	Communication Skills		Semester	2
	Course Code	**BVU201**	CIE Marks	100
	Teaching Hours/Week (L: T:P:S)	1:0:0:2	SEE Marks	0
	Total Hours of Pedagogy	25 (each module 5 hours)	Total Marks	100
	Credits	02	Exam Hours	03 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Develop effective verbal and nonverbal communication skills: This includes both oral and written communication, as well as understanding body language and other nonverbal cues.

CLO2: Develop proficiency in using grammatical structures and vocabulary for everyday communication.

CLO3: Improve interpersonal communication: This involves building relationships, resolving conflicts, and collaborating effectively with others.

CLO4: Understand intercultural communication: This includes appreciating cultural differences, adapting communication styles, and promoting cross-cultural understanding

Module-1

INTRODUCTION:

- What is communication?
- Why communication?
- How do we communicate?
- Communication Theory and Process
- Barriers to communication
- Building blocks of communication

Module-2

Verbal Communication

- **Different types of verbal communication**
- **Listening Skills:** Types of Listening (theory /definition), Tips for Effective Listening Academic Listening-(lecturing), Listening to Talks and Presentations, Basics of Telephone communication

Module-3

Non-Verbal Communication:

- Body Language
- Art of Professional writing

Module-4

	Reading Skills, Grammar & Vocabulary ● Reading skills ● Vocabulary
	Module-5
	Communication Tools ● One-to-One: Email ● One-to-Many: PPT, Web Tools ● Other: MS Office

Course outcome (Course Skill Set)

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

CO 1: Effective verbal communication: Students will be able to express ideas clearly, concisely, and persuasively in both formal and informal settings.

CO 2: Improved listening skills: Students will be able to actively listen, understand, and respond appropriately to others' messages.

CO 3: Enhanced nonverbal communication: Students will be able to interpret and use nonverbal cues effectively to enhance communication.

CO 4: Developed interpersonal skills: Students will be able to build and maintain positive relationships through effective communication.

CO 5: Increased confidence: Students will gain confidence in their communication abilities.

CO 6: Public speaking: Students will be able to prepare and deliver effective presentations to different audiences.

CO 7: Written communication: Students will be able to write clearly, accurately, and persuasively for various purposes.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks(18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation: 100 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks
4. The test after completion of 100% syllabus is conducted for 100 marks.
   Two questions are to be set for each module, there are 10 questions with 20 marks each. Each question may or may not have a sub-question. The students have to answer for 100 marks(05 full questions).
5. The sum of the two assignments is scaled down to 50.
6. The marks scored in the test shall be scaled down to 50.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks

(Teacher may conduct the quiz or presentation or other suitable method of assignment in place of two or one assignment mentioned)

Semester-End Examination:

SEE is Not Applicable

Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/109104030

Suggested Learning Resources:

Books

1. Mckay, M., Davis, M. & Fanning, P.(2008). Messages: The Communication Skills Book, New Harbinger Publications.
2. Perkins, P.S., & Brown, L. (2008). The Art and Science of Communication: Tools for effective communication in the
3. workplace, John Wiley and Sons

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

Verbal Communication

- Role-playing: Simulate real-life scenarios like job interviews, customer service interactions, or conflict resolution.
- Group Discussions: Encourage participants to share their perspectives on various topics, promoting critical thinking and effective expression.
- Public Speaking: Provide opportunities for individuals to deliver short speeches or presentations, building confidence and clarity.
- Impromptu Speaking: Challenge participants to speak on a given topic without prior preparation, improving spontaneity and adaptability.
- Storytelling: Have participants share personal stories or create fictional narratives, developing storytelling abilities and engaging the audience.

Non-Verbal Communication

- **Body Language Analysis:** Observe and discuss non-verbal cues in videos or real-life situations to understand their impact.
- **Charades:** Act out words or phrases without speaking, enhancing nonverbal communication and teamwork.
- **Mirror Activity:** Partners imitate each other's body language and facial expressions, fostering empathy and understanding.
- **Silent Conversations:** Communicate messages using only gestures and facial expressions, emphasizing the importance of nonverbal cues.

Listening Skills

- **Active Listening Exercises:** Practice active listening techniques like summarizing, reflecting, and clarifying.
- **Information Gap Activities:** Divide participants into groups with different pieces of information and require them to collaborate to complete a task.
- **Telephone Game:** Pass on a message through a chain of people to assess how information can be distorted or lost.
- **Speed Dating:** Practice brief conversations with multiple partners, focusing on active listening and asking relevant questions.

	Environmental Studies and Sustainability		Semester	2
	Course Code	**BVU202**	CIE Marks	50
	Teaching Hours/Week (L: T:P:S)	1:0:0:2	SEE Marks	50
	Total Hours of Pedagogy	25 (each module 5 hours)	Total Marks	100
	Credits	02	Exam Hours	01 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Understand the interdisciplinary nature of environmental issues: Recognize the complex interplay of natural, social, economic, and political factors in environmental challenges.
CLO2: Develop critical thinking and problem-solving skills: Analyse environmental problems, evaluate potential solutions, and propose sustainable approaches.
CLO3: Acquire knowledge of ecological principles: Understand fundamental ecological concepts and their application to environmental issues.
CLO4: Explore the social and ethical dimensions of environmental issues: Examine the social, cultural, and ethical implications of environmental problems and policies.
CLO5: Develop an understanding of environmental policy and governance: Analyse environmental laws, regulations, and policies, and assess their effectiveness.
CLO6: Appreciate the importance of sustainability: Understand the concept of sustainable development and its implications for individuals, societies, and the planet.
CLO7: Master core concepts in ecology, chemistry, geology, and biology.

Module-1

Introduction:

- Definition, scope and importance. Need for Public Awareness.
- The multidisciplinary nature of environmental studies

Module-2

Biodiversity and its Conservation:

- Introduction - Definition, Levels of biodiversity - genetic, species, ecosystem diversity.
- Biogeographical classification of India. (In Brief)
- Significance and Values of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option value.
- India as a Mega - Biodiversity nation
- Hot - spots of Biodiversity.

Module-3

Ecosystem:

- Concept of an ecosystem.
- Structure and functions of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in an ecosystem.
- Food chains, food web and ecological pyramids and their types.
- Introduction, types, characteristic features, structure and functions of the following ecosystem
- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystem (Ponds)

Module-4

Natural Resources:

- Renewable and non-renewable natural resources. Natural resources and associated problems
- Forest Resources: use and over-exploitation, deforestation. Timber extraction,
- mining, resort construction, ecotourism, dams and their effects on forest and tribal people.
- Water Resources: use and over-exploitation of surface and groundwater, dams - benefits and problems.
- Mineral Resources: use and exploitation, environmental effects of extracting and using minerals.
- Food Resources: World food problems, changes caused by agriculture and overgrazing. Effects of modern agriculture, chemical fertiliser - pesticide problems, waterlogging, salinity, genetically modified plants and their impact.
- Energy Resources: Renewable and non-renewable energy resources, use of alternate energy sources,
- Land Resources: Land as a resource, land degradation, (man-induced landslides), soil erosion and desertification.
- A brief account ofnature and its management – Floods, earthquakes, cyclones and landslides.
- Impact of destroying and depleting natural resources.
- Role of an individual in the conservation of natural resources.

Module-5

Environmental Pollution:

- Definition, Pollutants and their types. Causes, effects and control measures of the following pollution: Air Pollution. - (Case study – Bhopal gas tragedy)
- Soil Pollution
- Water Pollution – (Case study Ganga River, Bellandur Lake)
- Marine Pollution - (Coral reefs overexploitation)
- Noise Pollution
- Thermal Pollution
- Nuclear hazards
- act of disposable goods and modern lifestyle on the environment.

Course outcome (Course Skill Set)

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

CO 1: Develop a strong foundation in environmental science, ecology, and natural resource management.
CO 2: Understand the complex interconnections between human societies and the environment.
CO 3: Gain knowledge of environmental policies, laws, and regulations.
CO 4: Comprehend the economic, social, and political dimensions of environmental issues.
CO 5: Analyse environmental problems from multiple perspectives.
CO 6: Collaborate with others to address environmental problems.
CO 7: Understand the principles of sustainable development.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for the Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks(18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation: 50 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks(May be quiz or other method of assignments)
4. The test after completion of 90 % syllabus is conducted for 100 marks.
5. The sum of the two assignments is scaled down to 25.
6. The marks scored in the test shall be scaled down to 25.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks

(The class teacher may conduct the quiz/presentations/other suitable methods of assignment in place of two or one test)

Semester-End Examination: 50 Marks

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Marks scored will be scaled down to 50 marks

Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/105102089

Suggested Learning Resources:

Books

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Public Ltd Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt ltd, Ahmedabad – 380013, India,
3. Brunner R.C. 1989, Hazardous Waste Incineration, McGraw Hill Inc 480 p
4. Clark R.S. Marine Pollution, Clanderson Press Oxford (TB)

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning

- Nature Scavenger Hunt: Students explore their local environment to identify plants, animals, and other natural elements.
- Energy Audits: Analyse energy consumption in the school or home.
- Waste Reduction Campaigns: Organize recycling or composting initiatives.
- Climate Change Simulations: Model the effects of climate change on ecosystems.

	Engineering Mechanics		Semester	2
	Course Code	**BVU203**	CIE Marks	50
	Teaching Hours/Week (L: T:P:S)	2:0:0:2	SEE Marks	50
	Total Hours of Pedagogy	40 (each module 08 hours)	Total Marks	100
	Credits	03	Exam Hours	03 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Understand the concepts of force, moment, and couple.
Foundational Concepts: Introduces mechanics, fundamental units and dimensions, and vector operations essential for analyzing forces and motion.
CLO2: Covers force systems, equilibrium conditions for rigid bodies, moments, couples, and their application to structural analysis.
CLO3: Explores kinematics (motion) and kinetics (forces causing motion), including Newton's laws, work, energy, and applications like projectile motion and collisions.
CLO4: Focuses on determining the center of gravity and centroid of objects, and understanding the principles of friction and its applications.
CLO5: Introduces the concept of machines, mechanical advantage, velocity ratio, efficiency, and explores the workings of common lifting machines.

Module-1

- **Introduction-Concept of mechanics and applied mechanics –** Explanation of mechanics and applied Mechanics, its importance and necessity, giving suitable examples of bodies at rest and in motion, explanation of branches of this subject.Fundamental concepts: mass, force, time, space.

- **Units and Dimensions:** Systems of units (SI, British). Dimensional analysis and homogeneity. Conversion of units.

- **Scalars and Vectors:** Scalar quantities vs. vector quantities. Vector representation, addition, subtraction, multiplication. Resolution and composition of vectors

Module-2

- **Statics (Forces in Equilibrium)**

a) Force Systems: Concept of force, types of forces (concurrent, coplanar, parallel, etc.). Principle of transmissibility. Free body diagrams.
b) Equilibrium of Rigid Bodies: Conditions for equilibrium in two and three dimensions. Equations of equilibrium.
c) Moments and Couples: Moment of a force about a point. Varignon's theorem. Couples and their properties.
d) Applications: Analysis of simple structures (beams, trusses), equilibrium of bodies in contact (friction).

	Module-3
	• **Dynamics (Motion and Forces)** a) Kinematics: Displacement, velocity, acceleration. Uniform and non-uniform motion. Motion under gravity. Projectile motion. b) Kinetics: Newton's laws of motion. Inertia, mass, weight. Equations of motion. Impulse and momentum. Work, energy, power. c) Applications: Analysis of linear and rotational motion, collisions, simple harmonic motion.
	Module-4
	• **Centre of Gravity and Centroid-** Concept of gravity, gravitational force, Centroid and centre of gravity. The centroidis for regular lamina, and the centre of gravity is for regular solids. Position of centre of gravity of compound bodies and centroid of composite area. CG of bodies and areas with portions removed. • **Friction:** Laws of friction, static and dynamic friction. Coefficient of friction. Applications to inclined planes and other systems.
	Module-5
	• **Simple Lifting Machines-** Concept of the machine, mechanical advantage, velocity ratio and efficiency of a machine, their relationship, law of machine, simple machines (lever, wheel and axle, pulleys, jacks winch crabs only).

Course outcome (Course Skill Set)

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

CO 1: Apply fundamental principles: Students will be able to apply fundamental concepts of mechanics, including units, dimensions, scalars, and vectors, to analyze and solve problems related to bodies at rest and in motion.

CO 2: Analyze static equilibrium: Students will be able to analyze force systems and determine the equilibrium conditions for rigid bodies in two and three dimensions, including the calculation of moments, couples, and reactions in simple structures.

CO 3: Solve dynamic problems: Students will be able to solve problems involving kinematics and kinetics, applying Newton's laws of motion to analyze linear and rotational motion, collisions, and other dynamic systems.

CO 4: Determine geometric properties and analyze friction: Students will be able to determine the centroid and center of gravity of composite bodies and areas, and analyze the effects of friction in various systems, including inclined planes.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for the Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks(18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation: 50 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks(May be quiz or other method of assignments)
4. The test after completion of 90 % syllabus is conducted for 100 marks.
5. The sum of the two assignments is scaled down to 25.
6. The marks scored in the test shall be scaled down to 25.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks

(The class teacher may conduct the quiz/presentations/other suitable methods of assignment in place of two or one test)

Semester-End Examination: 50 Marks

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Marks scored will be scaled down to 50 marks

Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/112106286

Suggested Learning Resources:
Books

1. A.K.Tayal, “Engineering Mechanics: Statics and Dynamics”, Umesh publications
2. R.K. Rajput, “Applied Mechanics”, Lakshmi Publications
3. A. K. Upadhyay, “Applied Mechanics, Kataria Publications

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning

- Students can visualize and comprehend complex principles through physical demonstrations.
- Kinetics: Building simple pendulum systems to study the relationship between period, length, and acceleration due to gravity.
- Impulse and Momentum: Conducting experiments with collisions between objects to verify conservation of momentum.

	Constitution of India		Semester	2
	Course Code	**BVU204**	CIE Marks	50
	Teaching Hours/Week (L: T:P:S)	1:0:0:0	SEE Marks	50
	Total Hours of Pedagogy	12 hours (2.5 hours per module)	Total Marks	100
	Credits	01	Exam Hours	01 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: know the fundamental political codes, structure, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens

CLO2: Understand engineering ethics and their responsibilities; identify their individual roles and ethical responsibilities towards society.

CLO3: Know about the cybercrimes and cyber laws for cyber safety measures.

Module-1

Introduction to Indian Constitution: The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian Constitution, The Making of the Constitution, The Role of the Constituent Assembly - Preamble and
Salient features of the Constitution of India. Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building.

Module-2

Union Executive and State Executive: Parliamentary System, Federal System, Centre-State Relations. Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies.
Supreme Court of India, Judicial Reviews and Judicial Activism. State Executives – Governor, Chief Minister, State Cabinet, State Legislature, High Court and Subordinate Courts, Special Provisions (Articles 370.371,371J) for some States.

Module-3

Elections, Amendments and Emergency Provisions: Elections, Electoral Process, and Election Commission of India, Election Laws. Amendments - Methods in Constitutional Amendments (How and Why) and Important Constitutional Amendments. Amendments – 7,9,10,12,42,44, 61, 73,74, ,75, 86, and 91,94,95,100,101,118 and some important Case Studies. Emergency Provisions, types of Emergencies and their consequences. Constitutional special provisions: Special Provisions for SC and ST, OBC, Women, Children and Backward Classes.

Module-4

Professional / Engineering Ethics: Scope & Aims of Engineering & Professional Ethics - Business Ethics, Corporate Ethics, Personal Ethics.
Engineering and Professionalism, Positive and Negative Faces of Engineering Ethics, Code of

	Ethics as defined in the website of Institution of Engineers (India): Profession, Professionalism, and Professional Responsibility. Clash of Ethics, Conflicts of Interest. Responsibilities in Engineering Responsibilities in Engineering and Engineering Standards, the impediments to Responsibility. Trust and Reliability in Engineering, IPRs (Intellectual Property Rights), Risks, Safety and Liability in Engineering
	Module-5
	Internet Laws, Cyber Crimes and Cyber Laws: Internet and Need for Cyber Laws, Modes of Regulation of the Internet, Types of cyber terror capability, Net neutrality, Types of Cyber Crimes, India and cyber law, Cyber Crimes and the Information Technology Act 2000, Internet Censorship. Cybercrimes and enforcement agencies.

Course outcome (Course Skill Set)

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

CO 1: Have constitutional knowledge and legal literacy.
CO 2: Understand Engineering and Professional ethics and responsibilities of Engineers.
CO 3: Understand the cybercrimes and cyber laws for cyber safety measures.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for the Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE, the minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation: 50 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks(May be quiz or other method of assignments)
4. The test after completion of 90 % syllabus is conducted for 100 marks.
5. The sum of the two assignments is scaled down to 25.
6. The marks scored in the test shall be scaled down to 25.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks

(The class teacher may conduct the quiz/presentations/other suitable methods of assignment in place of two or one test)

Semester-End Examination: 50 Marks

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Marks scored will be scaled down to 50 marks

Web links and Video Lectures (e-Resources):

Suggested Learning Resources:

Books

1. Constitution of India, Professional Ethics and Human Rights, Shubham Singles, Charles E. Haries, et al

Activity-Based Learning (Suggested Activities in Class)/Practical-Based learning

- Contents-related activities (Activity-based discussions)
- For active participation of students instruct the students to prepare Flowcharts.
- Organising group-wise discussions on topics.
- Quizzes and Discussions, Seminars and assignments.

	Manufacturing Technology - Basic		Semester	2
	Course Code	**BVU205**	CIE Marks	50
	Teaching Hours/Week (L: T:P:S)	2:0:2:2	SEE Marks	50
	Total Hours of Pedagogy	50 (Each module 10 hours)	Total Marks	100
	Credits	04	Exam Hours	03 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Understand the scope of Manufacturing Technology and its role in engineering.
CLO2: Classify different shop activities based on the nature of work.
CLO3: Learn about fundamental woodworking operations and common carpentry tools.
CLO4: Understand sheet metal working operations and the tools involved.
CLO5: Learn about sheet metal joints and their construction.
CLO6: Differentiate between permanent and temporary joining methods.
CLO7: Learn about welding, soldering, brazing, and riveting processes.
CLO8: Gain familiarity with various mechanical engineering workshop tools.

Module-1

(A) General Introduction:
(a) Scope of subject "Manufacturing Technology" in engineering
(b)different shop activities and broad division of the shops on the basis of nature of work done
such as
(i) Wooden Fabrication-carpentry
(ii) Metal Fabrication (shaping and Forming,Smithy, sheet metal and Joining-welding, Riveting, Fitting and Plumbing).

(B) Carpentry: (a) Fundamental of wood working operations (b) Common Carpentry Tools-Their classification, size, specification (name of the parts and use only): (i) Marking and measuring tools (ii) Holding and supporting tools: (iii) Cutting and Sawing Tools: (iv) Drilling and Boring Tools (v) Striking Tools-Mallet and Claw hammer (vi) Turning Tools & Equipment (vii) Miscellaneous Tools

(Learning with practical)

Module-2

(A) Joining of Timber Components for Fabrications Works: Assembly of joints (Preparationsteps and tools used only) Mortise, Tenon, Rivet, Groove, Tongue, Dowel, operations inassembly-simple lap and butt, Mortise, Tenon, Dovetail, Miter&briddle joints.

(B) Metal Fabrication:(B) Metal Shaping-Smithy: (i) Operations involved (concept only) (ii) Tool and equipmentused (Names, size, specification for identification only) (iii) Heating and fuel handlingequipment (iv) Holding and supporting tools (v) Striking Tools (vi) Cutting tools (vii)Punching & Drifting Tools (viii) Bending Tools and figures (ix) Forming & Finishing Tools (x)Defects Occurring & its remedy

(Learning with practical)

Module-3

Sheet metal working-Tools and operation: (1) Operations involved (Names and conceptonly) (2) Sheet metal joints (3) Tools and equipment used (Name, size, specifications foridentification only) (4) Marking tools (5) Cutting and shearing Tools (6) Straightening tool(7) Striking Tools (8) Holding Tools (9) Supporting Tools (10) Bending tools (11) Punching-Piercing and Drafting tools (12) Burring Tools-Files (13) Defects Occurring & its remedy

(Learning with practical)

Module-4

(A) Metal Joining During Fabrication-

(a) Permanent Joining: (i) Welding methods (ii) Electric welding(b) Soldering & Brazing: (i) Its concept, comparison with welding as joining method andclassification (ii) Soldering operation (iii) Materials Used (iv) Defects Occurring & itsremedy

(B) Riveting:

(i) Its comparison with welding as joining method. (ii) Rivets and Materials. (iii) Operationinvolved (iv) Tools and equipment used (Names, Size, specification and uses)), Elementaryknowledge about working of pneumatic, hydraulic and electric riveter. Temporary Joining(Fasteners & their uses), General Idea about temporary fasteners & their uses

(C) Familiarity with the Use of Various Tools Used in Mechanical Engineering Workshop(a)Marking & Measuring Tools (b) Holding Tools (c) Cutting Tools (d) Files (e) ThreadCutting Tools (h) Miscellaneous ToolsThey should be shown physically to each student for familiarity.

(Learning with practical)

Module-5

(**A) Protection of Fabricated Structures From Weather:**

(a) Painting: Its need, Introduction to methods of painting (classification only) operations involved description steps only, surface preparation materials, tools and equipment used (name, size specification for identification), Brushes-round and flat wire brush, scraper, trowel, spray gun, compressor, Defects likely to occur in painting and their remedies.

(b) Varnishing & Polishing: Its need, operation involved (description of steps only), surface preparation method of old and new articles, application of polishing materials, materials used for preparation of french and sprit polish, copal varnish, Defects likely to occur.

Safety of Personnel, Equipment & Tools to be observed.

(B) Foundry Work:
Elementary idea of patterns, green sand moulds and moulding, tools and equipment used in green sand moulding.

(Learning withpractical)

Course outcome (Course Skill Set)

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

CO 1: Understand the scope and importance of Manufacturing Technology in engineering.
CO 2: Classify different shop activities based on the nature of work.
CO 3: Acquire basic knowledge of woodworking operations and tools.
CO 4: Master the art of joining timber components using various joints.
CO 5: Learn sheet metal working operations, tools, and joints.
CO 6: Understand different welding, soldering, and brazing methods.
CO 7: Acquire knowledge about riveting and its applications.
CO 8: Proficiency in using hand tools for woodworking and metalworking.
CO 9: Ability to create basic wooden and metal structures.
CO 10: Understanding of different joining techniques.
CO 11: Knowledge of safety measures in the workshop.
CO 12: Basic understanding of foundry processes.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks(18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation: 50 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks(May be quiz or other method of assignments)
4. The test after completion of 90 % syllabus is conducted for 100 marks.
5. The sum of the two assignments is scaled down to 25.
6. The marks scored in the test shall be scaled down to 25.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks **(The class teacher may conduct the quiz/presentations/other suitable methods of assignment in place of two or one test)**

Semester-End Examination: 50 Marks

Question paper pattern:

• The question paper will have ten full questions carrying equal marks.
• Each full question will be for 20 marks.
• There will be two full questions (with a maximum of four sub-questions) from each module.
• Each full question will have sub- question covering all the topics under a module.
• The students will have to answer five full questions, selecting one full question from each module.
Marks scored will be scaled down to 50 marks

Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/112105127

Suggested Learning Resources:
Books

1. Workshop Technology, Vol. I: Hazra & Chaudhry
2. Workshop Technology, Vol. I: BS Raghuwanshi

Activity-Based Learning (Suggested Activities in Class)/Practical-Based learning

- Contents-related activities (Activity-based discussions)
- For active participation of students instruct the students to prepare Flowcharts.
- Organising group-wise discussions on topics.
- Quizzes and Discussions, Seminars and assignments.

	MECHANICAL MEASUREMENTS AND METROLOGY		Semester	2
	Course Code	**BVU206**	CIE Marks	50
	Teaching Hours/Week (L: T:P:S)	1:0:2:2	SEE Marks	50
	Total Hours of Pedagogy	40(Each Module 08 hours)	Total Marks	100
	Credits	03	Exam Hours	03 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Fundamentals of Measurement: Understand basic measurement concepts, units, accuracy, precision, errors, uncertainty, and instrument calibration.

CLO2: Linear, Angular Measurement & Instrumentation: Learn principles and classifications of measuring instruments, including practical applications.

CLO3: Limits, Fits, Tolerances, Gauging & Comparators: Master concepts of limits, fits, tolerances, interchangeability, selective assembly, gauging, and the use of comparators.

CLO4: Screw Thread, Gear & Surface Finish Measurement: Understand screw thread and gear terminology, measurement techniques, and surface finish assessment.

CLO5: Geometrical Error Inspection & Instrument Maintenance: Learn to inspect geometrical errors using auto collimators and maintain measuring instruments.

Module-1

Fundamentals of Measurement:

- Basic concepts of measurement, units, standards, and measurement systems.
- Accuracy, precision, errors, and uncertainty in measurement.
- Calibration of measuring instruments.

Liner measurement and angular measurements:

Principles and classifications of measuring instruments:

(Learning with practical)

Module-2

System of Limits, Fits, Tolerance and Gauging: Definitions, Tolerance, Tolerance analysis (addition & subtraction of tolerances) Inter changeability & Selective assembly. Class &grade of tolerance, Fits, Types of fits, Numerical on limits, fit and tolerance. Hole base system & shaft base system. Taylor's principle, Types of limit gauges, Numerical on limit gauge design.

Comparators: General principles of constructions, balancing and graduation of measuring instruments, characteristics comparators, use of comparators, difference between comparators, limit gauges and measuring instruments. Classification of comparators, construction and working of dial indicator, mechanical comparator, mechanical-optical, zeissoptotest, electro limit, electromechanical electronics, pneumatic comparators, gauges, tool makers microscope.

(Learning with practical)

	Module-3
	Measurement of screw thread and gear: Terminology of screw threads, Measurement of major diameter, Minor diameter, Pitch, Angle and Effective diameter of screw threads by 2-wire and 3-wire methods, Best size wire. Screw thread gauges, Toolmaker's microscope. **Gear Measurement:** • Gear terminology and measurement of gear tooth elements. • Gear measuring instruments and techniques. (Learning with practical)
	Module-4
	Surface Finish Measurement: • Surface roughness, waviness, and lay. • Surface finish measuring instruments and techniques. (Learning with practical)
	Module-5
	Inspection of geometrical errors Construction and working of auto collimeter, checking of straightness, flatness, squareness and parallelism, circularity. **Maintenance of measuring instruments**: Defects likely to occur in measuring instruments and their remedies. General maintenance of measuring instruments.

Course outcome (Course Skill Set)

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

CO 1: Understand and apply fundamental measurement concepts, including units, standards, measurement systems, accuracy, precision, errors, uncertainty, and instrument calibration.

CO 2: Perform and analyze linear and angular measurements using appropriate instruments, and apply principles of limits, fits, tolerances, and gauging in practical applications.

CO 3: Measure and evaluate screw threads and gears using specialized instruments and techniques, including calculations and analysis of relevant parameters.

CO 4: Assess and interpret surface finish characteristics using appropriate instruments and techniques.

CO 5: Inspect and analyze geometrical errors using instruments like auto-collimators, and understand the maintenance procedures for measuring instruments.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks(18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation: 50 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks(May be quiz or other method of assignments)
4. The test after completion of 90 % syllabus is conducted for 100 marks.
5. The sum of the two assignments is scaled down to 25.
6. The marks scored in the test shall be scaled down to 25.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks **(The class teacher may conduct the quiz/presentations/other suitable methods of assignment in place of two or one test)**

Semester-End Examination: 50 Marks

Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Marks scored will be scaled down to 50 marks

Web links and Video Lectures (e-Resources):

Suggested Learning Resources:

Books

1. Mechanical Measurements, Beckwith Marangoni and Lienhard
2. Engineering Metrology, R.K. Jain

Activity-Based Learning (Suggested Activities in Class)/Practical-Based learning

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