

II Year B.Tech. ME – II Semester

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(23A52402d) INDUSTRIAL MANAGEMENT

Course Objectives: The objectives of the course are to

- Introduce the scope and role of industrial engineering and the techniques for optimal design of layouts
- Illustrate how work study is used to improve productivity
- Explain TQM and quality control techniques
- Introduce financial management aspects and
- Discuss human resource management and value analysis.

Course Outcomes:

COs	Statements	BloomsLevel
CO1	Learn about how to design the optimal layout	L1
CO2	Demonstrate work study methods	L3
CO3	Explain Quality Control techniques	L2
CO4	Discuss the financial management aspects	L3
CO5	Understand the human resource management methods.	L2

UNIT– I

INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, quantitative tools of IE and productivity measurement. Concepts of management, importance, functions of management, scientific management, Taylor's principles, Fayol's principles of management. **PLANT LAYOUT:** Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts.

UNIT-II

WORK STUDY: Importance, types of production, applications, work study, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factors system, principles of Ergonomics, flow process charts, string diagrams and Therbligs.

UNIT-III

STATISTICAL QUALITY CONTROL: Quality control, Queuing assurance and its importance, SQC, attribute sampling inspection with single and double sampling, Control charts

– \bar{X} and R –charts \bar{X} and Scharts and their applications, simple numerical examples.

TOTALQUALITYMANAGEMENT: Elements of TQM – Continuous Improvement – zero defect concept, quality circles, implementation, applications, ISO quality systems. Six Sigma – definition, basic concepts.

UNIT– IV

FINANCIAL MANAGEMENT: Scope and nature of financial management, Sources of finance, Management of working capital, estimation of working capital requirements, budget and budgetary control, Capital budgeting – Nature of Investment Decisions – Investment Evaluation criteria-NPV, IRR, PI, Payback Period, and ARR, numerical problems.

UNIT–V

HUMAN RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, and types.

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

Text Books:

1. O.P.Khanna, Industrial Engineering and Management, Dhanpat Rai Publications (P)Ltd.
2. Mart and Telsang, Industrial Engineering and Production Management, S.Chand & Company Ltd. New Delhi

Reference Books:

1. Bhattacharya DK, Industrial Management, S.Chand, publishers.
2. J.G Monks, Operations Management, 3/e, McGraw Hill Publishers.
3. T.R.Banga, S.C.Sharma, N.K.Agarwal, Industrial Engineering and Management Science, Khanna Publishers.
4. Koontz O'Donnell, Principles of Management, McGraw Hill Publishers.
5. R.C.Gupta, Statistical Quality Control, Khanna Publishers.
6. NVS Raju, Industrial Engineering and Management, Cengage India Private Limited.

Online Learning Sources

- https://onlinecourses.nptel.ac.in/noc21_me15/preview
- https://onlinecourses.nptel.ac.in/noc20_mg43/preview
- <https://www.edx.org/learn/industrial-engineering>
- <https://youtube.com/playlist?list=PL299B5CC87110A6E7&si=TghLCbEobuxjEaXi>
- https://youtube.com/playlist?list=PLbjTnj-t5Gkl0z3OHOGK5RB9mvNYvnImW&si=oaX_5RG69hS3v2ll

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(23A54403) COMPLEX VARIABLES, PROBABILITY AND STATISTICS**Course Outcomes:**

COs	Statements	Blooms level
CO1	Analyze limit, continuity and differentiation of functions of complex variables and Understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions.	L2, L3
CO2	Understand Cauchy theorem, Cauchy integral formulas and apply these to evaluate complex contour integrals. Classify singularities and poles; find residues and evaluate complex integrals using the residue theorem.	L3, L5
CO3	Apply Probability theory to find the chances of happening of events.	L3
CO4	Understand various probability distributions and calculate their statistical constants.	L2, L3
CO5	Analyze to test various hypotheses included in theory and types of errors for large samples.	L3, L5

UNIT I : Complex Variable – Differentiation

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.

UNIT II Complex Variable – Integration

Line integral-Contour integration, Cauchy's integral theorem(Simple Case), Cauchy Integral formula, Power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

UNIT III: Probability theory

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation

UNIT IV Random variables & Distributions

Probability distribution - Binomial, Poisson approximation to the binomial distribution, Normal distribution and their properties

UNITV Estimation and Testing of hypothesis, large sample tests

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

Textbooks:

3. B.S.Grewal, Higher Engineering Mathematics, Khanna Publishers,2017, 44th Edition
4. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.

Reference Books:

6. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021 5th Edition(9th reprint).
7. B.V.Ramana, Higher Engineering Mathematics, Mc Graw Hill publishers
8. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc20_ma50/preview
2. <https://archive.nptel.ac.in/courses/111/106/111106111/>

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(23A03401T) MANUFACTURING PROCESSES**Course Objective: The objectives of the course are to**

- Know the working principle of different metal casting processes and gating system.
- Classify the welding processes, working of different types of welding processes and welding defects.
- Know the nature of plastic deformation, cold and hot working process, working of a rolling mill and types, extrusion processes.
- Understand the principles of forging, tools and dies, working of forging processes.
- Know about the Additive manufacturing.

Course Outcomes:

COs	Statements	Blooms Level
CO1	Design the patterns and core boxes for metal casting processes	L6
CO2	Understand the different welding processes	L2
CO3	Demonstrate the different types of bulk forming processes	L3
CO4	Understand sheet metal forming processes	L2
CO5	Learn about the different types of additive manufacturing processes	L2

UNIT– I

Casting: Steps involved in making a casting – Advantage of casting and its applications. Patterns and Pattern making – Types of patterns – Materials used for patterns, pattern allowances and their construction, Molding, different types of cores , Principles of Gating, Risers, casting design considerations. Methods of melting and types of furnaces, Solidification of castings and casting defects- causes and remedies. Basic principles and applications of special casting processes - Centrifugal casting, Die casting, Investment casting and shell molding.

UNIT-II

Welding: Classification of welding processes, types of welded joints and their characteristics, Gas welding, Different types of flames and uses, Oxy – Acetylene Gas cutting. Basic principles of Arc welding, power characteristics, Manual metal arc welding, submerged arc welding, TIG&MIG welding. Electro-slag welding.

Resistance welding, Friction welding, Friction stir welding, Forge welding, Explosive welding; Thermit welding, Plasma Arc welding, Laser welding, electron beam welding, Soldering &Brazing.

Heat affected zones in welding; pre & post heating, welding defects –causes and remedies.

UNIT–III

Bulk Forming: Plastic deformation in metals and alloys-recovery, recrystallization and grain growth.

Hot working and Cold working-Strain hardening and Annealing. Bulk forming processes: Forging-Types of Forging, forging defects and remedies; Rolling – fundamentals, types of rolling mills and products, Forces in rolling and power requirements. Extrusion and its characteristics. Types of extrusion, Impact extrusion, Hydrostatic extrusion; Wire drawing and Tube drawing.

UNIT– IV

Sheet metal forming- Blanking and piercing, Forces and power requirement in these operations, Deep drawing, Stretch forming, Bending, Spring back and its remedies, Coining, Spinning, Types of presses and press tools.

High energy rate forming processes: Principles of explosive forming, electromagnetic forming, Electro hydraulic forming, rubber pad forming, advantages and limitations.

UNIT -V

Additive manufacturing - Steps in Additive Manufacturing (AM), Classification of AM processes, Advantages of AM, and types of materials for AM, VAT photo polymerization AM Processes, Extrusion - Based AM Processes, Powder Bed Fusion AM Processes, Direct Energy Deposition AM Processes, Post Processing of AM Parts, Applications

Textbooks:

1. Kalpakjain S and Steven R Schmid, Manufacturing Processes for Engineering Materials, 5/e, Pearson Publications, 2007.
2. P.N. Rao, Manufacturing Technology -Vol I, 5/e, McGraw Hill Education, 2018.

Reference Books:

1. A.Ghosh&A.K.Malik, Manufacturing Science, East West Press Pvt. Ltd, 2010.
2. Lindberg and Roy, Processes and materials of manufacture, 4/e, Prentice Hall India Learning Private Limited, 1990.
3. R.K. Jain, Production Technology, Khanna Publishers, 2022.
4. Sharma P.C., A Text book of Production Technology, 8/e, S Chand Publishing, 2014.
5. H.S. Shaan, Manufacturing Processes, 1/e, Pearson Publishers, 2012.
6. WAJ Chapman , Workshop Technology, 5/e, CBS Publishers&DistributorsPvt.Ltd, 2001.
7. Hindustan Machine Tools, Production Technology, Tata McGraw Hill Publishers, 2017.
8. Ian Gibson, David W Rosen, Brent Stucker., Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 2/e, Springer, 2015.

Online Learning Resources:

- <https://www.edx.org/learn/manufacturing/massachusetts-institute-of-technology-fundamentals-of-manufacturing-processes>
- https://onlinecourses.nptel.ac.in/noc21_me81/preview
- www.coursera.org/learn/introduction-to-additive-manufacturing-processes
- <https://archive.nptel.ac.in/courses/112/103/112103263/>
- <https://elearn.nptel.ac.in/shop/nptel/principles-of-metal-forming-technology/?v=c86ee0d9d7ed>

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(23A03402T) FLUIDMECHANICS & HYDRAULIC MACHINES

Course Objectives: The students completing this course are expected to

- Understand the properties of fluids, manometry, hydrostatic forces acting on different surfaces
- Understand the kinematic and dynamic behavior through various laws of fluids like continuity, Euler's, Bernoulli's equations, energy and momentum equations.
- Understand the theory of boundary layer, working and performance characteristics of various hydraulic machines like pumps and turbines.

Course Outcomes:

COs	Statements	Blooms Level
CO1	Understand the basic concepts of fluid properties.	L2
CO2	Estimate the mechanics of fluids in static and dynamic conditions.	L5
CO3	Apply the Boundary layer theory, flow separation and dimensional analysis.	L3
CO4	Estimate the hydrodynamic forces of jet on vanes in different positions.	L5
CO5	Understand the working Principles and performance evaluation of hydraulic pump and turbines.	L2

UNITI

Fluid statics: Dimensions and units: physical properties of fluids - specific gravity, viscosity and its significance, surface tension, capillarity, vapor pressure. Atmospheric, gauge and vacuum pressure, Measurement of pressure – Manometers - Piezometer, U-tube, inverted and differential manometers. Pascal's & hydrostatic laws.

Buoyancy and floatation: Meta center, stability of floating body. Submerged bodies. Calculation of meta center height. Stability analysis and applications.

UNITII

Fluid kinematics: Introduction, flow types. Equation of continuity for one dimensional flow, circulation and vorticity, Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Condition for irrotational flow, flow net, source and sink, doublet and vortex flow.

Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a streamline, momentum equation and its applications, force on pipe bend.

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel-total energy line-hydraulic gradient line.

UNITIII

Boundary Layer Theory: Introduction, momentum integral equation, displacement,

momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.

Dimensional Analysis: Dimensions and Units, Dimensional Homogeneity, Non dimensionalization of equations, Method of repeating variables and Buckingham Pi Theorem.

UNITIV

Basics of turbo machinery: hydro dynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow Over radial vanes.

Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube-theory-functions and efficiency.

UNITV

Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer. Hydraulic systems- hydraulic ram, hydraulic lift, hydraulic coupling. Fluidics – amplifiers, sensors and oscillators. Advantages, limitations and applications.

Centrifugal pumps: classification, working, work done – manometric head- losses and efficiencies-specific speed- pumps in series and parallel-performance characteristic curves, cavitation & NPSH. **Reciprocating pumps:** Working, Discharge, slip, indicator diagrams.

Textbooks:

1. Y.A.Cengel, J.M.Cimbala, Fluid Mechanics, Fundamentals and Applications,6/e,McGraw Hill Publications, 2019.
2. Dixon,Fluid Mechanics and Thermodynamics of Turbomachinery,7/e, Elsevier Publishers, 2014.

Reference Books:

1. P N Modi and S M Seth, Hydraulics & Fluid Mechanics including Hydraulics Machines, Standard Book House, 2017.
2. RKBansal, Fluid Mechanics and Hydraulic Machines, 10/e,Laxmi Publications(P)Ltd, 2019.
3. Rajput, Fluid Mechanics and Hydraulic Machines, S Chand & Company, 2016.
4. D.S.Kumar, Fluid Mechanics and Fluid Power Engineering, S K Kataria & Sons, 2013.
5. D.Rama Durgaiah, Fluid Mechanics and Machinery,1/e, New Age International, 2002.

Online Learning Resources:

- <https://archive.nptel.ac.in/courses/112/105/112105206/>
- <https://archive.nptel.ac.in/courses/112/104/112104118/>
- <https://www.edx.org/learn/fluid-mechanics>
- https://onlinecourses.nptel.ac.in/noc20_ce30/previewnptel.ac.in
- www.coursera.org/learn/fluid-powerera

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(23A03403) THEORY OF MACHINES

Course Objectives: The objectives of the course are to make the students learn about

- Introduce various basic mechanisms and their applications.
- Explain importance of degree of freedom.
- Familiarize velocity and acceleration in mechanisms.
- Describe the cams and follower motions.
- Explain the importance of gyroscopic couples.
- Introduce the equation of motion for single degree of freedom system.

Course Outcomes:

COs	Statements	Blooms Level
CO1	Understand different mechanisms and their inversions.	L2
CO2	Calculate velocity and acceleration of different links in a mechanism	L4
CO3	Apply the effects of gyroscopic couple in ships, aero planes and road vehicles.	L3
CO4	Evaluate unbalance mass in rotating machines.	L5
CO5	Analyze free and forced vibrations of single degree freedom systems.	L4

UNIT – I: Simple Mechanisms

Simple Mechanisms: Classification of mechanisms – Basic kinematic concepts and definitions – Degree of freedom, mobility – Grashof’s law, kinematic inversions of four bar chain and slider crank chains- Limit positions – Mechanical advantage- Transmission angle- Description of some common mechanisms- Quick return mechanism, straight line mechanisms – UniversalJoint – Rocker mechanisms.

UNIT – II: Plane and motion analysis

Plane and motion analysis: Displacement, velocity and acceleration analysis of simple mechanisms, graphical velocity analysis using instantaneous centers, velocity and acceleration analysis using loop closure equations – kinematic analysis of simple mechanisms – slidercrank mechanism dynamics – Coincident points – Coriolis component of acceleration.

UNIT – III: Gyroscope & Gear Profile

Gyroscope: Principle of gyroscope, gyroscopic effect in an aeroplane, ship, car and two wheeler, simple problems

Gear Profile: Involute and cycloidal gear profiles, gear parameters, fundamental law of gearing and conjugate action, spur gear contact ratio and interference/undercutting – helical, bevel, worm, rack & pinion gears, epicyclic and regular gear train kinematics.

UNIT – IV: Balancing of Rotating masses & Cams

Balancing of Rotating masses: Need for balancing, balancing of single mass and several masses in different planes, using analytical and graphical methods.

Cams: Classification of cams and followers- Terminology and definitions – Displacement diagrams –Uniform velocity, parabolic, simple harmonic and cycloidal motions – derivatives of follower motions- specified contour cams- circular and tangent cams –pressure angle and undercutting.

UNIT – V: Vibrations & Turning Moment Diagrams and Flywheels

Vibrations: Introduction, degree of freedom, types of vibrations, free natural vibrations, Newton method and energy method for single degree of freedom. Damped vibrations- under damped, critically damped; and over damped systems, forced vibrations with and without damping in single degree of freedom; Vibration isolation and transmissibility.

Turning Moment Diagrams and Flywheels: Turning moment diagrams for steam engine, I.C engine and Multi Cylinder Engine. Crank effort – coefficient of fluctuation of energy, coefficient of fluctuation of speed – Fly Wheel and their design, fly wheels for punching press.

Textbooks:

1. S.S.Rattan, Theory of Machines, 4/e, Tata Mc-Graw Hill, 2014.
2. P.L.Ballaney, Theory of Machines & Mechanisms, 25/e, Khanna Publishers, Delhi, 2003.

Reference Books:

1. F. Haidery, Dynamics of Machines, 5/e, NiraliPrakashan, Pune, 2003.
2. J.E.Shigley, Theory of Machines and Mechanisms, 4/e, Oxford, 2014.
3. G.K.Groover, Mechanical Vibrations, 8/e, Nemchand Bros, 2009.
4. Norton, R.L., Design of Machinery – An Introduction to Synthesis and Analysis of Mechanisms and Machines, 2/e, McGraw Hill, New York, 2000.
5. William T. Thomson, Theory of vibration with applications, 4/e, Englewood Cliffs, N.J.: Prentice Hall, 1993.

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(23A03402P) FLUID MECHANICS & HYDRAULIC MACHINERY LAB

Course Objective: To impart practical exposure on the performance valuation methods of various flow measuring equipment and hydraulic turbine sand pumps.

Course Outcomes:

COs	Statements	Blooms Level
CO1	Demonstrate the devices used for measuring flow.	L3
CO2	Compute major losses in pipes.	L5
CO3	Illustrate the operating parameters of turbines.	L2
CO4	Explain the working of different types of pumps.	L2
CO5	Explain the devices used for measuring flow.	L2

List of Experiments

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipeline.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

Virtual Lab:

1. To study different patterns of a flow through a pipe and correlate them with the Reynolds number of the flow. (<https://me.iitp.ac.in/Virtual-Fluid-Laboratory/reynolds/introduction.html>)
2. To calculate Total Energy at different points of venture meter. (<https://me.iitp.ac.in/Virtual-Fluid-Laboratory/bernoulli/introduction.html>).
3. To calculate the flow (or point) velocity at center of the given tube using different flow rates. (<https://me.iitp.ac.in/Virtual-Fluid-Laboratory/pitot/introduction.html>)
4. To determine the hydrostatic force on a plane surface under partial submerge and full submerge condition. (<https://me.iitp.ac.in/Virtual-Fluid-Laboratory/cop/introduction.html>).
5. To determine the discharge coefficient of a triangular notch.

- (<https://me.iitp.ac.in/Virtual-Fluid-Laboratory/notch/introduction.html>)
6. To determine the coefficient of impact of jet on vanes. (<https://fm-nitk.vlabs.ac.in/exp/impact-of-jet>).
 7. To determine friction in pipes. (<https://fm-nitk.vlabs.ac.in/exp/friction-in-pipes/index.html>).

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(23A03401P) MANUFACTURING PROCESSES LAB

Course Objective: Acquire practical knowledge on Metal Casting, Welding, Press Working and Processing of Plastics.

Course Outcomes:

COs	Statements	Blooms Level
CO1	Make moulds for sand casting.	L2
CO2	Fabricate different types of components using various manufacturing techniques.	L5
CO3	Adapt unconventional manufacturing methods.	L3
CO4	Develop Different Weld joints.	L6
CO5	Explain different types of 3d Printing techniques.	L2

List of Experiments

1. Design and making of pattern
 - i. Single piece pattern
 - ii. Split pattern
2. Sand properties testing
 - i. Sieveanalysis (drys and)
 - ii. Claycontenttest
 - iii. Moisturecontent test
 - iv. Strengthtest (Compression test & Shear test)
 - v. Permeability test
3. Mould preparation
 - i. Straight pipe
 - ii. Bent pipe
 - iii. Dumble
 - iv. Gearblank
4. Gas cutting and welding
5. Manual metalarc welding
 - i. Lapjoint
 - ii. Buttjoint
6. Injection Molding
7. Blow Molding
8. Simple models using sheet metal operations
9. Study of deep drawing and extrusion operations
10. To make weldments using TIG/MIG welding

11. To weld using Spot welding machine
12. To join using Brazing and Soldering
13. To make simple parts on a 3D printing machine
14. Demonstration of metal casting.

Virtual Lab:

1. To study and observe various stages of casting through demonstration of casting process. (<https://virtual-labs.github.io/exp-sand-casting-process-dei/theory.html>)
2. To weld and cut metals using an oxyacetylene welding setup. (<https://virtual-labs.github.io/exp-gas-cutting-processes-iitkgp/index.html>).
3. To simulate Fused deposition modelling process (FDM) (<https://3dpdei.vlabs.ac.in/exp/simulation-modelling-process>)
4. <https://altair.com/inspire-mold/>
5. <https://virtual-labs.github.io/exp-simulation-cartesian-system-dei/theory.html>

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(23A52403) SOFT SKILLS**Course Objectives:**

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To enhance healthy relationship and understanding within and outside an organization
- To function effectively with heterogeneous teams

Course Outcomes

- List out various elements of soft skills (L1, L2)
- Describe methods for building professional image (L1, L2)
- Apply critical thinking skills in problem solving (L3)
- Analyse the needs of an individual and team for well-being (L4)
- Assess the situation and take necessary decisions (L5)
- Create a productive workplace atmosphere using social and work-life skills ensuring personal and emotional well-being (L6)

UNIT I Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills -Significance, process, types - Barriers of communication - Improving techniques.

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

UNIT II Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT III Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

UNIT IV Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.

Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT V Corporate Etiquette

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette - Corporate grooming tips -Overcoming challenges

Activities

Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

NOTE:-

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Prescribed Books:

1. Mitra Barun K, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018

Reference Books

1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
2. Alex K, Soft Skills S.Chand& Co, 2012 (Revised edition)
3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013
4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018
5. Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher : Vayu Education of India, 2014

Online Learning Resources:

1. https://youtu.be/DUIsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KIJ
3. <https://youtu.be/-Y-R9hD17IU>
4. <https://youtu.be/gkLsn4ddmTs>
5. <https://youtu.be/2bf9K2rRWwo>
6. <https://youtu.be/FchfE3c2jzc>
7. <https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-training-games/>
8. https://onlinecourses.nptel.ac.in/noc24_hs15/preview
9. https://onlinecourses.nptel.ac.in/noc21_hs76/preview

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(23A99401) DESIGN THINKING & INNOVATION**Course Objectives:**

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

Course Outcomes:

- Define the concepts related to design thinking. (L1, L2)
- Explain the fundamentals of Design Thinking and innovation (L1, L2)
- Apply the design thinking techniques for solving problems in various sectors. (L3)
- Analyse to work in a multidisciplinary environment (L4)
- Evaluate the value of creativity (L5)
- Formulate specific problem statements of real time issues (L3, L6)

UNIT I Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT II Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT III Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT V Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shruti N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough.H, The Era of Open Innovation – 2013

Online Learning Resources:

<https://nptel.ac.in/courses/110/106/110106124/>

<https://nptel.ac.in/courses/109/104/109104109/>

https://swayam.gov.in/nd1_noc19_mg60/preview

COMMUNITY SERVICE PROJECT

.....Experiential learning through community engagement

Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

- Every student should put in 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc
- A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty in charge.

- An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.
- Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
 - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
 - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
 - Agriculture
 - Health
 - Marketing and Cooperation
 - Animal Husbandry
 - Horticulture
 - Fisheries
 - Sericulture
 - Revenue and Survey
 - Natural Disaster Management
 - Irrigation
 - Law & Order
 - Excise and Prohibition
 - Mines and Geology
 - Energy
 - Internet
 - Free Electricity
 - Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

- Positive impact on students' academic learning
- Improves students' ability to apply what they have learned in "the real world"

- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment.
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community work.
- Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species

33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling lvel- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Program on Socially relevant themes.

Programs for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programs on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programs for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programs

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –
 - i. Agriculture
 - ii. Health
 - iii. Marketing and Cooperation
 - iv. Animal Husbandry
 - v. Horticulture
 - vi. Fisheries
 - vii. Sericulture
 - viii. Revenue and Survey
 - ix. Natural Disaster Management
 - x. Irrigation
 - xi. Law & Order
 - xii. Excise and Prohibition
 - xiii. Mines and Geology
 - xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.
- An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban).
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.