Vision of the Institution

To ignite the minds of the students through academic excellence so as to bring about social transformation and prosperity.

Mission of the Institution

- To expand the frontiers of knowledge through Quality Education.
- To provide valued added Research and Development.
- To embody a spirit of excellence in Teaching, Creativity, Scholarship and Outreach.
- To provide a platform for synergy of Academy, Industry and Community.
- To inculcate high standards of Ethical and Professional Behavior.

Vision of Mechanical Engineering Department

To foster prosperity through technological development by means of education, innovation and collaborative research.

Mission of Mechanical Engineering Department

- To produce effective and responsible graduate and post-graduate engineers for global requirements by imparting quality education.
- To improve the Department's infrastructure to facilitate research productivity and success.
- To integrate teaching and research for preservation and effective application of knowledge and skills.
- To strengthen and expand collaboration and partnerships with industry and other organizations.
- To provide consultancy to the neighborhood and inculcate a spirit of entrepreneurship.
- To serve society through innovation and excellence in teaching and research.

Program Educational Objectives(PEOs)

PEO1: Graduates apply a deep working knowledge of technical fundamentals in areas such as Design, Thermal, Production, Industrial and related fields to address needs of the customer and society.

PEO2: Graduates pursue advanced education, Research and Development in Engineering, Technology and other professional careers.

PEO3: Perform themselves in a responsible, professional and ethical manner.

PEO4: Graduates participate as leaders in their fields of specialization and in activities that contribute to service and overall economic development of society.

Program Outcomes(POs) of Mechanical Engineering Department

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSO's):

PSO1: Able to apply the knowledge learned as a part of the curriculum to provide solutions for problems related to Mechanical Engineering.

PS**O**2: Think innovatively, design and develop products with modern CAD/CAM tools and with optimized manufacturing processes.

S.No	Subject	L	P	C
1	Modeling and Simulation of Manufacturing Systems	3	--	3
2	ProductDesign	3	--	3
3	**ProgrammeElective III** Finite Element Methods Concurrent Engineering Design and Manufacturing of MEMS and Microsystems	3	--	3
4	**ProgrammeElective IV** Production and Operations Management Materials Technology Computational Fluid Dynamics	3	--	3
5	Manufacturing Simulation and Precision Engg. Lab	--	4	2
6	Product Design Lab	--	4	2
7	Pedagogy Studies	2	--	0
8	Mini Project	--	4	2
	Total	14	12	**18**

II Semester

	MODELLING AND SIMULATION OF MANUFACTURING SYSTEMS	L	P	C
		3	0	3

UNIT - I:

System – ways to analyze the system – Model - types of models – Simulation – Definition – Types of simulation models – steps involved in simulation – Advantages & Disadvantages.

Parameter estimation – estimator – properties – estimate – point estimate – confidence interval. Estimates – independent – dependent – hypothesis – types of hypothesis- steps – types 1& 2 errors.

UNIT - II:

Building of Simulation model – validation – verification – credibility – their timing – principles of valid simulation Modeling – Techniques for verification – statistical procedures for developing credible model.

Review of statistics and probability – Types of discrete and continuous probability distributions such as Geometric – Poisson – Uniform – Geometric distribution with examples – Normal – Exponential distribution with examples.

UNIT - III:

Random numbers – Need for RNs – Technique for Random number generation such as Mid product method, Mid square method, and Linear congruential method with examples – Test for Random numbers – Uniformity - Chi square test or Kolmogorov Smirnov test – Independency- Auto correlation test – Random Variate generation – Technique for Random variate generation such as Inverse transforms technique or Rejection method

UNIT - IV:

Simulation languages – comparison of simulation languages with general purpose languages – Simulation languages vs Simulators – software features – comparison of simulation languages.

Output data analysis – Types of Simulation with respect to output data analysis – warm up period Welch algorithm – Approaches for Steady State Analysis – replication – Batch means methods – comparisons

UNIT –V:

Applications of Simulation – flow shop system – job shop system – M/M/1 queues with infinite and finite capacities – Simple fixed period inventory system – New boy paper problem.

TEXT BOOKS:

1. Simulation Modeling and Analysis by Law, A.M. &Kelton, McGraw Hill, 2nd Edition, New York, 1991.
2. Discrete Event System Simulation by Banks J. & Carson J.S., PH, Englewood Cliffs, NJ, 1984.

REFERENCE BOOKS:

1. Simulation of Manufacturing Systems by Carrie A., Wiley, NY, 1990.
2. A Course in Simulation by Ross, S.M., McMillan, NY, 1990.
3. Simulation Modeling and SIMNET by Taha H.A., PH, Englewood Cliffs, NJ, 1987

II Semester

	PRODUCT DESIGN	L	P	C
		3	0	3

UNIT- I

Introduction -Need for IPPD – strategic importance of product development – integration of customer, designer, material supplier and process planner, Competitor and costumer – behavior analysis. Understanding customer – promoting customer understanding – involve customer in development and managing requirements – Organization – process management and improvement – Plan and establish product specification.

UNIT - II

CONCEPT GENERATION AND SELECTION: Task – Structured approaches – Clarification– Search – Externally and internally – explore systematically – reflect on the solutions and process – concept selection – methodology – benefits.

PRODUCT ARCHETECTURE: Implications – Product change – variety componentstandardization – product performance – manufacturability.

UNIT - III

PRODUCT DEVELOPMENT MANAGEMENT: Establishing the architecture – creation – clustering – geometric layout development – fundamental and incidental interactions – related system level design issues – secondary systems – architecture of the chunks – creating detailed interface specifications.

INDUSTRIAL DESIGN: Integrate process design – Managing costs – Robust design – Integrating CAE, CAD, CAM tools – simulating product performance and manufacturing processing electronically – Need for industrial design – impact – design process.

UNIT - IV

Investigation of customer needs – conceptualization – refinement – management of the industrial design process – technology driven products – user – driven products – assessing the quality of industrial design.

UNIT - V

DESIGN FOR MANUFACTURING AND PRODUCTY DEVELOPMENT: Definition –

Estimation of manufacturing cost – reducing the component costs and assembly costs – Minimize system complexity. Prototype basics – Principles of prototyping – planning for prototypes – Economics analysis – Understanding and representing tasks – baseline project planning – accelerating the projectexecution.

TEXT BOOKS:

1. Product Design and Development / Kari T. Ulrich and Steven D. Eppinger / McGraw Hill

International Edns.1999.

2. Concurrent Engg/integrated Product development / Kemnneth Crow / DRM Associates, 26/3, Via Olivera, Palos Verdes, CA 90274(310)377-569, Workshop Book.

REFERENCES:

1 Effective Product Design and Development / Stephen Rosenthal / Business One Orwin, Homewood, 1992, ISBN,1-55623-603-4.

2 Tool Design–Integrated Methods for Successful Product Engineering / Staurt Pugh / Addsion Wesley Publishing, Neyourk, NY, 1991, ISBN0-202-41369-5.

3. Production and OperationsManagement/Chase/TMH

II Semester

	FINITE ELEMENT METHODS (PROGRAMME ELECTIVE – III)	L	P	C
		3	0	3

UNIT - I

FORMULATION TECHNIQUES: Methodology, Engineering problems and governing differential equations, finite elements., Variational methods-potential energy method, Raleigh-Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT – II

ONE-DIMENSIONAL ELEMENTS: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT – III

TWO DIMENSIONAL PROBLEMS: CST, LST, four noded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary conditions.

Heat Transfer problems: Conduction and convection, examples: - two-dimensional fin.

UNIT – IV

ISOPARAMETRIC FORMULATION: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, Pascal's triangle, Patch test.

UNIT – V

FINITE ELEMENTS IN STRUCTURAL ANALYSIS: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

TEXT BOOK:

1. Finite element methods by Chandrubatla&Belagondu, PHI, 2011, 4th Edition

REFERENCES:

1. J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRC press, 1994
2. Zienckiwicz O.C. & R. L. Taylor, Finite Element Method, McGraw-Hill,1983.
3. K. J. Bathe, Finite element procedures, Prentice-Hall, 1996

II Semester

	CONCURRENT ENGINEERING (PROGRAMME ELECTIVE – III)	L	P	C
		3	0	3

UNIT I:

INTRODUCTION, Extensive definition of CE - CE design methodologies - Organizing for CE USE OF INFORMATION TECHNOLOGY IT SUPPORT - Solid modeling - Collaborative product development - Artificial Intelligence - Expert systems - Software hardware co-design.

UNIT II:

DESIGN STAGE Life-cycle design of products –Necessary technological development - Automated analysis idealization control - Concurrent engineering in optimal structural design - Real time constraints.

UNIT III:

MANUFACTURING CONCEPTS AND ANALYSIS Manufacturing competitiveness - Checking the design process - conceptual design mechanism – Qualitative, physical approach - An intelligent design for manufacturing system –

UNIT IV:

JIT system - low inventory - computer based assembly planning - Design of Automated manufacturing. PROJECT MANAGEMENT Life Cycle semi realization - design for economics - evaluation of design for manufacturing cost

UNIT V:

Concurrent mechanical design - decomposition in concurrent design - negotiation in concurrent engineering design studies - product realization taxonomy - plan for Project Management on new product development – bottleneck technology development.

TEXT BOOKS:

1. Integrated Product Development / Anderson MM and Hein, L. Berlin, Springer, 1987.
2. Concurrent Engineering: Automation Tools and Technology / Andrew Kusaik, John Wiley.

REFERENCES:

1. Design for Concurrent Engineering / Cleetus, J, Concurrent Engg. Research Centre, Morgantown, WV, 1992.
2. Concurrent Engineering Fundamentals: Integrated Product Development/ Prasad, Prentice Hall, 1996. 3. Successful Implementation of Concurrent Product and Process / Sammy G Sinha, Wiley, John and Sons Inc., 1998.

II Semester

	DESIGN AND MANUFACTURING OF MEMS AND MICRO SYSTEMS (PROGRAMME ELECTIVE – III)	L	P	C
		3	0	3

UNIT I:

OVERVIEW AND WORKING PRINCIPLES OF MEMS AND MICROSYSTEMS

MEMS & Microsystems, Evolution of Micro fabrication, Microsystems & Microelectronics, Microsystems & Miniaturization, Applications of MEMS in Industries, Micro sensors, Micro actuation, MEMS with Micro actuators Micro accelerometers, Micro fluidics.

UNIT II:

ENGINEERING SCIENCE FOR MICROSYSTEMS DESIGN AND FABRICATION:

Atomic structure of Matter, Ions and Ionization, Molecular Theory of Mater and Intermolecular Force, Doping of Semiconductors, The diffusion Process, Plasma Physics, Electrochemistry, Quantum Physics

UNIT III:

ENGINEERING MECHANICS FOR MICROSYSTEMS DESIGN:

Static Bending of thin Plates, Mechanical Vibration, Thermo mechanics Fracture Mechanics, Thin-Film Mechanics, Overview of Finite Element Stress Analysis

UNIT IV:

THERMO FLUID ENGINEERING & MICROSYSTEMS DESIGN:

Overview of Basics of Fluid Mechanics in Macro and Meso scales, Basic equations in Continuum Fluid dynamics, Laminar Fluid Flow in Circular Conduits, Computational Fluid Dynamics, Incompressible Fluid Flow in Micro conduits, Fluid Flow in Sub micrometer and Nano scale, Overview of Heat conduction in Solids, Heat Conduction in Multilayered Thin films and in solids in sub micrometer scale, Design Considerations, Process Design

MechanicalDesign, Mechanical Design using FEM, Design of a Silicon Die for a Micro pressure Sensor.

UNIT V:

MATERIALS FOR MEMS & MICROSYSTEMS AND THEIR FABRICATION:

Substrates and Wafers, Active substrate materials, Silicon as a substrate material, Silicon Compounds, Silicon Piezoresistors, Gallium Arsenide, Quartz, Piezoelectric Crystals and Polymers, Photolithography, Ion implantation, Diffusion and oxidation, chemical and physical vapor deposition, Etching, Bulk micro manufacturing, Surface Micromachining, The LIGA Process

TEXT BOOKS:

1. MEMs & Microsystems: Design & Manufacture/ Tai-Ran Hsu/Tata Mc-Graw Hill., ed./2002
2. An Introduction to Micro electro mechanical Systems Engineering/ Maluf, M./ Artech House, Boston, 2000

REFERENCES:

1. Micro robots and Micromechanical Systems/ Trimmer, W.S.N/ Sensors & Actuators, vol19, no.1989.
2. Applied Partial Differential Equations/ Trim, D.W/ PWS-Kent Publishing/ Boston 1990.
3. Fundamentals of Microfabrication.Madou, M/ CRC Press, Boca Raton, 1997.
4. The Finite Element Method in Thermomechanics/ Hsu, T.R / Alien &Unwin, London

II Semester

	PRODUCTION AND OPERATIONS MANAGEMENT (PROGRAMME ELECTIVE – IV)	L	P	C
		3	0	3

UNIT - I

OPERATION MANAGEMENT: Definition – Objectives – Types of production systems – historical development of operations management – Current issues in operation management. Product design – Requirements of good product design – product development – approaches – concepts in product development – standardization – simplification – Speed to market – Introduction to concurrent engineering.

UNIT – II

VALUE ENGINEERING: objective – types of values – function & cost – product life cycle-steps in value engineering – methodology in value engineers – FAST Diagram – Matrix Method. Location – Facility location and layout – Factors considerations in Plant location- Comparative Study of rural and urban sites – Methods of selection plant layout – objective of good layout – Principles – Types of layout – line balancing.

UNIT - III

AGGREGATE PLANNING: definition – Different Strategies – Various models of AggregatePlanning.Advance inventory control systems push systems – Material Requirement – Terminology – types of demands – inputs to MRP- techniques of MRP – Lot sizing methods – benefits and drawbacks of MRP –Manufacturing Resources Planning (MRP –II), Pull systems – Vs Push system – Just in time (JIT) philosophy Kanban System – Calculation of number of Kanbans Requirements for implementation JIT – JIT Production process – benefits of JIT.

UNIT - IV

PROJECT MANAGEMENT: Programming Evaluation Review Techniques (PERT) – threetimes estimation – critical path – probability of completion of project – critical path method – crashing of simple nature.

UNIT – V

SUPPLY CHAIN MANAGEMENT: Concepts, process of SCM, selection of channel strategy,core operations capabilities, SCM decisions, SCM models.

TEXT BOOKS:

1. Operations Management/ E.S. BuffA/ John Wiley & Sons / 2007
2. Production and Operations Management/ Chary/ McGraw Hill/2004

REFERENCES:

1 Operations Management Theory and Problems/ Joseph G. Monks / Macmillan / McGraw Hill / 3rd Edition.

2 Production and Operations Management - Theory and Practice by Dipak Kumar Battacharyya, Universities Press Pvt Ltd, 2012.

3 Production Systems Management/ James I. Riggs / John Wiley & Sons.

4 Operations Management/ Richard Chase/ McGraw Hill/2006

5 Production and Operation Management / PannerSelvam / PHI.

6 Production and Operation Analysis/ Nahima/ McGraw Hill/2004

II Semester

	MATERIALS TECHNOLOGY (PROGRAMME ELECTIVE – IV)	L	P	C
		3	0	3

UNIT I:

Elasticity in metals, mechanism of plastic deformation, slip and twinning, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, workhardening, solid solution, grain boundary strengthening. Poly phase mixture, precipitation,particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plasticbehavior, super plasticity, Yield criteria: Von-mises and Tresca criteria.

UNIT II:

Griffth's Theory, stress intensity factor and fracture Toughness, Toughening Mechanisms,Ductile and Brittle transition in steel, High Temperature Fracture, Creep, Larson – Millerparameter, Deformation and Fracture mechanism maps.

UNIT III:

Fatigue, fatigue limit, features of fatigue fracture,Low and High cycle fatigue test, CrackInitiation and Propagation mechanism and paris Law, Effect of surface and metallurgicalparameters on Fatigue, Fracture of non-metallic materials, fatigue analysis, Sources of failure,procedure of failure analysis. Motivation for selection, cost basis and service requirements,Selection for Mechanical Properties, Strength, Toughness, Fatigue and Creep.

UNIT IV:

MODERN METALLIC MATERIALS: Dual Steels, Micro alloyed, High Strength Low alloy(HSLA) Steel, Transformation induced plasticity (TRIP) Steel, Maraging Steel, Inter metallics,Ni and Ti Aluminides. Processing and applications of Smart Materials, Shape Memory alloys,Metallic Glass Quasi Crystal and Nano Crystalline Materials.

UNIT V:

NONMETALLIC MATERIALS: Polymeric materials and their molecular structures,Production Techniques for Fibers, Foams, Adhesives and Coatings, structure, Properties andApplications of Engineering Polymers, Advanced Structural Ceramics WC, TiC, TaC, A12O3,SiC, Si3N4, CBN and Diamond – properties, Processing and applications.

TEXT BOOKS:

1. Mechanical Behavior of Materials/Thomas H. Courtney/ McGraw Hill/2 nd Edition/2000
2. Mechanical Metallurgy/George E. Dicter/McGraw Hill, 1998.

REFERENCES:

1 Selection and use of Engineering Materials 3e/Charles J.A/Butterworth Heiremann.
2 Engineering Materials Technology/James A Jacob Thomas F Kilduff/Pearson
3 Material Science and Engineering/William D Callister/John Wiley and Sons
4 Plasticity and plastic deformation by Aritzur.
5 Introduction to Ceramics, 2nd Edition by W. David Kingery, H. K. Bowen, Donald R. Uhlmann

II Semester

	COMPUTATIONAL FLUID DYNAMICS (PROGRAMME ELECTIVE – IV)	L	P	C
		3	0	3

UNIT - I

INTRODUCTION: Finite difference method, finite volume method, finite element method, governing equations and boundary conditions, Derivation of finite difference equations.

Solution methods: Solution methods of elliptical equations — finite difference formulations, interactive solution methods, direct method with Gaussian elimination. Parabolic equations explicit schemes and Von Neumann stability analysis, implicit schemes, alternating direction implicit schemes, approximate factorization, fractional step methods, direct method with tri-diagonal matrix algorithm.

UNIT – II

HYPERBOLIC EQUATIONS: Explicit schemes and Von Neumann stability analysis, implicit schemes, multi step methods, nonlinear problems, second order one-dimensional wave equations. Burgers equations: Explicit and implicit schemes, Runge-Kutta method.

UNIT – III:

FORMULATIONS OF INCOMPRESSIBLE VISCOUS FLOWS: Formulations of incompressible viscous flows by finite difference methods, pressure correction methods, vortex methods.

Treatment of compressible flows: potential equation, Euler equations, Navier-stokes system ofequations, flow field-dependent variation methods, boundary conditions, example problems.

UNIT – IV

FINITE VOLUME METHOD: Finite volume method via finite difference method, formulations for two and three-dimensional problems.

UNIT – V:

STANDARD VARIATIONAL METHODS: Linear fluid flow problems, steady state problems, Transient problems.

TEXT BOOKS:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar/ Hemashava Publishers corporation&McGraw Hill.
2. Computational Fluid Dynamics: Basics with applications/John D. Anderson/ McGraw Hill.

REFERENCES:

1 Computational fluid dynamics/ T. J.C'hung/ Cambridge University press,2002.
2 Text book of fluid dynamics/ Frank Choriton/ CBS Publishers & distributors, 1985
3 Computational Fluid Flow and Heat Transfer/ Muralidaran/ Narosa Publications
4 Fundamentals of Computational Fluid Dynamics/Tapan K. Sengupta / Universities Press.
5 Introduction to Theoretical and Computational Fluid Dynamics/C. Pozrikidis /Oxford University Press/2nd Edition

II Semester

	MANUFACTURING SIMULATION & PRECISION ENGINEERING LAB	L	P	C
		0	4	2

A. MANUFACTURINGSIMULATION

The students will be given training on the use and application of the following software to manufacturing problems:

1. Auto MOD Software.
2. PROMOD
3. SLAM-II
4. CAFIMS
5. Flexsim

They also learn how to write sub routines in C-language and interlinking with the above packages.

Problems for modeling and simulation experiments:

1. AGV Planning
2. ASRS simulation and performanceevaluation
3. Machines, AGVs and AS/RS integratedproblems
4. JITsystem
5. Kanban flow
6. Material handlingsystems
7. M.R.P.Problems
8. Shop floor scheduling etc.

B. PRECISIONENGINEERING

1. Hydraulic and Pneumaticcircuits
2. Closed loop controlsystems
3. Study of the chip formation in turningprocess
4. Study of operation of tool and cutter grinder, twist drill grinder, Centrelessgrinder
5. Determination of cutting forces inturning
6. Experiments in unconventional manufacturing processes-AJM and study of USM, EDM, Laser Machining and Plasmaspraying
7. Inspection of parts using tool makers microscope, roughness and formtester
8. Study of micro-controllers, programming on various CNC machine tools and also controllers
9. Studies on PLCprogramming
10. Study and programming ofrobots

11. Condition monitoring in machining process using acoustic emission.

II Semester

	PRODUCT DESIGN LAB	L	P	C
		0	4	2

1. Estimate what fraction of price of a pocket calculator is required to cover the cost of developing the product. To do this you might start by estimating the information needed to fill out to exhibit 1-3 for pocket calculator?
2. Create a set of scatter charts by plotting each of the rows in Exhibit 1-3 against the development cost row. For each one, explain why there is or is not any correlation?
3. Diagram a process for planning and cooking a family dinner. Does your process resemble the generic product development process? Is cooking dinner is analogous into a market-pull, technology push, platform process-intensive, customization, high-risk, quick-build, or complex system process?
4. Sketch the organization (in some appropriate graphical representation) of a consulting firm that develops new products for clients on a project by project basis. Assume that the individuals in the firm represent all of the different functions required to develop a new product. Would this organization most likely to be aligned with functions, be aligned by projects, or be a hybrid?
5. Conduct a search using the Internet or published corporate annual reports to identify the corporate strategy of a company in which you might be interested in investing. Learn about the firm's product lines and its newest products. How do these products support the corporate strategy what types of products would you expect to see in the product plan?
6. Create a product technology road-map illustrating the availability of technologies for a class of products you understand well, such as personal computers?
7. How can the concept selection methods be used to benchmark or evaluate existing products? Perform such an evaluation for five automobiles you might consider purchasing.
8. Perform concept screening for the four pencil holder concepts shown below. Assume the pencil holders are for a member of a product development team who is continually moving from site to site.
9. Repeat exercise 3, but use concept scoring.
10. Prepare a PERT chart for the given task ?
    Task : Preparing Dinner with the following things

    i. Wash and cut the vegetables for the salad (15 minutes)
    ii. Toss the salad (2 minutes)
    iii. Set the table (8 minutes)
    iv. Start the rice cooking (2 minutes)
    v. Cook rice (25 minutes)

vi. Place the rice in a serving dish (1 minute)
vii. Mix casserole ingredients (10 minutes)
viii. Bake the casserole (25 minutes)

How fast can one person prepare this dinner? What if there were two people?

II Semester

	PEDAGOGY STUDIES	L	P	C
		2	0	0

UNIT-I:

Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education.Conceptual framework, Research questions**.**Overview of methodology and Searching.

UNIT-II:

Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT-III:

Evidence on the effectiveness of pedagogical practices Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?Theory of change.Strength and nature of the body of evidence for effective pedagogicalpractices.Pedagogic theory and pedagogical approaches.Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT-IV: Professional development: alignment with classroom practices and follow-up

Support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes

UNIT-V:

Research gaps and future directions- Research design**,** Contexts**,** Pedagogy**,** Teacher education**,** Curriculum and assessment**,** Dissemination and research impact.

Suggested reading

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools,Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal ofCurriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teachereducation research project (MUSTER) country report 1. London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learningof basic maths and reading in Africa: Does teacher preparation count? InternationalJournal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primaryeducation. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

II Semester

	MINI PROJECT	L	P	C
		0	4	2

Students can take up small problems in the field of design engineering as mini project. It can be related to solution to an engineering problem, verification and analysis of experimental data available, conducting experiments on various engineering subjects, material characterization, studying a software tool for the solution of an engineering problem etc.