students join an institution, they are to be welcomed and oriented to the institute, its vision, people, purpose, culture and values, policies, programs, rules, and regulations, etc. through a well-planned three-week interaction before regular classes start. They should feel at ease by lowering the burden of syllabus and credits. This is necessary for a student to acclimatize to the new environment of a college and to create a bond between the teacher and a student. An idea to introduce an induction program in the curriculum, to equip the students with communication skills, and get them acquainted with the culture of the institution and human values, was formalized. A student has to undergo this induction program after joining the institute and before the commencement of classes. Normal classes of the engineering program shall begin after the students have undergone a three-week induction program.

The SIP consists of different activities which includes meeting new students, socializing with teachers and other people in the university. Secondly associating with the Local area or city, knowing different departments, associating with the department heads, local stores and necessary shops for the survival at new place. Basically, getting information about the rules and regulations of the university which includes dos and don'ts. Other activities which may involve students in several creative, cultural and co-curricular activities through which they can explore themselves and get idea about their intrinsic desires and interests which may help them in the long run. In order to make it worth, at the initial level of joining of student various seminars, lectures by eminent personalities, sessions by the appointed mentor for the student is being done to make them more familiar with the university environment. It has been seen that student after schooling when moves towards further studies for either under graduation or post-graduation has got so many confusions and false knowledge about the college and the curriculum. They should know the basic idea about the fruits and prospects of the particular course and the university or institute in which they are entering. To have faith about their choices and to know that after completion, they will be well equipped with the values and skills.

With this background, the SIP has been formulated with specific goals to help students to connect to the basic principles through specific examples, to see and appreciate various cultures, to see the commonality amongst them, in the light of clarity about human culture and civilization, to become familiar with the ethos and culture of the institution (based on institutional culture and practices), to set a healthy daily routine, create bonding in batch as well as between faculty members and students, to get an exposure to a holistic vision of life, develop awareness, sensitivity and understanding of the Self--Family--Society--Nation--World--Entire Nature, to facilitate them in creating new bonds with peers and seniors who accompany them through their college life and beyond, to overcome weaknesses in some essential professional skills – Mathematics, Language proficiency modules (only for those who need it).

The various modules or core areas, the activities in which the student would be fully engaged throughout the day for the entire duration of the program, recommended for the 3-week SIP are: SIP Module 1: Universal Human Values I (UHV I):The course is designed with the purpose of helping students in developing a holistic perspective about life. It gets the students to explore themselves and allows them to experience the joy of learning, stand up to peer pressure, take decisions with courage, be aware of relationships with colleagues and supporting staff in the hostel and department, being sensitive to others, etc.

SIP Module 2: Physical Health and Related Activities: This module is intended to help understand the basic principles to remain healthy and fit and practice them through a healthy routine which includes exercise, games etc. Physical activities will help students remain healthy and build strong bones and muscles, control weight, and reduce symptoms of anxiety and depression.

SIP Module 3: Familiarization of Department/ Branch and Innovation: This module is for introducing and relating the student to the institution/department/branch; how it plays a role in the development of the society, the state, region, nation and the world at large and how students can participate in it. Guest lectures by prominent personalities and alumni will help the students in understanding what's ahead in their time at college. It is absolutely necessary for students to be familiar with their department/branch before the start of proper academic sessions. They need to be made understood how the department plays a role in the world's development and the opportunities it offers to the students.

SIP Module 4: Visit to a Local Area :For a student to relate to the social environment of the educational institution as well as the surroundings, a place wherein their most significant years students will scribble some indelible memories, an absolute necessity is generated for city visits to let students understand the environment through interaction with the people, place, history, and politics. This activity may also help the students to understand the local problems further, which will help to increase the innovative thinking for the solution to those problems.

SIP Module 5: Lectures by Eminent People: Guest lectures are a great way to help the students gain a perspective on many different things in the world. Eminent personalities in different fields of expertise like academics, sports, industry, business etc. can share their story and talk about important subjects like career, entrepreneurship, government policies, technology etc. Their stories will act as inspiration for the students embarking on a new phase in life. From these lectures, students will also be able to make note of valuable advice from the experienced persons and apply it in their life.

SIP Module 6: Proficiency Modules: This module is to help fill the gaps in basic competency required for further inputs to be absorbed. It includes efforts to make the student proficient in interpersonal communication and expression. This period can be used to overcome the deficiencies in some important skillsets that the students may have. For example, English, Computer proficiency, Hindi, Communication skills, etc.

SIP Module 7: Literature / Literary Activities: Through the exposure of local, national, and international literature, this module is aimed at helping the student learn about traditional as well as contemporary values and thought. To develop the clarity of humanistic culture and its expression through literature, students may be exposed to local, regional, national, or international literature. It will help them in understanding traditional and contemporary values and thought.

SIP Module 8: Creative Practices: This module is to help develop the clarity of humanistic culture and its creative, joyful expression. The students can choose one skill related to visual arts or performing arts. Examples: Painting, sculpture, pottery, music (vocal, instrumental…), dance, drama, literary activities (reading, writing, debating…), etc.

SIP Module 9: Extra Curricular Activities: This is a category under which things that are not placed in any of the above may be placed. This has suggestions for sessions or activities that can be conducted like some clubs and hobby group may be made for each of the above categories, so that students may pursue them even after SIP. Anti-Ragging Briefing, Wellness Sessions, Informal Interactions, Club/Council/Committee Briefings, Intra Fresher Competitions etc. are included in this module.

Walchand Institute of Technology, Solapur

Autonomous

F.Y.B.Tech. Part II

Engineering Chemistry

Civil Engineering /Mechanical & Automation Engineering

Teaching Scheme:	Examination scheme:
Lecture:3hrs/week,3credits	ESE:60Marks
Practical:2hr/week,1credit	ISE:40Marks
	ICA: 25 Marks

- **Course Objectives:**
  1. To understand the chemistry of fuels, their applications in various fields and to calculate calorific values.
  2. To understand the Phase rule and its applications in engineering.
  3. To study the chemistry of lubricants and their properties in different applications.
  4. To understand the properties and applications of various engineering materials like metals, alloys, and ceramics.
  5. To impart knowledge of the sources, impacts, and control measures of air and water pollutants to promote sustainable and clean air and water quality.
  6. To understand the various types of environmental issues and its effects.

- **Course Outcomes:**

  Upon successful completion of this course, the students will be able to:
  1. Identify the different types of fuels and their uses in various fields and to calculate calorific values.
  2. Apply thermodynamic principles to determine the equilibrium conditions and phase transformations in one and two-component systems.
  3. Evaluate the properties of lubricants and recommend suitable lubricants for different applications.
  4. Analyze the properties of metals, alloys, and ceramics and suggest their applications in various fields.
  5. Describe the methods to identify, prevent, and mitigate air and water pollution, thereby safeguarding ecosystems and human well-being.
  6. Understand the causes, consequences, and efforts to address various environmental issues for the protection of human health and the environment.

Section-I

Unit I: Fuels [06 Hrs]

Classification & characteristics, Comparison between solid, liquid and gaseous fuel & Dulong's formula & Numerical: Determination of calorific value of a fuel sample by Dulong formula.

Petroleum: Introduction, composition, classification, origin, refining of crude oil.

Unit II: Phase rule [07 Hrs]

Basic principles of Gibb's Phase Rule, definition, terminologies etc., Application of phase rule to one component system (Water), the triple point, areas, metastable system, effect of change of temp, pressure on equilibria.

Two component system, solid liquid equilibria, simple eutectic system, eutectic point, eutectic mixture, Silver-lead system, introduction, significance, merits and demerits of phase rule

Unit III: Lubricant [07 Hrs]

Definition, functions & classification of lubricants: solid, semisolid & liquid lubricant. Characteristic properties of lubricants: (only definition) such as viscosity, viscosity index, flash point & fire point, cloud point & pour point, aniline point, oiliness, saponification value & acid value. Numerical: Saponification & Acid value

Types of lubrications: Fluid film (thick film), Boundary (thin film).

Selection of lubricants: for cutting tools, I.C. engine, gears, transformers, delicate instruments & refrigeration system.

Section-II

Unit IV: Engineering Materials: [07 Hrs]

Metallic Materials: properties, composition and applications of cast iron, steel and wrought iron, Alloys: Definition, purposes of making alloys.

Ceramics: Definition, classification, properties.

Glass: General properties, general method of manufacture of glass,

Types of glasses: soft, hard, borosilicate, optical, laminated and safety glass

Unit V: Water-Parameters and treatment [07 Hrs]

Water quality parameters: pH, acidity alkalinity, total solids, dissolved oxygen, chlorides, BOD, COD, and Hardness of water: types of hardness (temporary & permanent), calcium carbonate equivalent hardness and its calculations. (Numerical on determination of hardness), scale and sludge in boilers, formation, disadvantages and prevention of scale & sludge.

Softening of hard water: Ion exchange process & Zeolite process.

Primary treatment of water: Aeration, sedimentation with coagulation &disinfection

Unit VI: Socio Environmental Problems [06 Hrs]

Climate change, Global warming and Greenhouse effect, Acid rain, Ozone layer depletion.

Water conservation- Rain water harvesting, Water shed development and management.

Internal Continuous Assessment (ICA):-

ICA consists of performance of eight experiments based on the units.

List of Experiments:

1. Determination of viscosity of a lubricant by Ostwald's viscometer.
2. Estimation of Copper in Bronze metal alloy.
3. Preparation of phenol formaldehyde resin.
4. Preparation of urea Formaldehyde resin.
5. Separation of mixture of organic compounds by TLC.
6. Determination of oil and grease from waste water.
7. Determination of dissolved oxygen in water.
8. Hands on Determination of pH by pH meter.

9. Hands on Determination of EMF of acid base titration by potentiometer.
10. Preparation of Biodiesel from oil.

- **Text Books:**
  1. A textbook of Engineering Chemistry, S.S. Dara, S.S Umare, S.Chand publication
  2. A text book of Engineering Chemistry, Shashi Chawala, Dhanpat Rai & Co.
  3. A text book of Experiments and Calculations in Engineering Chemistry, S.S.Dara. S.Chand, publication

- **Reference Books:**
  1. Engineering Chemistry, Jain and Jain, Dhanpat Rai & Co
  2. Engineering Chemistry, M.Subha Ramesh, Dr.S.Vairan-Ed.-IInd Wiley
  3. Instrumental Methods of chemical analysis, Chatwaland Anand, Himalaya Pub.House
  4. Industrial Chemistry, B.K. Sharma, Goyal
  5. Chemistry for Engineers, Rajesh Agnihotri, Wiley
  6. Fundamentals of Engineering Chemistry, S.K.Singh, New Age Int.
  7. Engineering Chemistry (NPTELWebbook), B.L.Tembe, Kamaluddin & M.S. Krishnan.

Walchand Institute of Technology, Solapur

Autonomous

F.Y.B.Tech. Part I

Engineering Chemistry

Computer Science Engineering/ Information Technology/ Electronics & Computer Engineering/ Electronics & Telecommunication Engineering

Teaching Scheme:	**Examination scheme:**
Lecture: 3 hrs./week,3credits	ESE:60 Marks
Practical:2 hrs./week,1credit	ISE:40 Marks
	ICA: 25 Marks

- **Course Objectives:**
  1. To understand the properties and applications of metals, alloys, and ceramics.
  2. To understand the synthesis, properties, and applications of polymers.
  3. To impart knowledge of importance of quality of water and appropriate water treatment process.
  4. To equip students with the required analytical skills.
  5. To provide fundamental knowledge of electrochemistry and its applications in engineering.
  6. To provide a comprehensive understanding of various energy Storage systems.

- **Course Outcomes:**

  Upon successful completion of this course, the students will be able to:
  1. Analyze the properties of metals, alloys, and ceramics and suggest their applications in various fields.
  2. Describe polymers and polymerization processes and various moulding operations
  3. Describe importance of quality of water and appropriate water treatment process
  4. Describe various instrumental techniques.
  5. Apply the principles of electrochemistry to analyze, design, and implement innovative solutions in various fields such as corrosion prevention, electroplating etc,
  6. Apply the knowledge to design, analyze, and implement efficient and sustainable energy storage systems to meet the demands of energy

Section-I

Unit I: Engineering Materials: [07 Hrs]

Alloys: Definition, purposes of making alloys.

Glass: General properties, general method of manufacture of glass, Types of glasses:
soft, hard, borosilicate, optical, laminated and safety glass. Optical fibers

Unit II: Plastic and Rubber [07 Hrs]

Introduction: Definition & important terms: Polymerization, types of polymerization degree of polymerization (DP), Numerical: Degree of polymerization, Number average molecular weight

Plastics: Definition, properties, types of plastics (thermosoftenig and thermosetting), Properties and applications: PVC and PET, Conducting Polymers,

Engineering Polymers: Polycarbonates, Solid Silicones.

Unit III: Water: Parameters and Treatment [07 Hrs]

Introduction: Water quality parameters: pH, acidity alkalinity, total solids, dissolved oxygen, chlorides, BOD, COD, and Hardness of water: types of hardness (temporary & permanent), calcium carbonate equivalent hardness and its calculations. (Numerical on determination of hardness), scale and sludge in boilers, formation, disadvantages and prevention of scale & sludge. Softening of hard water: ion exchange process & zeolite process, Primary treatment of water: Aeration, sedimentation with coagulation &disinfection.

Section-II

Unit IV: Analytical Techniques [07 Hrs]

Introduction: Concentration of solution: Normality, Molarity, Molality (definition and Numerical) Chromatography: Definition, types. GLC-definition, instrumentation and its applications. Thermal analysis: definition of TGA, instrumentation and application of TGA.

Unit V: Electrochemistry and its applications [07 Hrs]

Introduction to single electrode potential, Nernst equation, electrochemical series, Electroplating, Theory, Factors affecting the nature of deposit, Methods of cleaning base metal; Electroplating of copper;

Unit VI: Energy Storage systems [07 Hrs]

Introduction to batteries – classification – primary, secondary and reserve (thermal) batteries. Characteristics–cell potential, current, capacity and storage density, energy efficiency. Construction, working and application of Leclanche cell -Duracell, Lithium ion batteries.
Fuel cell - construction and working of PEMFC.

Internal Continuous Assessment (ICA):-

ICA consists of performance of eight experiments based on the units.

List of Experiments:

1. Estimation of Copper in Bronze metal alloy.
2. Determination of Hardness of water.
3. Determination of Alkalinity of water.
4. Determination of Chloride content in given water.
5. Determination of dissolved oxygen in water.
6. Preparation of phenol formaldehyde resin.
7. Preparation of urea Formaldehyde resin.
8. Determination of COD of water sample.
9. Separation of mixture of organic compounds by TLC.
10. Determination of oil and grease from waste water.
11. Hands on Determination of pH by pH meter.
12. Hands on Determination of EMF of acid base titration by potentiometer.

- **Text Books:**
    1. A textbook of Engineering Chemistry, S.S. Dara, S.S Umare, S.Chand publication
    2. A text book of Engineering Chemistry, Shashi Chawala, Dhanpat Rai & Co.
    3. A text book of Experiments and Calculations in Engineering Chemistry, S.S.Dara. S.Chand, publication

- **Reference Books:**
    1. Engineering Chemistry, Jain and Jain, Dhanpat Rai & Co
    2. Engineering Chemistry, M.Subha Ramesh, Dr.S.Vairan-Ed.-IInd Wiley
    3. Instrumental Methods of chemical analysis, Chatwaland Anand, Himalaya Pub. House
    4. Industrial Chemistry, B.K. Sharma, Goyal
    5. Chemistry for Engineers, Rajesh Agnihotri, Wiley
    6. Fundamentals of Engineering Chemistry, S.K.Singh, New Age Int.
    7. Engineering Chemistry (NPTELWebbook), B.L.Tembe, Kamaluddin & M.S. Krishnan.
    8. Fuel Cells-Shripad Revankar, Pradeep Majumdar
    9. Fuel Cell Fundamentals-Ryan O'Hayre, Suk-Won Cha, John Wiley & Sons
    10. Recent trends in Fuel
    11. Cell Science and Technology-Suddhasatwa Basu, Anamaya Publishers, New Delhi

Walchand Institute of Technology, Solapur
Autonomous
F.Y.B.Tech. Part I
Engineering Mathematics I
Civil / Mechanical & Automation Engineering

Teaching Scheme:
Lecture: 2 hrs/week, 2 credits
Tutorial: 1 hr/week, 1 credit

Examination scheme:
ESE: 60 Marks
ISE: 40 Marks
ICA: 25 Marks

- **Course Objectives:**
    1. To introduce to student rank of matrix, solution of simultaneous equations, Eigen values and Eigen vectors.
    2. To introduce to student the expansion of functions and evaluate the indeterminate forms of limits.
    3. To introduce to student the differentiation of function of several variables and its applications.
    4. To introduce to student gradient, directional derivative, curl and divergence.

- **Course Outcomes:**

At the end of this course, students will able to-
    1. Use matrices techniques for solving system of simultaneous Linear equations
    2. Calculate Eigen values and eigenvectors.
    3. Express the power series expansion of a given function and evaluate indeterminate forms.
    4. Deal with derivative of functions of several variables that are essential in various branches of Engineering and its applications.
    5. Understand the applications of vector calculus refer to solenoidal, irrotational vectors.

Section-I

Unit I Linear Algebra Part I   **[04 Hrs]**
Rank of matrix by echelon form, System of Linear Equations-Homogeneous and Non homogeneous equations.

Unit II Linear Algebra Part II   **[05 Hrs]**
Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors, Cayley – Hamilton theorem (excluding proof)

Unit III Expansion of Functions and Indeterminate forms   **[05 Hrs]**
Taylor's and Maclaurin's theorem, Standard series expansions, indeterminate forms by L' Hospital Rule.

Unit IV Partial Differentiation [05 Hrs]

Functions of several variables, Partial Derivatives, Composite Function, Total Derivative, Change of Independent variables, Euler's Theorem on Homogeneous functions

Unit V Applications of Partial Differentiation [04 Hrs]

Jacobians and its applications, Errors and Approximations, Maxima and Minima of functions of two variable.

Unit VI Vector Calculus [05 Hrs]

Scalar and vector fields, gradient of scalar point function, directional derivatives, curl and divergence - physical interpretation, solenoidal and irrotational vector fields.

Internal Continuous Assessment (ICA): -

ICA shall be based on student's performance during tutorial sessions and on completion of six assignments one on each unit.

- **Text Books:**

1. A Text Book of Applied Mathematics, P.N. and J.N.Wartikar,Vol.1, Pune Vidyarthi Griha Prakashan.
2. Advanced Engineering Mathematics, H.K. Das, S. Chand Publications, Delhi.
3. Engineering Mathematics (Volume), ITL Education, C engage Learning.
4. Engineering Mathematics, Ravish R Sing and Mukul Bhatt, McGraw-Hill.

- **Reference Books:**

1. Higher Engineering Mathematics (42ndEdition), B.S. Grewal Khanna Publications, Delhi.
2. Engineering Mathematics, Srimanta Paland Subodh C. Bhunia, Oxford Higher Education.
3. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill NewDelhi, 2010.
4. Applied Mathematics-I, II, Kreyzig's, Wiley.

Walchand Institute of Technology, Solapur
Autonomous
F.Y.B.Tech. Part I
Engineering Mathematics I
Computer Science / Information Technology Engineering / Electronics & Telecommunication / Electronics & Computer Engineering

Teaching Scheme:	**Examination scheme:**
Lecture: 2 hrs/week, 2 credits	ESE: 60 Marks
Tutorial: 1 hr/week, 1 credit	ISE: 40 Marks
	ICA: 25 Marks

- **Course Objectives:**
    1. To introduce to student rank of matrix, solution of simultaneous equations, Eigen values and Eigen vectors.
    2. To introduce to student the differentiation of function of several variables and itsapplications.
    3. To introduce to student awareness of concept of convergence of sequence and series.
    4. To introduce the tools of differentiation of functions of complex variable that are used in various techniques dealing engineering problems.

- **Course Outcomes:**

At the end of this course, students will able to-
    1. Use matrices techniques for solving system of simultaneous Linear equations
    2. Calculate Eigen values and eigenvectors.
    3. Test divergence & convergence of infinite series.
    4. Deal with derivative of functions of several variables that are essential in various branches of Engineering and its applications.
    5. Use the tools of differentiation of functions of a complex variable that are used in various techniques dealing engineering problems.

Section-I

Unit I Linear Algebra Part I [04 Hrs]

Rank of matrix by echelon form, System of Linear Equations-Homogeneous and Non homogeneous equations.

Unit II Linear Algebra Part II [05 Hrs]

Characteristic equation – Eigen values and Eigen vectors of a real matrix – Properties of Eigen values and Eigen vectors ,Cayley – Hamilton theorem (without proof).

Unit III Infinite Series 04 Hrs]

Infinite sequences, infinite series, types of series, Test of convergence, absolute and conditional convergence, Cauchy test, comparison test and De Alembert's test.

Unit IV Partial Differentiation [05 Hrs]

Functions of several variables, Partial Derivatives, Composite Function, Total Derivative, Change of Independent variables, Euler's Theorem on Homogeneous functions.

Unit V Applications of Partial Differentiation [04 Hrs]

Jacobians and its applications, Errors and Approximations, Maxima and Minima of functions of two variables

Unit VI Complex Variable (Differentiation) [05 Hrs]

Introduction to complex number, Differentiation, Cauchy Riemann Equations (Without Proof), Analytic Functions, Elementary Analytic Functions (Exponential, Trigonometric and Logarithmic function), Harmonic Functions and Conjugates, Construction of Analytic Function.

Internal Continuous Assessment (ICA): -

ICA shall be based on student's performance during tutorial sessions and on completion of six assignments one on each unit.

- **Text Books:**

1. A Text Book of Applied Mathematics, P.N. and J.N.Wartikar,Vol.1, Pune Vidyarthi Griha Prakashan.
2. Advanced Engineering Mathematics, H.K. Das, S. Chand Publications, Delhi.
3. Engineering Mathematics (Volume), ITL Education, C engage Learning.
4. Engineering Mathematics, Ravish R Sing and Mukul Bhatt, McGraw-Hill.

- **Reference Books:**

1. Higher Engineering Mathematics (42ndEdition), B.S. Grewal Khanna Publications, Delhi.
2. Engineering Mathematics, Srimanta Paland Subodh C. Bhunia, Oxford Higher Education.
3. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill NewDelhi, 2010.
4. Applied Mathematics-I, II, Kreyzig's, Wiley.

Walchand Institute of Technology, Solapur
Autonomous
F.Y.B.Tech. Part I
Basic Electrical and Electronics Engineering
(All Branches)

Teaching Scheme:	Examination scheme:
Lecture: 2 hrs/week, 2 credits	ESE: 60 Marks
Practical: 2 hr/week,1 credit	ISE: 40 Marks
	ICA: 25 Marks

Electrical and Electronic engineers work at the forefront of practical technology, improving the devices and systems we use every day. From solar-energy systems to mobile phones, we innovate to meet society's communication, tech. and energy needs. Electricity is integral to modern life - power generation, transport, medicine, quantum information, and electrical engineering deal with the supply and flow of power; circuits where electricity flows from one point to another, and high-voltage applications with heavy current. Electronic engineering is about electrical circuits and components, creating, designing, and testing them, and integrating them into the hardware of the systems, and circuits that process. Both fields focus on real-world applications.

- **Course Objectives:**

1. To introduce student various simplification methods for DC circuits so that student can analyze DC circuits and can solve numerical problems based on it
2. To introduce student fundamentals of magnetic circuits and electromagnetic induction and their application.
3. To make student comprehend the generation and behavior of single-phase and poly-phase AC circuits.
4. To make student comprehend the working of a diode and bipolar junction transistor.
5. To make student understand different types of transducers & application areas of transducers.
6. To introduce to student the fundamental of digital electronics.

- **Course Outcomes:**

    At the end of this course, students will able to-

1. Apply the various simplification methods to analyze dc circuits.
2. Use the concept of magnetic circuits to analyze different application parameters.
3. Apply knowledge of AC fundamentals to analyze AC circuits.
4. Explain the working, characteristics, and applications of diode and BJT.
5. Select appropriate transducers to measure various physical parameters like distance, temperature, etc.
6. Perform arithmetic operations on digital number systems and solve Boolean expressions.

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Section – I
</div>

Unit 1: DC Circuits [4 Hrs]
Kirchhoff's voltage and current law & its implementations, simplifications of resistive circuits - series and parallel combinations, star-delta, delta-star conversions

Unit 2: Electromagnetism [5 Hrs]
Series Magnetic Circuits: Introduction, Faraday's law of electromagnetic induction, Lenz's law, self and mutual inductance.
Single-Phase Transformer: Working principle and construction.
DC motor- Construction, working principle, and speed control.

Unit 3: AC Circuits [6 Hrs]
Single phase AC- Generation of voltage and current, RMS value, average value, form factor, crest factor, and peak factor.
AC circuits - R, L and C circuits, its behavior for single phase AC and phasor diagram.
Three phase AC- Generation, star and delta connections for balanced systems.

<div align="center">

Section – II
</div>

Unit 4: Diodes and Rectifiers [4 Hrs]
P-N junction diode - Construction, working, V-I characteristics.
Rectifiers-Circuit diagram & working of half wave rectifier, full wave rectifier, bridge rectifier,bridge rectifier with capacitor filter.
Special Purpose Diodes- Photodiode,Zener, LED-working and application

Unit 5: Bipolar Junction Transistor [3 Hrs]
BJT- Construction, working, current components, relationship between α and β, CB, CE, CC configuration, I/O characteristics of CE configuration.
Application of BJT- Switch and CE amplifier.

Unit 6: Electrical Transducers [2 Hrs]
Parameters for selection of transducers.
Construction and Working- Strain gauge, LVDT, thermocouple, thermistor, LDR, solar cell.

Unit 7: Digital Electronics [6 Hrs]
Number system- Decimal, binary, octal, hexadecimal & their inter-conversion, BCD code
Binary Arithmetic- Addition, subtraction,subtraction using 2's complement
Logic Gates- Symbol, output equation, truth table, the realization of basic gates using universal gates.
Boolean Algebra- Laws & rules, De-Morgan theorem

Internal Continuous Assessment (ICA): -
ICA consists of the performance of eight experiments based on the units.

Text Books:
1. Electrical Technology (Volume I & 2), B L Theraja, 22nd edition, S Chand & Company Ltd.
2. Basic Electrical Engineering, V K Mehta, Revised edition, S Chand & Company Ltd.
3. Basic Electronics Solid State, B L Thereja, Revised edition, S Chand & Company Ltd.

- **Reference Books:**
1. Electrical Technology, E Hughes, 10th edition, ELBS, Longman.
2. Electronic Devices and Circuits, David A. Bell Oxford University, Press India, Fifth edition.
3. Principles of Electronic Devices and Circuits (Analog and Digital), B.L. Theraja, R.S. Sedha, S. Chand publication
4. Digital Principles and Applications, Albert Malvino, Donald Leach, Tata McGraw Hills Publication

Walchand Institute of Technology, Solapur
Autonomous
F.Y.B.Tech. Part I
Basic Civil & Mechanical Engineering
(All Branches)

Teaching Scheme:	Examination scheme:
Lecture: 3hrs/week, 3 credits	ESE: 60 Marks
Practical:2hr/week, 1 credit	ISE: 40 Marks
	ICA : 25 Marks

Basic Civil Engineering course shares the knowledge of the role of a Civil engineer, the relevance of Civil Engineering to other branches, components of the building, and different modes of transportation systems. Engineers need geospatial knowledge of remote sensing, GIS, and GPS as a part of Surveying and Geomatics. A Civil Engineer executes the work with various aspects of environmental and water resource management. The introduction of sustainability and green buildings are essential interdisciplinary components of Civil Engineering.

The course on Basic Mechanical Engineering is aimed at providing him the knowledge in all those areas through demonstrations and shop instructions. This course is also aimed at providing the student the exposure to Engineering concepts and machines which will help him to adapt to the teaching which takes place in higher semesters

Course Objectives:

1. To describe the relevance of Civil Engineering to other branches of Engineering and explain the significance of different modes of Transportation Engineering
2. To enable the students to carry out simple surveys using surveying instruments and geospatial techniques of Remote sensing, Geographic Information System (GIS) and Global Positioning System (GPS).
3. To introduce the students to concepts of Environment &Water Resources Engineering, Buildings components, and 'Green' Buildings.
4. To introduce the students to thermodynamic processes.
5. To introduce the students to 2-stroke and 4-stroke IC Engines
6. To introduce the students to power-producing and power-absorbing devices.

Course Outcomes: At the end of the course, students will be able to,

1. List and describe various roles of Civil Engineer with the relevance of Civil Engineering knowledge to other branches of Engineering and explain various modes of Transportation.
2. Perform Engineering surveys like measurement of distances, elevations and angles using Surveying instruments and explain the introduction of modern techniques such as Remote sensing, GIS, and GPS.
3. Explain various components of Environmental Engineering, Water Resources Management And Building Construction.
4. Determine the heat and work quantum in thermodynamic processes.
5. Distinguish between 2-stroke and 4-stroke I.C. engines.
6. Distinguish and select the type of power plants and power-producing/absorbing systems.

Section-I

Unit1: Introduction to Civil Engineering [09Hrs]

Definition and scope of various sub domains of Civil Engineering. Role of Civil Engineer in various construction activities, Relevance of the Civil Engineering branch to other branches of Engineering and Technology. Various modes of transportation, Roads, Railways Bridges, Tunnels, Docks, and Harbours. Introduction to roads: IRC classification, typical functional cross sections.

Unit 2: Introduction of Surveying and Geomatics [09Hrs]

General Principles of Surveying, Classification of Surveying. Measurement of horizontal distances; Determination of reduced levels using Dumpy level/Auto level. Angular measurements using Prismatic Compass. Introduction, types, and applications of 'Total Station' and Transit Theodolite.

Fundamentals of 'Remote sensing' and its application in various fields. Introduction to Geographic Information System (GIS), Fundamentals of Global Positioning System (GPS).

Unit 3: Building Construction and Sustainable Development [09Hrs]

General idea about substructure, superstructure, Elements of a building (Foundation, Column, beam, plinth, lintel, chajja, roof, parapet, spout, etc.) and their functions.

Principle of load transfer: frame structures, load-bearing wall structures.

Environmental Engineering: Sources of water, Hydrology, Dams, and storage reservoirs. Water treatment systems; Solid waste management.

Section-II
Basic Mechanical Engineering

Unit 5: Pumps, Compressors &Turbines [05 Hrs]

Power absorbing devices

Pumps: definition, classification, construction, working and applications of reciprocating pump, centrifugal pump.

Compressors: construction, working and applications of reciprocating compressor, rotary compressors (vane blower)

Power producing devices

Turbines: construction, working and applications of Pelton-wheel, Francis and Kaplan turbines.

Unit 6: Machine Tools and Joining Processes [05 Hrs.]

Machine tools:

Centre lathe – basic elements, construction, working, operations on lathe-(Only turning, facing).

Drilling machine - basic elements construction, working, operations on pillar drilling machine-(Only drilling and reaming)

Metal Joining Processes: Welding process: Definition, Types- manual metal arc welding, spot welding.

Unit 7: Power Transmission System [06 Hrs.]
Belt drives:

Open and cross belt drives, materials of belt, types of belts, length of belt for open and cross drive, velocity ratio of simple and compound belt drive, centrifugal tension, maximum power transmitted (numerical on simple belt drive only)

Other Transmission Systems:

Chain drive, gear, types of gears (excluding gear terminology), gear trains- simple and compound, epicyclical gear train.

Unit 8: Thermodynamics [04 Hrs.]

Definition of thermodynamics, thermodynamic Systems, surrounding, universe, types of systems, state of system, properties- intensive and extensive, thermodynamic equilibrium, process and cycle, Zeroth Law of thermodynamics.

Work, heat, first law of thermodynamics, first law applied to flow processes, steady flow process, steady flow energy equation (SFEE),(numerical).

Internal Continuous Assessment (ICA): -

The ICA shall consist of any 4 Practicals /Demonstrations from the following list:

   Note:
1.   Practicals of Basics of Civil Engineering and Basics of Mechanical Engineering will be conducted in alternate weeks.
2.   As a part of the completion of ICA, student shall submit separate completed Journals and drawings at the end of the course.

List of Experiments:
1.   Study of domestic refrigerator.
2.   Study of split air conditioner.
3.   Study of 2 stroke engine.
4.   Study of 4 stroke engine.
5.   Study of pumps.
6.   Study of compressors.
7.   Demonstration of turbines.
8.   Demonstration of Power Plant equipment.

Text Books:
1.   Thermal Engineering, P.L. Ballaney, Khanna Publishers
2.   Thermal Engineering, Domkundwar, Kothandaraman, Domkundwar, Dhanpat Rai & Co.
3.   Elements of Workshop Technology, Vol-I & II, S.K. Hajra Choudhury, A K, Hajra Choudhury, Nirjhar Roy, Media Promoters & Publishers Pvt. Ltd.
4.   Design of Machine Elements, V.B. Bhandari, Tata McGraw Hill Publications

Reference Books:
1.   Engineering Thermodynamics, P K Nag, The Tata McGraw-Hill Companies
2.   Mechanical Engineering Design, Joseph E Shigley, Charles R Mischke, The Tata McGraw- Hill Company.

Walchand Institute of Technology, Solapur

Autonomous

F. Y. B. Tech. Part I

Professional & Communication Skills

(All Branches)

Teaching Scheme: **Examination Scheme:**

Lecture:1 hrs/week, 1credit   ESE:30 Marks

Practical:2 hr/week,1credit   ISE:20 Marks

                                                        ICA: 25 Marks

Course Objectives:

1. To make students understand English Grammar and its application in Communication
2. To develop writing skills amongst students
3. To develop and enhance oral communication skills of students
4. To nurture reading and comprehension skills of the students
5. To prepare students for competitive exams with focus on verbal ability

Course Outcomes:

At the end of this course, students will be able to-

1. Frame grammatically correct sentences for day-to-day Communication.
2. Demonstrate effective oral communication skills in various situations.
3. Read, comprehend and make note of any text
4. Make effective technical writings including letters, emails, paragraphs and essays with appropriate content and context.
5. Solve verbal ability questions in competitive exams

Section – I

Unit 1: Basic English Skills [02 Hrs]

Parts of Speech, forms of tenses, articles, passive voice, comparative, sentence and its types

Unit 2: Engineering SMART Vocabulary [02 Hrs]

Word Formation: Prefixes, Suffixes, Root words

Synonyms, Antonyms, One word Substitution, Idioms & Phrases

Unit 3: Introduction to Communication [02 Hrs]

Communication, Types of Communication, various techniques of skilled Communication, Recognize and address barriers of Communication

Section – II

Unit 4: Technical Listening & Speaking Practices [03 Hrs]

Situational Conversation, Role Play, Extempore Speech, Describe a person, situation

Unit 5: Technical Reading & Writing Skills [03 Hrs]

Reading comprehension, book review, writing professional letters, e-mail communication, Paragraph & essay writing

Unit 6: Aptitude Verbal Ability [03 Hrs]

Common Errors, Sentence Correction, Sentence Rearrangement, Cloze Passage and Spot the Error

Internal Continuous Assessment (ICA): -

ICA shall be based on performance of the student during the laboratory sessions in language Lab covering minimum 10 exercises and two oral assignments

List of Exercises

1. Grammar Exercise –I based on articles, comparative, nouns and pronouns
2. Grammar Exercise –II based on verbs, modal verbs, auxiliary verbs
3. Grammar Exercise –III based on adjectives, adverbs, prepositions, and conjunctions
4. Grammar Exercise- IV based on passive voice, sentences and their types
5. Grammar Exercise –V based on idioms and phrases its usage in the sentences
6. Vocabulary – Based on word formation (prefixes /suffixes) the synonym & antonym of the given word.
7. Writing conversation based on a formal situation and informal situation
8. Exercise based on reading comprehension.
9. Professional / technical letter writing.
10. Professional / technical E mail writing.
11. Writing a paragraph of about 120 words / an essay of about 300
12. Extempore speech on a given topic

Text Books:

1. English Grammar Just for You. Rajeevan Karal. Oxford University Press
2. Technical English. Dr. M. Hemamalini. Wiley India Pvt.
3. Technical English: Course Book, Terry Philips. Garnet Education, 2011
4. English for Practical Purposes, Z. N. Patil, B.S. Valke, A.R. Thorat, Zeenath Merchant
5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge UniversityPress.2006.
6. Exercises in Spoken English. Parts I-III. CIEFL, Hyderabad. Oxford University Press.
7. Communication Skills, Sanjay Kumar and Pushpa Lata. Oxford University Press.2011
8. The Functional Aspects of Communication Skills, Dr. P.Prasad, New Delhi, 2008

Reference Books:

1. English Grammar & Composition, Wren & Martin, S. Chand, 2015
2. Practical English Usage, MichaelSwan.OUP.1995.
3. Remedial English Grammar. F.T Wood.Macmillan.2007.

4. On Writing Well. William Zinsser. Harper Resource Book.2001.
5. Business Communication, Shalini Kalia, Shailja Agarwal, Wiley
6. Communication Skills for Technical Students, T. M. Farhathullah, Orient Black Swan, 2003
7. Longman Dictionary of Contemporary English, Longman, Harlow, England, 1978
8. Essential Activator, Longman, Harlow, 2006
9. *Word Power Made Easy*, Norman Lewis, 2017

Walchand Institute of Technology, Solapur

Autonomous
F. Y. B. Tech. Semester-I
Workshop Practice

Teaching Scheme:	Examination Scheme:
Lecture:1 hrs/week, 1credit	ESE:--
Practical:2hrs/week,1credit	ISE:--
	ICA: 50 Marks

I. Mechanical and Automation Engineering

Rational:

Workshop practice aims at imparting knowledge of transforming a raw material into a finished product and associated processes through hands on experience. Students should learn both the theoretical and practical knowledge of shaping a product. Engineering Workshop has become important field in the industrial atmosphere to produce products for the service of mankind. The knowledge of converting a raw material into a useful product is highly essential for all engineers for familiarizing with concepts. This course covers various processes used for product manufacturing.

Course Objectives:

During this course, students is expected-

1. To understand general safety precautions in workshop.
2. To improve team work skills.
3. To get acquainted with various manufacturing processes

Course Outcomes:

At the end of this course, students will be able to-

1. Identify the different manufacturing processes & related equipments.
2. Describe the practical aspects of engineering through understanding of workshop practices followed in industry.

1. Welding **(3 Hours)**

Construction & working of different types of welding machines

2. Fitting job **(2 Hours)**

Process of assembly of different components

3. 3D Printing **(3 Hours)**

Construction & working of different types of 3D printing machines

4. Assembly **(3 Hours)**

Assembly and Disassembly of few products like Three and Four jaw chuck, Lathe

Tailstock, Apron of Lathe, Cross Slide, Tumbler Gear assembly for different types of threads.

5. Machine Tools   (4 Hours)
Construction & working of different types of machine tools :Lathe Machine, Drilling Machine, Milling Machine.

Internal Continuous Assessment
Demonstration & hands on experience related to above contents should be given during practical sessions. A report of the above work should be submitted by each student.

Text Books:
1. Workshop Technology, B. S. Raghuwanshi, Dhanpat Rai & Co.
2. Workshop Technology, Hajra Chowdhary, Media Promoters & Publishers Pvt. Ltd.
3. Rapid prototyping: Principles and Applications, Chua C.K., Leong K.F., and Lim C.S., World Scientific Publishers

II. Electronics and Telecommunication Engineering / Electronics and ComputerEngineering

• **Course Outcomes**
At the end of this course, students will able to-
   1. Identify and use various electronic components and instruments.
   2. Develop basic electronic circuits on breadboards.
   3. Demonstrate the use of an Arduino board using basic circuits.

Unit 1: Introduction to Basic Electronic Components and Devices   [03   Hrs]
Introduction to various electrical passive components such as Resistors, inductors and capacitors, introduction to active components, introduction to breadboard, Measurement of resistance using the color code, series and parallel connection of the resistances and its implementation on breadboard. Timer IC: Application of IC-555 as an Astable mode Calculation of duty cycle and frequency of IC 555 in a stable mode.

Unit 2: Introduction to Electronics Instruments   [03   Hrs]
Exposure to usual electronic equipment/instruments such as Soldering iron, Multimeter, Oscilloscope, Function generator, Power supply, Information about their front panels, Demonstrations on their working, Hands- on for measurement of component values and DC voltage using multimeter, measurement of amplitude, time period and frequency of the waveform Square wave/any small signal from function generator on Oscilloscope (DSO),Measurement of the voltage and current in the circuit implemented on breadboard using multimeter.

Unit 3: Introduction to Arduino: [04 Hrs]

Arduino Configuration and architecture, Device and platform features, Concept of digital and analog ports, Familiarizing with Arduino Interfacing Board, Introduction to Embedded C and Arduino platform (IDE), Arduino data types (Variables and constants, Operators, ControlStatements, Arrays, Function).

Unit 4: Arduino I/O & Sensors : [04 Hrs]

Arduino I/O Functions (Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT, FUNCTIONS: pinMode(), digitalWrite(), analogRead(), Arduino Interrupts), SENSORS: Humidity Sensor, Temperature Sensor, Water Detector / Sensor, PIR Sensor, Ultrasonic Sensor, Magnetic relay switches.

Internal Continuous Assessment (ICA): -

ICA shall be based on completion of any of the eight LAB Sessions/Tasks on the above mentioned units along with the report writing.

- **Text Books:**
1. Principles of Electronics by V.K Mehta (Author), Rohit Mehta (Author).
2. Basic Electronics: Devices, Circuits and it Fundamentals by Kal.
3. The Basic Soldering Guide Handbook: Learn to solder electronics successfully by Alan RWinstanley.

III. Civil Engineering

- **Course Outcomes**

    At the end of laboratory, the student will be able to
    1. Explain construction activities in substructure and superstructure with tools /equipment along with safety measures to be taken.
    2. Compare the construction of brick wall using English , Flemish and stretcher bondalong with testing of bricks.

Unit 1:Building elements and Safety Tools in Construction [06 Hrs]

Identify the substructure construction activities and equipments/tools being used at site alongwith safety tools and display boards during the visit.
Identify the superstructure construction activities and the equipments/tools at site along withsafety tools and display boards being used at site during the visit.

Unit 2: Different Bonding in Brick wall [04 Hrs]

Assemble a corner brick wall in six courses by arranging bricks in English, Flemish andstretcher bond. Ensure that wall is in line, plumb ,level using water pipe technique .

Unit 3: Testing of Bricks   [04 Hrs]

Testing the quality of bricks , Laboratory test of bricks:1 Water absorption test, 2 compressive strength of bricks.

Internal Continuous Assessment (ICA): -

ICA shall be based on completion of any of the eight LAB Sessions/Tasks on the above mentioned units along with the report writing.

- **Text Books:**
  1. I.S Code for Bricks IS 3495 Part I to IV Revised 2002
  2. Building Construction, S.R.Arora, S.R.Bimdra, Dhanpat Rai Publications.
  3. Building Construction Satish Kumar, Dhanpat Rai Publications.
  4. Practical Building Construction and it's Management, Sandeep Mantri, SatyaPrakashan, New Delhi.

IV.Computer Science Engineering /Information Technology

- **Course Objective:**
  1. To make students learn the hardware and software of a computer.
  2. To make students assemble a desktop PC from its components and also use alternatives

- **Course Outcomes:**

    At the end of the laboratory, the student will be able to

  1. Identify various hardware and software components of a computer and comparebetween them.
  2. Assemble a desktop from the components supplied and setup a working desktop system

Unit 1: Name and identify various PC hardware components   (03 Hrs.)

USB Mouse, PS/2 Mouse, Keyboard, LCD/LED Monitor, VGA, HDMI, CAT5, CAT6, server, routers, fiber cable, Hard disk,RAM, CMOS battery, SMPS, cache, ROM, BIOS
Type using all your fingers and achieve a speed of 30 words per minute

Unit 2: Introduction to various important software   (04 Hrs)

Assemble a Desktop PC from its Components: Install any two operating systems on a PC making it dual boot, including the latest version of Ubuntu Linux, Windows 7/

Unit 3: Assemble a Desktop PC from its Components   (04 Hrs)

Learn the following terms and concepts: LAN, DNS, Proxy, Router, Hub, Switch, Server, Client, Web-server; Understand basic networking commands, applications and services: ssh, telnet, Ftp, WinSCP, ping, HTTP, HTTPS, Prepare a working

LAN cable by using crimping tools.
Connect 2-4 computers together using a network hub to create a LAN

Unit 4: Assemble a Desktop PC from its Components   **(03 Hrs.)**
Introduction to various important software: Ubuntu, Windows, Libre Office and Microsoft Office, Linux Command Line (few basic commands);

Internal Continuous Assessment (ICA): -
ICA shall be based on completion of any of the eight LAB Sessions/Tasks on the above mentioned units along with the report writing.

- **Text Books:**
1. Building Your Own Computer Made Easy: The Step By Step Guide (Computers MadeEasy) by James Bernstein.
2. Raspberry Pi Cookbook: Software and Hardware Problems and Solutions 3rd Edition bySimon Monk.
3. A text book of Computer Hardware and Networking (DJ 5) [Print Replica] Kindle Editionby Ms. Jyotika Deshmukh

Walchand Institute of Technology, Solapur
Autonomous
F. Y. B. Tech. Semester-I
Creativity and Design Thinking
(All Branches)

Teaching Scheme: **Examination Scheme:**

Lecture:1 hrs/week, 1credit   ESE:--

Practical:2hrs/week,1credit   ISE:--

                                                             ICA: 50 Marks

- **Course Objectives:**
    1. To relate and compare the various memory techniques and apply them in engineeringeducation.
    2. To appreciate the importance of creativity and design thinking.
    3. To analyze emotional experience and experiment with emotional expressivity to understand users in a better way, while designing the products.
    4. To transform thought process so as to come up with multiple solution using ideation and creative tools.
    5. To develop skills for evaluating, articulating, refining, testing and creating an innovative engineering product/prototype that solves customer problems(s).

- **Course Outcomes:**

   At the end of the course, students will be able to-
    1. Relate and Compare the various memory techniques and apply them in engineeringeducation.
    2. Appreciate the importance of creativity and design thinking
    3. Analyze emotional experience and Experiment with emotional expressivity to understand users in a better way, while designing the products.
    4. Transform their thought process so as to come up with multiple solution using Ideation and creative tools.
    5. Develop skills for evaluating, articulating, refining, testing and creating an innovativeengineering product/prototype that solves customer problems(s).

Section-I

Unit 1:An Insight into Remembering   **[02 Hrs]**

Understanding the Memory process, Memory enhancement techniques.

Unit 2: Introduction to Creativity and Tools for creativity   **[04 Hrs]**

The creative person, Lateral & vertical thinking concept, Creative style- adaptor & Innovator. Tools for creativity: Brain storming, Six hat technique,   Introduction to TRIZ,Divergent and Convergent thinking.

Unit 3: Basics of Design Thinking [04 Hrs]

Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test, User Persona

Unit 4: Process of Empathize [04 Hrs]

Empathize, Different techniques used, case studies.

Section-II

Unit 5: Ideate [04 Hrs]

Ideate – Explanation with case studies, tools to be used

Unit 6: Prototype [02 Hrs]

Prototype –Explanation with case studies. tools to be used,

Unit 7: Testing the Prototype [04 Hrs]

Testing for prototype, case studies.

Unit 8: Feedback, Re-Design & Re-Create [04 Hrs]

Feedback loop, Focus on User Experience, User focused design, rapid prototyping &testing, final product.

Internal Continuous Assessment (ICA):

Activities are to be conducted using various tools of creative and design thinking. Typical case studies shall be done to understand process of design thinking and product development. Assessment shall be carried out on final prototype / product for end user. In addition to the above, the institute may prescribe additional modes of assessment such as product development, Case study, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

- **Text Books:**
1. Thinking Design by S. Balaram, Publisher: Sage India; ISBN-10 :8132103149
2. The Creative thinker's Toolkit: Course Guidebook by Gerard Puccio, The great courses, 2014
3. Six Thinking Hat by Marcela Pandolfo
4. Basic Design Thinking by Gavin Ambrose &Paul Harris, AVA Publishing
5. Design Thinking for Beginners: Innovation as a factor for entrepreneurial success, Publisher : Personal Growth Hackers (18 August 2019),ISBN-10 : 3967160629

- **Reference Books:**
1. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011 (Unit I).
2. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach Youat Business or Design School", John Wiley & Sons 2013. (Unit III).
3. Design Thinking for Educators: Unleashing Imaginnovation Ideas Being Student

Centric, D.M. , Arvind Mallik, Publisher : Notion Press; 1st edition (17 September 2019), ISBN-10 : 1646506928

4. Cracking the Creativity code: Zoom in Zoom out framework for creativity, fun and success by Arie Ruttenberg and Shlimo Maital, Publisher- SAGE, 2014

- **Web References:**
  1. https://dschool.**stanford**.edu/.../**design** resources/.../ModeGuideBOOTCAMP2010L.pdf
  2. https://dschool.**stanford**.edu/use-our-methods/
  3. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking- process
  4. http://www.creativityatwork.com/design-thinking-strategy-for-innovation/
  5. https://www.nngroup.com/articles/design-thinking/
  6. https://designthinkingforeducators.com/design-thinking/
  7. www.**designthinking**formobility.org/wp-content/.../10/**NapkinPitch_**Worksheet.pdf
  8. https://www.behance.net/joblist?sdid=V6NZKQSK&mv=search

Walchand Institute of Technology, Solapur
Autonomous
F.Y.B.Tech. Part II
Engineering physics
Civil Engineering /Mechanical & Automation Engineering

Teaching Scheme:	Examination scheme:
Lecture: 3 hrs/week, 3 credits	ESE : 60 Marks
Practical :2hrs/week, 1 credit	ISE : 40 Marks
	ICA : 25 Marks

- **Course Objectives:**
  1. To make students understand fundamentals of crystal system.
  2. To make students recall and discuss the concepts of wave optics through diffraction and polarization
  3. To make students comprehend basics, working of laser and optical fiber
  4. To introduce students basic concepts of quantum mechanics and nanotechnology.
  5. To introduce students sound engineering through basic concepts of acoustics and ultrasonic.
  6. To introduce students the concepts of nuclear reactor and fission, fusion reaction.

- **Course Outcomes:**
  At the end of this course, students willable to-
  1. Describe the concepts of formation crystal structure.
  2. Express the concepts of diffraction, polarization and can relate them to day to day observable phenomena.
  3. Explain the fundamental concepts, advantages and applications of laser and optical fiber in the field of science, engineering and medical.
  4. Express the basic concepts of quantum mechanics and nanotechnology.
  5. Apply basic concepts of acoustics and ultrasonic in engineering field.
  6. Explain the fundamental concepts of nuclear reactor and nuclear reactions.

Section-I

Unit 1: Crystallography [07Hrs.]

Introduction, Space Lattice and Crystal Structure, Unit cell, Bravais Space Lattices, Seven Crystal System, Properties of Cubic Unit Cell, Relation between Lattice Constant and Density, Lattice Planes and Miller Indices, Interplanar Spacing for Cubic System, Symmetry elements (axis, center and plane), Bragg's Law,
Numericals: Density, No. of atoms /unit cell, Interplanar Distance, Miller Indices, Angle of diffraction

Unit 2: Wave Optics [06Hrs.]
Diffraction:
Introduction, resolving power (R.P), Rayleigh criterion, theory of diffraction grating and its R.P.

Numericals: Wavelength of light, Resolving power, No. of lines/cm,Order of spectrum.
Polarization:
Introduction, Malus law, Optical activity, Specific rotation, Laurent's half shade Polarimeter,
Numericals: Specific Rotation, Concentration of solution

Unit 3:LASER and Fibre Optics [07Hrs]
LASER:
Introduction, Interaction of radiation with matter, Population Inversion and Pumping, Characteristics of laser, He-NeLASER, Applications of LASER.
Fibre Optics:
Introduction, Structure of optical fibre, Working principle of optical fibre, Propagation Mechanism of light through optical fibre, Acceptance Angle, Numerical Aperture, Classification of optical fibres, Advantages and applications ofoptical fibres, Communication system: basic building blocks.
Numericals: Acceptance angle, Critical angle, Acceptance cone and Numerical aperture, Fractional refractive index change

Section-II

Unit 4:Introduction to Quantum Mechanics and Nanoscience [06Hrs]
Introduction to Quantum Mechanics:
de Broglie hypothesis, de Broglie wavelength of matter waves: in terms of kinetic energy and associated with particle in thermal equilibrium, Properties of matter waves, Davisson-Germer Experiment (apparatus, investigations and analysis)
Numericals :de-Broglie Wavelength
Introduction to Nanoscience:
Introduction, Types of Carbon Nanotubes, Applications of nanomaterials in medical, energy, automobile, sensors, space, defense.

Unit 5: Sound Engineering [07 Hrs]
Acoustics:
Introduction, Defects due to Reflection of Sound, Reverberation, Reverberation time, absorption coefficient (definition only), Sabine's formula, basic requirements for acoustically good hall. Factors affecting acoustics of auditorium and their remedies,
Numericals: Absorption Coefficient, Reverberation Time.
Ultrasonic:
Introduction, Production methods of ultrasonic waves (piezoelectric effect and magnetostriction effect (introduction only), Properties of ultrasonic waves, Detection methods of ultrasonic waves and applications.
Numericals: Frequency of ultrasonic waves, Depth of Sea
Unit 6: Nuclear Physics [07 Hrs]
Nuclear fission Reaction: Fission as a source, energy released by 1 Kg of U^{235}, chain reaction and multiplication factor (Introduction).
Nuclear reactor: Classification of nuclear reactor, Essentials of nuclear reactor.
Nuclear Fusion Reaction: Thermonuclear reaction, proton-proton cycle, carbon-Nitrogen cycle.

Difference between Fusion and Fission.
Numericals : Energy, Power, Amount of fuel.

Internal Continuous Assessment (ICA): -
ICA consists of performance of eight experiments based on the units.

- **List of Experiments:**
    1. To study crystal systems.
    2. Plane Diffraction Grating
    3. Resolving Power of Plane Diffraction Grating
    4. Malus Law
    5. Laurentz's Half shade Polarimeter
    6. He-Ne Laser: Beam Divergence
    7. To determine numerical aperture of an optical fibre.
    8. To determine Plank's constant
    9. Kundt's Tube
- **Text Books:**
    1. A Text Book of Engineering Physics, M.N. Avadhanulu, P.G. Kshirsagar, S. Chand Publications.
    2. A Text Book of Optics, Subramanya and BrijLal, S. Chand and Company Ltd
    3. Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpat Rai Publications (P) Ltd.

- **Reference Books:**
    1. Modern Physics, B.L. Theraja, S. Chand and Company Ltd.
    2. Nanotechnology: Principles and Practices, Sulabha K. Kulkarni, Capital Publishing Company.
    3. Nanoscience and Nanotechnology: Fundamentals to Frontiers –M.S. Ramachandra Rao,
    4. Shubra Singh, Wiley India Pvt Ltd, New Delhi
    5. Engineering Physics, D.K. Bhattacharya, Poonam Tandon, Oxford University Press
    6. Solid State Physics, S.O. Pillai, McGraw Hill Publications.
    7. An Introduction to Laser's Theory and Applications – Dr. M. N. Avdhanulu, Dr. P.S. Hemne– Revised edition 2017-S. Chand & Company Pvt. Ltd.

Walchand Institute of Technology, Solapur
Autonomous
F.Y.B.Tech. Part II
Engineering Physics
Computer Science Engineering /Information Technology / Electronics & Telecommunication Engineering /Electronics & Computer Engineering

Teaching Scheme:	**Examination scheme:**
Lecture: 3 hrs/week, 3 credits	ESE : 60 Marks
Practical :2hrs/week, 1 credit	ISE : 40 Marks
	ICA : 25 Marks

- **Course Objectives:**
  1. To make students understand fundamentals of crystal system.
  2. To make students recall and discuss the concepts of wave optics through diffraction and polarization.
  3. To make students comprehend basics, working of laser and optical fiber.
  4. To introduce students basic concepts of quantum mechanics and nanotechnology.
  5. To make students understand the classification of solids depending on energy gap with their electronic properties.
  6. To introduce students the concepts of nuclear reactor and fission, fusion reaction.

- **Course Outcomes:**
  At the end of this course, students willable to-
  1. Describe the concepts of formation crystal structure.
  2. Express the concepts of diffraction, polarization and can relate them to day to day observable phenomena.
  3. Explain the fundamental concepts, advantages and applications of laser and optical fiber in the field of science, engineering and medical.
  4. Express the basic concepts of quantum mechanics and nanotechnology.
  5. Describe the concepts of semiconducting materials.
  6. Explain the fundamental concepts of nuclear reactor and nuclear reactions.

Section-I
Unit 1: Crystallography [07Hrs.]

Introduction, Space Lattice and Crystal Structure, Unit cell, Bravais Space Lattices, Seven Crystal System, Properties of Cubic Unit Cell, Relation between Lattice Constant and Density, Lattice Planes and Miller Indices, Interplanar Spacing for Cubic System, Symmetry elements (axis, center and plane), Bragg's Law,
Numericals: Density, No. of atoms /unit cell, Interplanar Distance, Miller Indices, Angle of diffraction

Unit 2: Wave Optics [06 Hrs.]
Diffraction:
Introduction, resolving power (R.P), Rayleigh criterion, theory of diffraction grating and its R.P.

Numericals: Wavelength of light, Resolving power, No. of lines/cm,Order of spectrum.
Polarization:
Introduction, Malus law, Optical activity, Specific rotation, Laurent's half shade
Polarimeter,
Numericals: Specific Rotation, Concentration of solution

Unit 3:LASER and Fibre Optics   [07Hrs]
LASER:
 Introduction, Interaction of radiation with matter, Population Inversion and Pumping,
Characteristics of laser, He-Ne LASER, Applications of LASER.
Fibre Optics:
Introduction, Structure of optical fibre, Working principle of optical fibre, Propagation
Mechanism of light through optical fibre, Acceptance Angle, Numerical Aperture,
Classification of optical fibres, Advantages and applications ofoptical fibres,
Communication system: basic building blocks.
Numericals: Acceptance angle, Critical angle, Acceptance cone and Numerical aperture,
Fractional refractive index change.

Section-II
Unit 4:Introduction to Quantum Mechanics and Nanoscience   [06 Hrs]
Introduction to Quantum Mechanics:
de Broglie hypothesis, de Broglie wavelength of matter waves: in terms of kinetic energy
and associated with particle in thermal equilibrium, Properties of matter waves, Davisson-
Germer Experiment (apparatus, investigations and analysis)
Numericals :de-Broglie Wavelength
Introduction to Nanoscience:
Introduction, Types of Carbon Nanotubes, Applications of nanomaterials in medical, energy,
automobile, sensors, space, defense.

Unit 5: Semiconductor Physics   [07 Hrs]
Formation of Energy Band, Types of Energy Bands, Classification of solids, Fermi level
(definition), Fermi-Dirac probability distribution function (introduction only), Fermi level in
intrinsic and extrinsic semiconductors, Effect of impurity concentration on Fermi level,
Derivation for E_{Fin} , Hall effect and applications.
Numericals: Hall voltage, Hall Coefficient, Concentration and Mobility of Charge Carriers.

Unit 6: Nuclear Physics   [07 Hrs]
Nuclear fission Reaction: Fission as a source, energy released by 1 Kg of U^{235}, chain
reaction and multiplication factor (Introduction).
Nuclear reactor: Classification of nuclear reactor, Essentials of nuclear reactor.
Nuclear Fusion Reaction: Thermonuclear reaction, proton-proton cycle, carbon-Nitrogen
cycle.
Difference between Fusion and Fission.
Numericals: Energy, Power, Amount of fuel

Internal Continuous Assessment (ICA): -

ICA consists of performance of eight experiments based on the units.

- **List of Experiments:**
  1. To study crystal systems.
  2. Plane Diffraction Grating
  3. Resolving Power of Plane Diffraction Grating
  4. Malus Law
  5. Laurentz's Half shade Polarimeter
  6. He-Ne Laser: Beam Divergence
  7. To determine numerical aperture of an optical fibre.
  8. To determine Plank's constant
  9. To determine energy gap of P-N junction diode
  10. Hall effect

- **Text Books:**
  1. A Text Book of Engineering Physics, M.N. Avadhanulu, P.G. Kshirsagar, S. Chand Publications.
  2. A Text Book of Optics, Subramanya and BrijLal, S. Chand and Company Ltd
  3. Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpat Rai Publications (P) Ltd.

- **Reference Books:**
  1. Modern Physics, B.L. Theraja, S. Chand and Company Ltd.
  2. Nanotechnology: Principles and Practices, Sulabha K. Kulkarni, Capital Publishing Company.
  3. Nanoscience and Nanotechnology: Fundamentals to Frontiers –M.S. Ramachandra Rao, Shubra Singh, Wiley India Pvt Ltd, New Delhi
  4. Engineering Physics, D.K. Bhattacharya, Poonam Tandon, Oxford University Press
  5. Solid State Physics, S.O. Pillai, McGraw Hill Publications.
  6. An Introduction to Laser's Theory and Applications – Dr. M. N. Avdhanulu, Dr. P.S.Hemne– Revised edition 2017-S. Chand & Company Pvt. Ltd.

- **List of Experiments:**
  1. To study crystal systems.
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  6. He-Ne Laser: Beam Divergence
  7. To determine numerical aperture of an optical fibre
  8. To determine Plank's constant
  9. To determine energy gap of P-N junction diode
  10. Hall effect

Walchand Institute of Technology, Solapur

Autonomous
F.Y.B.Tech. Part II
Engineering Mathematics II
Civil / Mechanical & Automation Engineering

Teaching Scheme:	Examination scheme:
Lecture: 2 hrs/week, 2 credits	ESE: 60 Marks
Tutorial: 1 hr/week, 1 credit	ISE: 40 Marks
	ICA: 25 Marks

- **Course Objectives:**
    1. To introduce to students the solution of ordinary differential equations and applications.
    2. To introduce to students the numerical solutions of ordinary differentialequations
    3. To introduce to students integral calculus and evaluate an improper integrals by somespecial functions.
    4. To introduce to students correlation and curve fitting.

- **Course Outcomes:**

At the end of this course, students will able to-

1. Solve the ordinary differential equations and apply their applications in various engineering problems.
2. Use numerical method for solving the ordinary differential equations.
3. Evaluate the improper integrals by some special functions.
4. Compute the double and triple integrals.
5. To introduce to students correlation and curve fitting.

Section – I

Unit 1: First Order Ordinary differential Equations   **[05 Hrs]**

Exact differential equations, Equations reducible to exact form. Linear differential Equations, equations reducible to linear form, Bernoulli's equation.

Unit 2: Applications of Differential Equations   **[04 Hrs]**

Applications of Differential Equations to Orthogonal Trajectories, Newton's Law of Cooling, Kirchhoff's Law of Electrical Circuits.

Unit 3: Numerical solution of ordinary differential Equation   **[05 Hrs]**

Picard's method, Euler's method, Modified Euler's method and Runge-Kutta method of fourth order.

Section – II

Unit 4: Integral Calculus   **[04 Hrs]**

Beta and Gamma functions, Differentiation under Integral Sign.

Unit 5: Multiple Integrals   **[05 Hrs]**

Double and Triple integrations, Double integration over a given region, Change of Order of integration, Change to polar coordinates.

Unit 6: Statistics   **[05 Hrs]**

Karl Pearson's Coefficient of correlation, lines of regression, curve fitting by least square principle.

Internal Continuous Assessment (ICA):

ICA shall be based on student's performance during tutorial sessions and on completion of six assignments one on each unit.

Text Books:

1. A Text Book of Applied Mathematics, P.N.and J.N.Wartikar,Vol.1, Pune Vidyarthi Griha Prakashan.
2. Advanced Engineering Mathematics, H.K. Dass, S. Chand Publications, Delhi.
3. Engineering Mathematics (Volume), ITL Education, C engage Learning.
4. Engineering Mathematics, Ravish R Sing and Mukul Bhatt, McGraw-Hill.

Reference Books:

1. Higher Engineering Mathematics (42ndEdition), B.S. Grewal Khanna Publications,Delhi.
2. Engineering Mathematics, Srimanta Paland Subodh C. Bhunia, Oxford Higher Education.
3. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi, 2010.
4. Applied Mathematics-I, II, Kreyzig's, Wiley.

Walchand Institute of Technology, Solapur
Autonomous
F.Y.B.Tech. Part II
Engineering Mathematics II
Computer Science / Information Technology Engineering
Electronics & Telecommunication / Electronics & Computer Engineering

Teaching Scheme:	Examination scheme:
Lecture: 2 hrs/week, 2 credits	ESE: 60 Marks
Tutorial: 1 hr/week, 1 credit	ISE: 40 Marks
	ICA: 25 Marks

- **Course Objectives:**
  1. To introduce to students the solution of ordinary differential equations and applications.
  2. To introduce to students the numerical solutions of ordinary differentialequations
  3. To introduce to students integral calculus and evaluate an improper integrals by somespecial functions.
  4. To introduce to students the multiple integrals.
  5. To introduce to students probability distributions.

- **Course Outcomes:**

At the end of this course, students will able to-

  1. Solve the ordinary differential equations and apply their applications in various engineering problems.
  2. Use numerical method for solving the ordinary differential equations.
  3. Evaluate the improper integrals by some special functions.
  4. Compute the double and triple integrals.
  5. Compute probability distributions.

Section – I

Unit 1: First Order Ordinary differential Equations [05 Hrs]
Exact differential equations, Equations reducible to exact form. Linear differential Equations, equations reducible to linear form, Bernoulli's equation.

Unit 2: Applications of Differential Equations [04 Hrs]
Applications of Differential Equations to Orthogonal Trajectories, Newton's Law of Cooling, Kirchhoff's Law of Electrical Circuits.

Unit 3: Numerical solution of ordinary differential Equation [05 Hrs]
Picard's method, Euler's method, Modified Euler's method and Runge-Kutta method of fourth order.

Section – II

Unit 4: Integral Calculus [04 Hrs]

Beta , Gamma functions and their properties, Differentiation under Integral Sign.

Unit 5: Multiple Integrals [05 Hrs]

Double and Triple integrations, Double integration over a given region, Change of Order of integration, Change to polar coordinates.

Unit 6: Probability [05 Hrs]

Introduction to probability, random variable, probability distributions Binomial, Poisson, Normal   distribution.

Internal Continuous Assessment (ICA):

ICA shall be based on student's performance during tutorial sessions and on completion ofsix assignments one on each unit.

Text Books:

1. A Text Book of Applied Mathematics, P.N.and J.N.Wartikar,Vol.1, Pune VidyarthiGriha Prakashan.
2. Advanced Engineering Mathematics, H.K. Dass, S. Chand Publications, Delhi.
3. Engineering Mathematics (Volume), ITL Education, C engage Learning.
4. Engineering Mathematics, Ravish R Sing and Mukul Bhatt, McGraw-Hill.

Reference Books:

1. Higher Engineering Mathematics (42ndEdition), B.S. Grewal Khanna Publications,Delhi.
2. Engineering Mathematics, Srimanta Paland Subodh C. Bhunia, Oxford HigherEducation.
3. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi,2010.
4. Applied Mathematics-I, II, Kreyzig's, Wiley.

Walchand Institute of Technology, Solapur
Autonomous
F.Y.B.Tech. Part II
Engineering Mechanics
(All Branches)

Teaching Scheme:	Examination scheme:
Lecture: 2 hrs/week, 2 credits	ESE : 60 Marks
Practical :2 hr/week, 1 credit	ISE : 40 Marks
	ICA : 25 Marks

Study of Engineering mechanics helps to formulate new ideas and theories, discover and interpret phenomena, and develop experimental and computational tools. The objective of this course is to understand the basic principles of statics and dynamics. This principle helps to formulate and solve problems related to body/object in rest and motion.

- **Course Objectives:**
  1. To impart knowledge of basic fundamentals in Engineering Mechanics for analyzing the effect of force system on a rigid body.
  2. To prepare the student to analyze the beam, truss and to solve problems on friction.
  3. To prepare the students to solve the problem on centroid and moment of inertia of plane lamina.
  4. To impart the knowledge to solve problems on kinematics of rigid body.
  5. To impart the knowledge to solve problems on kinetics of rigid body.
  6. To impart the knowledge of work- energy and impulse momentum principles on rigid body having linear motion.

- **Course Outcomes:** At the end of this course, the student will be able to:
  1. Analyze effects of a various force system acting on a rigid body.
  2. Solve problems on statically determinate beams, pin jointed trusses and friction using equilibrium conditions.
  3. Locate centroid, center of Gravity and calculate moment of Inertia of plane lamina.
  4. Solve problems on Kinematics of rigid body.
  5. Solve problems on Kinetics of rigid body.
  6. Apply work-energy and impulse momentum principles for analyzing linear motion of bodies.

Section – I

Unit 1: Resultant of coplanar forces   **[05Hrs]**
Introduction:
- Basic units, SI units, body, rigid body, particle, scalar quantities, vector quantities, Idealization of engineering problems, force, law of transmissibility of force, moment

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of a force, couple, moment of a couple, resultant, parallelogram law of forces, triangle law of forces, polygon law of forces. Varignon's theorem,

- Composition of co-planar concurrent and non-concurrent forces: analytical method, graphical method, Bow's notation.

Unit 2: Equilibrium & Analysis of Pin-Jointed Plane Frames [06Hrs]
- **Equilibrium**: Equilibrium of co-planar forces, analytical and graphical conditions of equilibrium, free body diagrams, Lami's theorem.

- **Friction**: Friction, types of friction, limiting friction, laws of Friction, Static and Dynamic friction, inclined planes,

- **Support Reactions**: Support reactions of statically determinate beams with different type of supports, point loads, inclined loads, uniformly distributed load, uniformly varying loads.

- **Analysis of Truss**: Pin-jointed statically determinate plane trusses-perfect frames, assumptions, determination of nature and magnitude of a force in a member, simple trusses; zero force members. Analysis of trusses by method of joints and method of section.

Unit 3: Center of Gravity and Moment of Inertia [04Hrs]
- **Centroid**: Centre of gravity, centroid of a composite area, Centroid of simple figures from first principle.

- **Moment of inertia:** Definition, moment of inertia of plane sections from first principles, Theorems of moment of inertia, perpendicular axis theorem, parallel axis theorem, moment of inertia of symmetrical sections, radius of gyration, polar moment of inertia.

Section – II
Unit 4: Kinematics of particles [5Hrs]
- **Linear Motion:** Rectilinear motion, equations of motion, motion curves and their applications, relative velocity- problems on Newton's laws of motion for linear motion

Unit 5: Kinetics of particles [5Hrs]
- D'Alembert's principle, rectilinear motion on a rough inclined plane, motion of a lift, motion of connected bodies.

Unit 6: Work Energy Methods [5Hrs]
- **Work Energy Method:** Potential energy, kinetic energy of line in motion, principle of conservation of energy, work energy equation.
- Impulse momentum equation and its application.

Note: Scope of Graphical method sinunit1, 2, 3 is limited to ICA only.

Internal Continuous Assessment (ICA):

A   List of Experiments:
1. Law of parallelogram of forces
2. Triangle Law of forces using Jib crane apparatus
3. Law of polygon of forces
4. Law of Moments using Bell crank lever
5. Support reaction of beams
6. Newton's Second law using Fletcher's trolley

B   Graphic Statics: Problems on
7. Finding resultant of forces (2 Problem)
8. Evaluating support reactions of beam. (2Problem)

C   Assignments based on the various units in curriculum

Text Books:
1. Engineering Mechanics, Bhavikatti S. S., New Age International Pvt. Ltd.
2. Engineering Mechanics, K. L. Kumar, Tata McGraw Hill Publications
3. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press.
4. Engineering Mechanics - Statics and Dynamics, A. Nelson, McGraw Hill Education (India) Pvt. Ltd.
5. Engineering Mechanics - Statics and Dynamics, A.K. Dhiman, P. Dhiman& D.C. Kelshreshtha, McGraw Hill Education (India) Pvt. Ltd
6. A Text book of Engineering Mechanics, R.S. Khurmi, S. Chand Publications
7. Engg Mechanics by Sadhu Singh (Khanna Publishers)

Reference Books:
1. Vector Mechanics for Engineers: Statics and Dynamics by Beer and Johnson, Tata McGraw Hill Education (India) Pvt. Ltd.
2. Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.
3. Engineering Mechanics Statics and Dynamics by Ferdinand Singer, Harper & Row Publications.
4. Engineering Mechanics Statics, Vol.1, SI Version, 7th Edition – J. L. Meriam, L. G. Kraige, Wiley India Pvt. Ltd., New Delhi.
5. Engineering Mechanics Dynamics, SI Version, 7th Edition – J. L. Meriam, L. G. Kraige, Wiley India Pvt. Ltd., and New Delhi.

Walchand Institute of Technology, Solapur
F. Y. B. Tech. Part-II
Engineering Graphics and CAD
(All Branches)

Teaching Scheme:
Lecture   : 2hrs/week, 2 credits
Practical : 2hrs/week, 1 credit

Examination scheme:
ISE:50 Marks
ICA:50 Marks

'Engineering Graphics & CAD' has become an indispensable tool for Engineers, Technocrats, Architects, Draftsmen, Surveyors, Designers and many other professionals in the recent times. It is used to convey the ideas and information necessary for the construction or analysis of machines, structures and system, graphically. This course focuses on drawing orthographic and isometric drawings with the aid of drafting software.

Course Objectives:
1. Visualize and draw the orthogonal views.
2. Draft the machine components and related parts by using drafting software.
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Course Outcomes:
   At the end of this course, students will able to-
1. Draw orthographic views of objects.
2. Draw isometric views of objects.
3. Use CAD software in developing orthographic projections and isometric views of simple objects.

Unit 1: Introduction to methods of projections. **[02 Hrs]**

Unit 2: Orthographic Projections: Drawing orthographic projections from pictorial views by using first angle projection method. **[09 Hrs]**

Unit 3: Isometric Projections: Difference between isometric view and projection. Drawing isometric views from given orthographic views. **[09 Hrs]**

Internal Continuous Assessment (ICA): -
ICA shall be based on drawing orthographic and isometric views using suitable 2D drafting software.

Textbooks:
1. Engineering Drawing, D. N. Jolhe, TATA McGraw Publishing Co. Ltd.
2. Engineering drawing, N. D. Bhatt, Charotar Publishing House Pvt. Ltd.
3. A Textbook of Engineering Graphics, Natarajan K.V., Dhanalakshmi Publishers, Chennai
4. Engineering Graphics-I.M.L.Dabhade,Vision Publication

Reference Books:
1. Engineering Drawing, N. S. Parthasarathy & VelaMurali, Oxford Publication.
2. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publication.
3. Engineering Graphics, A. M. Chandra, New Age International Publishers.

Walchand Institute of Technology, Solapur

Autonomous

F. Y. B. Tech. Part-II

Programming for Problem Solving

(All Branches)

Teaching Scheme: **Examination scheme:**
Lecture: 2hrs/week, 2 credits   ESE :25 Marks
Practical:2hr/week, 1 credit   ISE:50 Marks
                                                         ICA: 25 Marks

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Introduction:

C programming language is a procedural and general-purpose programming language.It is fast and simple to learn and implement. It includes low-level memory access and simple syntax. It makes the C programming language suitable for system programming like compiler development and operating system development. C language is also known as a structured programming language. C language has features like simple, powerful, structure-oriented, case-sensitive, fast and efficient.

- **Course Objectives:**
1. To introduce the concepts of algorithms & flowcharts for problem solving
2. To introduce the fundamentals of structured programming
3. To formulate simple C programs using various control structures & loop structures
4. To apply the concept of functions & pointers to solve the problems
5. To apply the concept of arrays to solve the problems
6. To apply the concept of structures, unions and files to solve the problems

- **Course Outcomes:**

At the end of this course, students will be able to-

1. Design the flowcharts and algorithms for the given problem.
2. Translate the algorithms into C programs and test & execute the programs.
3. Design & develop C programs by appropriately selecting control and loop structures.
4. Design & develop C programs using functions and pointers.
5. Design & develop C programs using arrays, structures, unions and files..

Unit 1: Fundamentals of Computers & Structure of a 'C' Program   (05 Hrs)
Techniques for Problem Solving: algorithm, flow chart, examples. Algorithms specifications, formulation of simple algorithms and logical problems. Structure of C program, building blocks of C, program (preprocessor, compilation and execution & debugging of C program), IDE, C character set, tokens, constants, variables, keywords, primitive data types, 'C' operators(arithmetic, unary, binary, ternary, Logical, assignment, relational, increment and decrement, conditional, bitwise, size of)Operator precedence, expressions, typecasting and type conversion, formatting input and output (getchar, putchar, printf, scanf), Storage Classes-Automatic, Register, Static, External storage classes.

Unit 2:Control Structures   (05 Hrs)
Control Statement: if, if-else, nested if –else, else if ladder Loops: while, do-while, for, nesting of loops,break, continue, goto statement, switch-case statement.

Unit 3:Arrays and Strings   (05 Hrs)
Declaration and initialization of one dimensional array, accessing elements, Array handling. String handling functions. Declaration and initialization of two dimensional arrays, accessing elements, Array handling, Matrix operations

Unit 4: Structures and Unions   (03 Hrs.)
Definition of structure and union, declaration, Accessing elements and displaying elements, differencebetween structureand union.

Unit 5:Pointers   (04 Hrs)
Introduction, Declaration of pointer, initialization, accessing pointer, pointer to basic data types,pointer toarray (one dimensional)
Pointers of Arrays, Array of Pointer,Pointer to Pointer, Pointer and String, Pointer and Structures,Pointer to Functions in C, Pointers and Dynamic memory.

Unit 6: Functions   (05 Hrs)
Declaration & definition, passing parameters to functions, pass by value, scope of variable, returnstatement. function using call by value and call by reference
Recursion: Processes and Recursion in C. How recursion works, Factorial, Fibonacci sequence,Towers of Hanoi, Advantages and Disadvantages of recursive Techniques

Unit 7:Files   (03 Hrs)
Introduction, Streams and file types, File operations, File I/O, Structures of read and write, other filefunctions, command file arguments

Internal Continuous Assessment (ICA): -
ICA shall be based on the programming assignments.
* **Text Books:**
1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. Simplifying C – Harshal Arolkar & Sonal Jain, Dreamtech (ForUnit-01)
3. Let s 'C' – Yaswant Kanetkar, BPB Publication
4. Programming in ANSI C- C Balgurusamy, Tata McGraw Hill
* **Reference Books:**
1. The C Programming Language (ANSI C Version), Brian W. Kernighan, Dennis M.Ritchie, PHI Publications
2. Programming in C – B.L. Juneja, Cengage Learning
3. Projects using C- PVN Varalaxmi, Scitech Publications
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHall of India

- **Web resource:** https://onlinecourses.nptel.ac.in/noc18_cs31/preview

ICA:

ICA shall be based on the programming assignments.

- **List of Assignments:**
1. Fundamentals of algorithm & flowchart, structure of a C program
2. Formatted input/ output functions and different operators in C
3. Control structures - Decision control statement (if, if-else , nested if-else, else if ladder), Loop Statement (for, while, do-while, nested loop) and Switch-case statement
4. Arrays (one-dimensional & two-dimensional) and string operations
5. Structures and unions
6. Pointers and dynamic memory allocation
7. Functions (call-by-value & call-by-reference) , recursion
8. File operations

POE(#) :The Course 'Programming for Problem Solving' shall have a 'Practical andOral Examination' at the end of the semester assessing student's programming

Walchand Institute of Technology, Solapur

Autonomous

F. Y. B. Tech. Part II

Technical English

(All Branches)

Teaching Scheme:	Examination Scheme:
Lecture: 1 hrs/week, 1credit	ESE: 30 Marks
Practical: 2 hr/week,1 credit	ISE: 20 Marks
	ICA: 25 Marks

Course Objectives:
1. To nurture student's effective presentations skills.
2. To equip students with skills for participating effectively in group discussion.
3. To equip students with skills for performing effectively in personal interviews.
4. To develop and enhance resume writing and report writing skills of the students.
5. To inculcate soft skills in students for personal and professional success.

Course Outcomes:
At the end of this course, student will able to
1. Prepare a good quality presentation and deliver it effectively
2. Participate effectively in group discussion.
3. Perform effectively in personal interviews.
4. Prepare an effective resume for job interviews and write various reports professionally.
5. Demonstrate various soft skills like team skills, leadership, creativity, etc. in different situations.

Section-I

Unit 1: Presentation Skills   **[03 Hrs]**

Presentation-effective preparing & delivering, what makes a good presentation, Do's and Don'ts of effective presentation, Preparing and delivering presentations, Presenting PPT and Content delivery,

Soft Skills and Employability Skills: Self talk self esteem and Positive attitude

Unit 2: Goal Setting and Group Discussion   **[03 Hrs]**

Group Discussion- introduction, traits evaluated, types, tips for successful participation, individual Traits, Mock group discussion on a topic

Soft Skills and Employability Skills: Goal Setting: goal, SMART Goals, action plan, time management, strategies for effective time management and problem solving and decision making

Unit 3: Technical Interview skills   **[03 Hrs]**

Interview, types of interviews, preparatory steps for employment interviews, skill tips, frequently asked questions, Effective Interview Techniques

Soft Skills and Employability Skills: Etiquettes, leadership and SWOC Analysis

<div align="center">**Section-II**</div>

Unit 4: Technical Writing Skills [03 Hrs]

Resume Writing, types, format, writing resume for campus placement and employability, Précis writing, types, Technical report writing- types, structures, data collection, content, Format, Write a report on event / industrial visit / project

Soft Skills and Employability Skills: Technical formalities, teamwork

Unit 5: Employability Skills [03 Hrs]

Professional skills: Team building, Motivation and Positive thinking, Leadership and team working, Stress management, Emotional intelligence, Creativity

Text Books:

1. Soft Skills: An Integrated Approach to Maximize Personality, Gajendra Singh Chauhan & Sangeeta Sharma, Willy Indian Pvt. Ltd.
2. Professional Communication Skills. S. Chand. Paperback Publication: 1 December 2006.
3. Communication Skills for Professionals. Nira Konar. PHI Learning: 3rd Edition 30 May 2022.
4. On Writing Well. William Zinsser. Harper Resource Book Publication: 2001.
5. Technical English. Dr. M. Hemamalini, Willy Indian Pvt. Ltd.
6. Professional Speaking Skills. Aruna Koneru. Paperback, January 2018.
7. Group Discussion and Interview Skills Book. Priyadarshi Patnaik. Cambridge University Press India; Second edition,1 September 2015.

References Books:

1. Soft Skills. K. Alex., S. Chand Publications
2. Soft Skills – A Text book for Undergraduates. Ajay R Tengse, Orient Black Swan
3. Communication Skills Sanjay Kumar Pushpa Lata Oxford University Press
4. Managing Soft Skills for Personality Development, B N Ghosh- McGraw Hill Publication
5. Soft Skills for Everyone Jeff Butterfield, Cengage Learning
6. Soft Skills for Managers. Dr. T. Kalyana Chakravarthi & Dr. T. Latha Chakravarthi Biztantra Publication.

Internal Continuous Assessment (ICA)-

ICA shall be based on performance of the student during the laboratory sessions in language Lab covering minimum12 exercises out of the following exercises.

List of Exercises:

1. Prepare PowerPoint presentation and a present it effectively.
2. Oral presentation on self-short term and long-term goals.
3. Writing Self-short term and long-term goals.

4. Participation in a group discussion and writing views on a topic for group discussion.

5. Writing responses to frequently asked questions in mock interviews.

6. Resume writing for campus placement.

7. Exercise on Précis Writing.

8. Industrial visit and the technical report writing.

9. Identify and analyze Self SWOC analysis.

10. Exercise on motivational success stories, positive thinking,

12. Role plays on leadership and team working.

13. Exercise on Emotional Intelligence and stress management.

14. Exercise on motivational stories, positive Thinking, creativity and entrepreneurship.

Note – Students shall be encouraged to use ICT tools for compilation, analysis, report writing and presentation.

Walchand Institute of Technology, Solapur
Autonomous
F. Y. B. Tech. Part II
Democracy, elections and goodgovernance
(All Branches)

- **Course Objectives:**
1. To make the pupil aware of the importance of democracy.
2. To make the individual understand the different aspects of democracy and its implicationsin the overall development of the state.

- **Course Outcomes:**
   By the end of this course student will be able to
   1. Explain dimensions of Democracy and Challenges before Democracy
   2. Explain duties of an individual towards electoral process
   3. Express Concept and Good Governance initiatives in India

Unit 1: Democracy in India   [05 Hrs]
Dimensions of Democracy: Social, Economic and Political, Decentralization: Grassroots LevelDemocracy, Challenges before Democracy; women and marginalized sections of the society

Unit 2: Election to Local Self Government Bodies   [05 Hrs]
73rd and 74th constitutional amendment Acts: Institutions at the local level and Role of State Election Commission, Local Body Elections, Duties of an Individual towards electoral process, Awareness of Voters

Unit 3: Good Governance   [05 Hrs]
Meaning and concept, Government and Governance, Good Governance initiatives in India

- **Text / Reference Books:**
   1. Alam Javeed,2004,Who Wants Democracy? Delhi, Orient Longman
   2. Banerjee Mukulika,2014,Why India votes?, Delhi, Routledge
   3. Godbole Madhav, 2014,Good Governance: Never on India's Radar, New Delhi,Rupa and Co.
   4. Guha Ramchandra, 2017, India After Gandhi: The History of the World's LargestDemocracy, New Delhi, Pan Macmillan , India
   5. Jaffrelot Christophe and Narendar Kumar(ed.),2018,Dr.Ambedkar and Democracy:An Anthology, New Delhi, Oxford University Press.
   6. Jayal Niraja, Amit Prakash, Pradeep Sharma,2006, Local Governance in India:Decentralization and Beyond, New Delhi, Oxford University Press.

7. Kohli Atul(ed.)2001,The Success of India's Democracy, Cambridge, CambridgeUniversity Press

8. Palshikar Suhas,2017, Indian Democracy, Oxford India Short Introductions, New Delhi, Oxford University Press.

9. Sawant P.B.,2013,A Grammer of Democracy, Mumbai, Bhashya Prakashan

10. Suri K.C.(ed.)2013,Indian Democracy, ICSSR Research Survey and ExplorationsVolume II, New Delhi, Oxford University Press

11. Vora Rajendra and Suhas Plashikar(ed.),2001, Indian Democracy: Meaning andPractices, New Delhi, Sage Publications.

12. गोडबोले सुजाता (अनुवादित),२०१५,हरवलेले सुशासन ,पुणे विश्वकर्मा पब्लिकेशन्स

13. लेले चित्रा (अनुवादित),२०१०, भारतीय लोकशाही : अर्थ आणि व्यवहार , पुणे , डायमंड पब्लिकेशन्स

14. साठे शारदा (अनुवादित),२०१७, गांधीनंतरचा भारत : जगातील सर्वात मोठ्या लोकशाहीचा इतिहास , ठाणे ,मॅजेस्टिक पब्लिशिंग हाऊस .

15. सोनावणे मनोहर (अनुवादित),२०१०, लोकशाही जिंदाबाद ,पुणे ,समकालीन प्रकाशन